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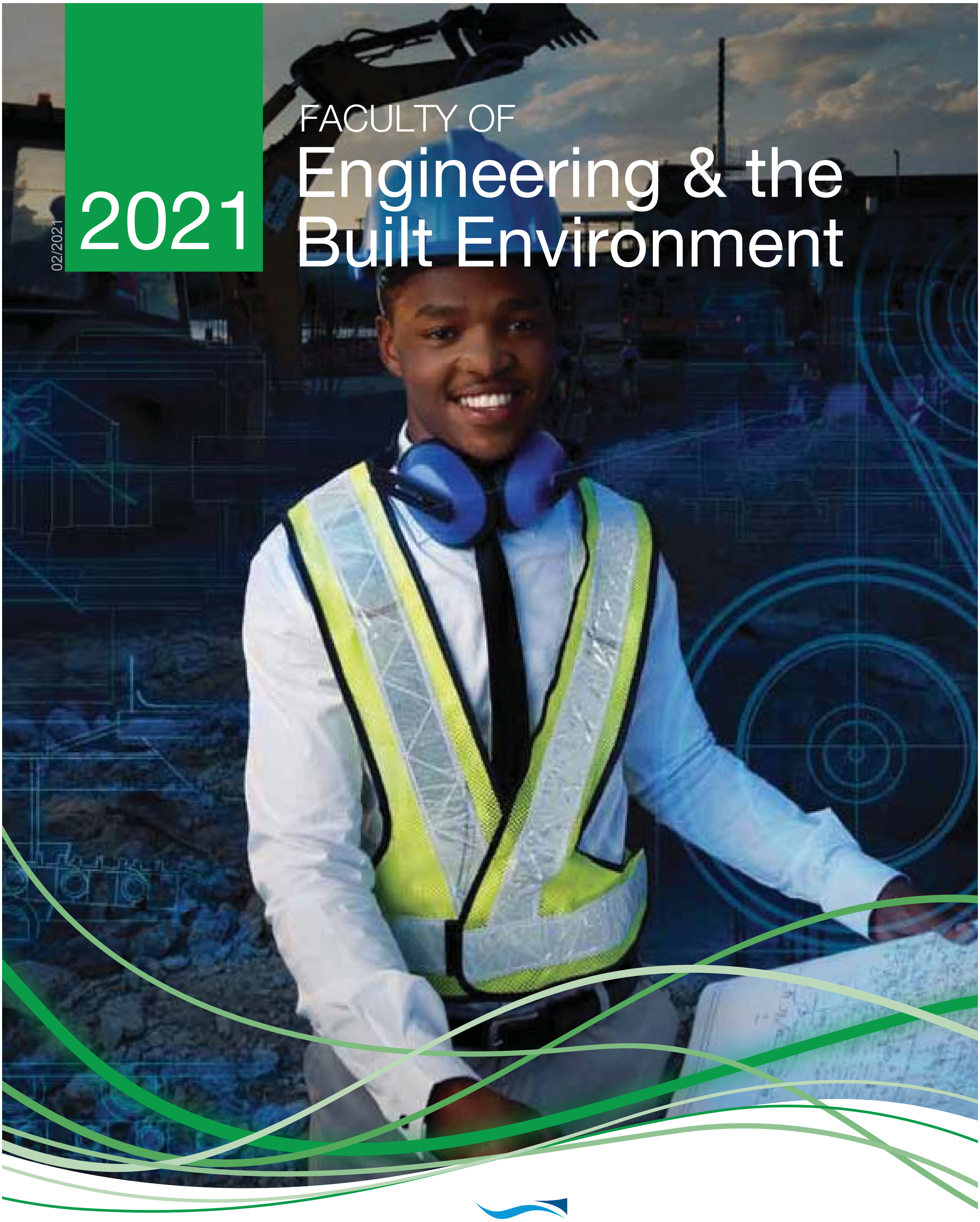
2021

FACULTY OF

Engineering & the Built Environment



creating futures

Cape Peninsula University of Technology

TABLE OF CONTENTS

Every effort has been made to ensure the accuracy of the information in this handbook, however the University reserves the right at any time, if circumstances require, to make changes to any of the published details.

Note: This Faculty Handbook applies to the 2021 cohort of registered students

CONTACT DETAILS

STAFF MEMBERS

POSITION	NAME	TELEPHONE	E-MAIL
Dean of the Faculty	Prof M Sheldon	021 959 6217	SheldonM@cput.ac.za
Secretary	Ms N Didiza	021 959 6612	DidizaN@cput.ac.za
Assistant Dean: Teaching and Learning	Prof S Ramsuroop	021 959 6629	RamsuroopS@cput.ac.za
Secretary	Ms S Yaphi	021 959 6642	DingileS@cput.ac.za
Assistant Dean: Research and Innovation	Prof V Fester	021 953 6897	FesterV@cput.ac.za
Secretary	Ms T Green	021 953 6666	GreenT@cput.ac.za
Faculty Manager	Mr N Cloete	021 959 6632	CloeteN@cput.ac.za
Secretariat	Ms N Hanning	021 959 5606	Hanningn@cput.ac.za

Academic Departments

* HoP indicates Head of Programme

CHEMICAL ENGINEERING			
Heads of Department (Acting)	Dr Mujahid Aziz and Dr Buntu Godongwana	021 460 4292 021 460 3170	AzizM@cput.ac.za GodongwanaB@cput.ac.za
HoP: Post Graduate	Dr M Aziz	021 460 4292	AzizM@cput.ac.za
HoP: Under Graduate	Dr B Godongwana	021 460 3170	GodongwanaB@cput.ac.za
Dept. ECP Co-ordinator	Dr D de Jager	021 959 6516	deJagerD@cput.ac.za

CIVIL ENGINEERING AND SURVEYING			
Head of Department	Ms A Kamalie	021 959 6619	KamalieA@cput.ac.za
Dept. ECP Co-ordinator	Mr N Armien	021 959 6678	ArmienM@cput.ac.za
HoP: National Diploma Civil	Mr M Habets	021 953 8755	HabetsM@cput.ac.za
HoP: Diploma Civil	Dr P Kumar	021 959 8762	KumarP@cput.ac.za
HoP: Advanced Diploma Civil	Mr C Mutsvangwa	021 959 8782	MutsvangwaC@cput.ac.za
HoP: Bachelors Civil	Dr Y Owusu-Asante	021 959 6680	Owusu-AsanteY@cput.ac.za
HoP: BTech Civil	Mr M Phillips	021 959 6673	PhillipsM@cput.ac.za
HoP: Geomatics (previously Surveying & GiSc)	Mr K Musungu	021 959 8769	MusunguK@cput.ac.za
HoP: Postgraduate	Mrs M Khahledi	021 959 6598	ThamaeMC@cput.ac.za

CLOTHING AND TEXTILE TECHNOLOGY			
Head of Department	Dr A Patnaik	021 959 5542	PatnaikA@cput.ac.za

CONTACT DETAILS

CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING			
Head of Department	Ms T Stringer	021 959 6629	StringerT@cput.ac.za
Dept. ECP Co-ordinator	Mr R Fisher	021 953 8736	FisherR@cput.ac.za

ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING			
Head of Department	Dr ML Adonis	021 959 6859	AdonisMA@cput.ac.za
HoP: Undergraduate	Dr ZT Nkosi	021 959 6859	NkoziZ@cput.ac.za
HoP: Postgraduate	Dr A Raji	021 959 6246	RajiA@cput.ac.za
Dept. ECP Co-ordinator	Ms N Tshemese-Mvandaba	021 959 4360	TshemeseN@cput.ac.za

INDUSTRIAL AND SYSTEMS ENGINEERING			
Head of Department	Prof B Yan	021 969 6225	YanB@cput.ac.za
HoP: Industrial Engineering	Mr B Morar	021 953 8474	MorarB@cput.ac.za
HoP: Quality	Ms L Valentine	021 959 6709	ValentineL@cput.ac.za

MARITIME STUDIES AND SURVIVAL CENTRE			
Head of Department	Ms T Williams	021 440 5755	WilliamsTH@cput.ac.za
Dept. ECP Co-ordinator	Ms E Rzyankina	021 440 5758	RzyankinaE@cput.ac.za

MECHANICAL ENGINEERING			
Head of Department	Mr S Nqabisa (Acting)	021 953 8642	NqabisaS@cput.ac.za
Dept. ECP Co-ordinator	Mr L Meyers	021 953 8719	MeyersL@cput.ac.za
HoP: Diploma	Mr S Nqabisa	021 959 6982	NqabisaS@cput.ac.za
HoP: Advanced Diploma / BTech	Mr W Kohlhofer / Mr HT Fawkes	021 959 6051 021 959 6582	KohlhoferW@cput.ac.za / FawkesH@cput.ac.za
HoP: Mechatronics	Mr O Ayodele	021 953 8732	AyodeleO@cput.ac.za

FACULTY COORDINATORS AND SUPPORT STAFF

POSITION	NAME	TELEPHONE	E-MAIL
Extended Curriculum Programme (ECP) Co-ordinator	Mr J M John	021 959 5856	JohnJ@cput.ac.za
Community Engagement and Work Integrated Learning Co-ordinator	Mr W Kohlhofer	021 959 6051	KohlhoferW@cput.ac.za
I.T. Co-ordinator	Mr D Evans	021 959 6713	EvansD@cput.ac.za
Language Co-ordinator	Ms A Reiners	021 953 8720	ReinersA@cput.ac.za
Student Engagement Co-ordinator	Mr L Kakaza	021 959 6814	KakazaL@cput.ac.za
Teaching and Learning Co-ordinator	Dr T Joseph	021 953 8720	JosephT@cput.ac.za
Human Resources Business Partner	Mr T Mokgwasa	021 959 6911	MokgwasaK@cput.ac.za

CONTACT DETAILS

DEPARTMENT WORK INTEGRATED LEARNING CO-ORDINATORS

POSITION	NAME	TELEPHONE	E-MAIL
Admin Assistant	Ms F Ismail	021 953 6642	IsmailFE@cput.ac.za
Chemical Engineering	Ms N Mti	021 959 6822	MtiN@cput.ac.za
Civil Engineering and Surveying	Ms P Overmeyer	021 959 6682	OvermeyerP@cput.ac.za
	Mr B Fortuin	021 959 6681	FortuinB@cput.ac.za
Clothing and Textile Technology	Ms N Drotskie	021 959 6571	DrotskieN@cput.ac.za
Construction Management and Quantity Surveying	Ms A Fisher	021 959 6648	FisherA@cput.ac.za
Electrical, Electronic and Computer Engineering	Mr R Tjale	021 959 5850	TjalePR@cput.ac.za
	Dr P Lazanas	021 959 4363	LazanasP@cput.ac.za
Industrial and Systems Engineering	Mr D Adams	021 959 4305	AdamsDQ@cput.ac.za
Maritime Studies and Marine Engineering	Ms T Williams	021 440 5755	WilliamsTH@cput.ac.za
	Ms N Nkani	021 440 5752	NkaniN@cput.ac.za
Mechanical	Mr G Morris	021 959 6293	MorrisG@cput.ac.za
	Mr P Tebele	021 959 6732	TebeleP@cput.ac.za
Mechatronics	Mr M Mazibuko	021 959 5801	MazibukoM@cput.ac.za

FACULTY OFFICE STAFF

POSITION	NAME	TELEPHONE	E-MAIL
Faculty Officer	Mr B Cassiem (Acting)	021 959 5819	CassiemB@cput.ac.za
Assistant Faculty Officer	Mr B Cassiem	021 959 6653	CassiemB@cput.ac.za
Assistant Faculty Officer	Ms N Booysen	021 959 4433	BooysenN@cput.ac.za
FACULTY ASSISTANTS			
Chemical Engineering	Ms E Festus	021 959 5852	FestusE@cput.ac.za
Civil Engineering and Surveying	Ms Z Rawoot	021 953 8729	RawootZ@cput.ac.za
Clothing and Textile Technology	Mr A Burt	021 953 8484	BurtA@cput.ac.za
Construction Management and Quantity Surveying	Mr A Burt	021 953 8484	BurtA@cput.ac.za
Electrical, Electronic and Computer Engineering	Ms W Stoffels	021 959 6773	StoffelsW@cput.ac.za
Industrial and Systems Engineering	Mr A Burt	021 953 8484	BurtA@cput.ac.za
Maritime Studies	Ms Z Rawoot	021 953 8729	RawootZ@cput.ac.za
Mechanical Engineering, and Mechatronics	Mr N Madonsela	021 959 6207	MadonselaN@cput.ac.za

LIST OF UNDERGRADUATE & POSTGRADUATE PROGRAMMES

DEPARTMENT	QUALIFICATION
CHEMICAL ENGINEERING Bellville Campus	Diploma in Chemical Engineering **Replacing:** ND Chemical Engineering
	Diploma in Chemical Engineering (Extended) **Replacing:** ND Chemical Engineering (Extended)
	Advanced Diploma in Chemical Engineering: **Replacing:** BTech Chemical Engineering
	Bachelor of Engineering Technology in Chemical Engineering ***New Qualification***
	Master of Engineering in Chemical Engineering
	Doctor of Engineering in Chemical Engineering
CIVIL ENGINEERING AND SURVEYING Bellville Campus	Diploma in Civil Engineering **Replacing:** ND Civil Engineering
	Diploma in Civil Engineering (Extended) **Replacing:** ND Civil Engineering (Extended)
	Advanced Diploma in Civil Engineering **Replacing:** BTech: Engineering: Civil (Construction Management), BTech: Engineering: Civil (Transport), BTech: Engineering: Civil (Urban Engineering), BTech: Engineering: Civil (Water)
	Bachelor of Engineering Technology in Civil Engineering ***New Qualification***
	Master of Engineering in Civil Engineering
	Doctor of Engineering in Civil Engineering
	Diploma in Geomatics **Replacing:** ND: Surveying, ND: Cartography
	Bachelor of Geomatics ***New Qualification***
	MTech: Cartography (Phasing out)
CLOTHING AND TEXTILE TECHNOLOGY Bellville Campus	Diploma in Clothing and Textile Technology, **Replacing:** ND: Clothing Management
	Diploma in Clothing and Textile Technology (Extended), **Replacing:** ND: Clothing Management (Extended)
	Advanced Diploma in Clothing and Textile Technology, **Replacing**: BTech: Clothing Management
CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING Bellville Campus	Diploma in Construction **Replacing:** ND: Building
	Diploma in Construction (Extended) **Replacing:** ND: Building (Extended)
	Advanced Diploma in Construction Management **Replacing:** BTech: Construction Management
	Advanced Diploma in Construction Health & Safety **Replacing:** BTech: Construction Management (Health and Safety)
	Advanced Diploma in Facility Management **Replacing:** BTech: Construction Management (Facility Management)
	Advanced Diploma in Quantity Surveying **Replacing:** BTech: Quantity Surveying
	Master of Construction

DEPARTMENT	QUALIFICATION
ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING Bellville Campus	Diploma in Engineering Technology in Electrical Engineering, **Replacing:** ND: Engineering: Electrical Diploma in Engineering Technology in Electrical Engineering (Extended), **Replacing:** ND: Engineering: Electrical (Extended)
	Diploma in Engineering Technology in Computer Engineering, **Replacing:** ND: Engineering: Computer Systems
	Bachelor of Engineering Technology in Electrical Engineering ***New Qualification***
	Bachelor of Engineering Technology in Computer Engineering ***New Qualification***
	Master of Engineering in Electrical Engineering (Full Thesis)
	Master of Engineering in Electrical Engineering Smart Grid (Coursework) ***New Qualification***
	Master of Engineering in Electrical Engineering Energy (Coursework) ***New Qualification***
	Master of Engineering in Electrical Engineering Satellite Systems & Applications (Coursework) ***New Qualification***
	Doctor of Engineering in Electrical Engineering
INDUSTRIAL AND SYSTEMS ENGINEERING Bellville Campus	Diploma in Industrial Engineering, **Replacing:** ND: Engineering: Industrial
	Diploma in Industrial Engineering (Extended), **Replacing:** ND: Engineering: Industrial (Extended)
	Advanced Diploma in Industrial Engineering, **Replacing:** BTech: Engineering: Industrial
	Advanced Diploma in Quality, **Replacing:** BTech: Quality
	Master of Engineering in Quality
	Master of Engineering in Engineering Management ***New Qualification***
MARITIME STUDIES Granger Bay Campus	Bachelor of Marine Engineering **Replacing:** ND: Engineering: Mechanical: Marine
	Bachelor of Marine Engineering (Extended) **Replacing:** ND: Engineering: Mechanical: Marine (Extended)
	Bachelor of Nautical Science **Replacing:** ND: Maritime Studies
	Bachelor of Nautical Science (Extended) **Replacing:** ND: Maritime Studies (Extended)
MECHANICAL ENGINEERING Bellville Campus	Diploma in Mechanical Engineering, **Replacing:** ND: Engineering: Mechanical
	Diploma in Mechanical Engineering (Extended), **Replacing:** ND: Engineering: echanical (Extended)
	Advanced Diploma in Mechanical Engineering, **Replacing:** BTech: Engineering: Mechanical
	Master of Engineering in Mechanical Engineering
	Doctor of Engineering in Mechanical Engineering
	Diploma in Mechanical Engineering in Mechatronics, **Replacing:** ND: Engineering: Mechanical (Mechatronics)
	Advanced Diploma in Mechanical Engineering in Mechatronics, **Replacing:** BTech: Engineering: Mechanical (Mechatronics)

STAFF AWARDS

Awards recognising excellence at the faculty and department level.

FACULTY TEACHING EXCELLENCE AWARDS

2020	No Awards made	
2019	Assoc Prof Oluwaseun Oyekola Dr Bronwyn Swartz	Chemical Engineering Industrial & Systems Engineering
2018	Ms Cheryl Belford	Civil Engineering & Surveying
2017	Dr Aysha Abrahams	Electrical, Electronic and Computer Engineering
2016	Mr Siddique Motala	Civil Engineering & Surveying
2015	Dr Panagiotis Lazanas	Electrical, Electronic and Computer Engineering
2014	Mr Moses Basitere	Chemical Engineering
2013	Ms Philomina Aziakpono	Electrical, Electronic and Computer Engineering

DEPARTMENTAL TEACHING EXCELLENCE AWARDS

2020	No Awards made	
2019	Industrial & Systems Engineering Clothing and Textile Technology	Dr Mncedisi Dewa Dr Sweta Patnaik
2018	Mechanical Engineering Industrial & Systems Engineering	Ms Felicity Harris Ms Bronwyn Swartz
2017	Chemical Engineering Construction Management & Quantity Surveying Chemical Engineering	Dr Oluwaseun Oyekola Dr Ruben Ndihokubwayo Mr Joe John
2016	Civil Engineering & Surveying Electrical, Electronic and Computer Engineering	Ms Cheryl Belford Dr Atanda Raji
2015	Clothing Management Construction Management & Quantity Surveying Maritime Studies	Ms Nina Drotskie Ms Laura Pinfold Captain Lauren Lawson
2014	Chemical Engineering Clothing and Textiles	Dr Joy Alexander Dr Bernadette Millar

OUTSTANDING COMMUNITY PROJECT/COMMUNITY OUTREACH AWARD

2015	Mechanical Engineering	Mr Fareed Ismail

CPUT RESEARCH AWARDS

POSTGRADUATE SUPERVISION

2017	Silver Award	Prof J Gryzagoridis
2016	Gold Award	Prof MTE Kahn
2015	Platinum Award Platinum Award Gold Award	Prof I Masalova Prof MTE Kahn Prof R Tzoneva
2014	Silver Award	Prof RR van Zyl

PUBLICATIONS

2018	Platinum Award	Prof B Sun
2015	Platinum Award Bronze Award	Dr J Fapohunda Dr A Raji
2014	Silver Award Silver Award	Prof R Tzoneva Prof I Masalova

RESEARCH FUNDING

2018	Gold Award Silver Award Bronze Award	Prof VG Fester Prof R Tzoneva Prof I Masalova
2017	Gold Award	Prof I Masalova
2015	Silver Award	Prof R Tzoneva
2014	Platinum Award Gold Award	Prof RR van Zyl Dr EM Hovgaard

STUDENT AWARDS

VICE CHANCELLOR'S MEDAL

The Vice Chancellor's Medal is awarded to the top Advanced Diploma or BTech graduate across all faculties, taking all four years of study into account.

YEAR	WINNER	DISCIPLINE
2018	Ms Sumone Febe Herholdt	ND Building & BTech Quantity Surveying
2016	Mr Jean - Pierre Francois Mostert	ND & BTech Electrical Engineering
2015 *	Mr Jonathan Kabamba Katende	ND & BTech Chemical Engineering
2014 *	Ms Sipiwe Shoko	ND & BTech Chemical Engineering
2013 *	Mr Alexander Ebben-Esser Christian	ND & BTech Electrical Engineering
2012	Ms Marguerite Ester Stoffberg	ND & BTech Clothing Management

***** The criteria were changed between 2013 and 2015, from one medal for the university (across all faculties), to one for all faculties.

DEAN'S TOP STUDENT

The Dean's Top Student is awarded to the top student in the faculty for all four years of study, for years where a student from the faculty is not the Vice-Chancellors Medal winner.

YEAR	WINNER	DISCIPLINE
2020	Mr Andro Riaan Botes	ND & BTech Civil Engineering
2019	Ms Michaela Lockley	ND & BTech Clothing Management
2017	Mr Sandro Duarte Cesar	ND & BTech Chemical Engineering

DEAN'S MEDAL

The Dean's Medal is awarded to the top Diploma or National Diploma graduate in the Faculty.

YEAR	WINNER	DISCIPLINE
2020	Mr Pascal Coninx	ND Maritime Studies
2019	Mr Kniekeal Rajpaul	ND Maritime Studies
2018	Mr Daniel Norman Stuck	ND Maritime Studies
2017	Mr George Valerievich Fatnev	ND Maritime Studies
2016	Mr Nhlanhla Aubrey Sosibo	ND Maritime Studies
2015*	Mr Jean-Pierre Mostert	ND Electrical Engineering
	Mr Sandro Duarte Cesar	ND Chemical Engineering
2014*	Mr Anton van der Linde	ND Maritime Studies
	Mr Albert van Niekerk	ND Electrical Engineering
2013*	Ms Sipiwe Shoko	ND Chemical Engineering
	Capt Zetta Gous	ND Maritime Studies
2012	Mr Alexander Ebben-Esser Christian	ND Electrical Engineering
2011	Ms Marguerite Ester Stoffberg	ND Clothing Management
2010	Mr Vaughan Pillay	ND: Maritime Studies

** The criteria were changed between 2013 and 2015, from one to two medals for each faculty.*

DEAN’S EXCELLENCE AWARDS

The Dean’s Excellence Award is given to the best student at the Diploma and BTech level (or equivalent) in each department. Where the top student in a department is the winner of the VC’s or Dean’s Medal, then the award is given to the runner-up in each category.

CHEMICAL ENGINEERING

	National Diploma	BTech
2018	Ms Keshrie Reddy	Ms Zaylia Marolize Henneta Vollenhoven
2017	Mr Reinford Mapfumo	Mr Tsepelang Mahlasane
2016	Mr Tsepelang Mahlasane	Ms Micaela Lisa Harry
2015	Mr Wiseman Chipo Ruwona	Ms Thonya Otsengue
2014	Mr Jonathan Kabamba Katende	Mr James Philip Brassell

CIVIL ENGINEERING AND SURVEYING

	National Diploma	BTech
2018	Mr Christopher Peter De Wet	Mr Gerhard Rheeder
2017	Mr Jan-Hendrik Bothma	Ms Whidaad Nazier
2016	Mr Khumbulani Andreas Ntuli	Mr Jaim Spear
2015	Mr Kyle Andrew Grant	Mr Timothy James Milner
2014	Mr Francois Neal Jordaan	Mr Gareth Alistair Holtman

CLOTHING & TEXTILE TECHNOLOGY

	National Diploma	BTech
2018	Ms Zeenat Davids	Ms Lara Viljoen
2017	Ms Michaela Lockley	Ms Larnique Olivia La Gorce
2016	Ms Lindsay Swart	Ms Kayla Kim Arendse
2015	Ms Ashlee Smith	--
	Ms Mieke Margaretha du Plessis	--
2014	Ms Marcelle Carlin van Coller	Ms Liesel Schliemann

CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING

	National Diploma	BTech
2018	Ms Faatimah Salie Ms Nelago Ndaziminua Amutenya	Mr Luke Cotterell
2017	Ms Sumone Febe Herholdt	Ms Nicole Scheepers
2016	Ms Nicole Scheepers	Ms Sivenathi Lamati
2015	Ms Irma Christine Clarence	Mr Blaine Jude Amon
2014	Mr Zubayr Anwary	Ms Camerin Ashley Coxson

ELECTRICAL, ELECTRONIC AND COMPUTER ENGINEERING

	National Diploma	BTech
2018	Mr Randy Matuka Kabala Mr Elie Ndjung Ului Omatuku	Mr Willem Johannes Conradie
2017	Mr Willem Johannes Conradie	Mr Ian Basson
2016	Mr Litheko Legapa Nkabiti	Mr David Gavin Osterloh
2015	Ms Jennifer Florencia Nsumbo	Mr David Stephen Berliner
2014	Mr David Gavin Osterloh	Mr Muammar Slamdien

INDUSTRIAL & SYSTEMS ENGINEERING

	National Diploma	BTech
2018	Mr Janco Andre Engelbrecht	Ms Azile Aza Ncumisa Madikizela
2017	Mr Mogamat Junaid Samaai	Mrs Tharwa Tape
2016	Mr Oliver Mukuna Murara	Ms Olivia Leshia Parbhu Nath
2015	Mr Sizwe Ndlovu	Mr Moos Deon Koopman
2014	Mr Mark le Grange	Mrs Busiswa Kekana

MARITIME STUDIES

	National Diploma - (No BTech offered)	
2018	Mr Clemento Rejino Jansen	
2017	Mr Vickus Coetzee	Mr Vito Marco Rickerts
2016	Mr Abel De Oliveira Daniel	Mr Leslie Thomas Moss
2015	Mr Francois Conradie	Ms Dermonique Mische' Cloete
2014	Mr Rolf Adrian Henry Sieboldt-Berry	Mr Paulus Eita Kanyangela

MECHANICAL ENGINEERING

	National Diploma	BTech
2018	Mr Vusi Given Msiza	Mr Ludwigh Andre Le Grange
2017	Mr Motheo Molamo	Mr Rowan Earp-Jones
2016	Mr Jared Evans	Mr Duval Labuschagne
2015	Mr Walter Stephen Harmse	Mr Parfait Dongmo Yemele
2014	Mr Gerhard Johan Steenkamp	Mr Jeffrey Craig Ball

THE INSTITUTE OF PROFESSIONAL ENGINEERING TECHNOLOGISTS (IPET) MEDAL

The IPET Medal is awarded to the best male and female BTech (or equivalent) engineering student at each University of Technology, as well as the best student country-wide on the basis of academic achievement.

CPUT WINNERS OF THE NATIONAL AWARD

2016	Mr Jean - Pierre Francois Mostert Ms Micaela Lisa Harry	Electrical Engineering Chemical Engineering

CPUT WINNERS

2019	Mr Deswill Jumat Willemse Ms Keshrie Reddy	Electrical Engineering Chemical Engineering
2018	Mr Willem Johannes Conradie Ms Zaylia Marolize Henneta Vollenhoven	Electrical Engineering Chemical Engineering
2017	Mr Sandro Duarte Cesar Ms Whidaad Nazier	Chemical Engineering Civil Engineering
2016	Mr Jean - Pierre Francois Mostert Ms Micaela Lisa Harry	Electrical Engineering Chemical Engineering
2015	Mr Rocco Kirsten Ms Shirzade Osman	Electrical Engineering Industrial Engineering
2014	Ms Sipiwe Shoko Mr James Stubbs	Chemical Engineering Electrical Engineering
2013	Ms Taimi Nashidengo Mr Alexander Christian	Industrial Engineering Electrical Engineering
2012	Ms Angela Tafadzwa Shumba Mr Yves Tshimanga	Electrical Engineering Chemical Engineering
2011	Ms Dineo Kadi Mr Haltor Mataifa	Chemical Engineering Electrical Engineering

ACADEMIC PROGRESSIONS AND EXCLUSIONS

1. The maximum time allowed to complete a programme shall be double the minimum completion duration, for example, six years for a three-year qualification. In addition, students shall be given a maximum of one chance to repeat a semester, year, subject, course or module. In other words, repeaters are limited to one repeat.
2. Students shall pass at least 50% of their subjects, including at least two of three major subjects that they are registered for in any semester or year of study, in order to proceed to the next level of their studies, unless otherwise prescribed by statutory bodies, such as professional bodies. Students shall carry over repeated subjects to the next level that they are promoted to, pending timetabling. Students shall not be allowed to carry over more than two subjects per semester/year or at any one time.
3. When a student does not fulfil the above requirements for progression, s/he will be notified in writing of his/ her exclusion from the programme or from progression.
4. Where a student fails to meet rule 2 above s/he shall be permitted to repeat the repeated level a maximum of one time.
5. These prescribed requirements will be stated in subject requirements and all efforts shall be made by the department concerned to familiarise students with these additional requirements.
6. If a student fails the level or subjects more than once, s/he shall be excluded from the programme.
7. If a student obtains an overall mark of less than 30%, s/he shall be excluded from registering for any programme in the faculty.
8. If a student obtains an overall mark ranging from 30% to 40%, s/he shall be excluded from the programme. Such a student may apply for admission to any other programme within the faculty, subject to meeting the Admission requirements.
9. If a student obtains an overall mark ranging from 40 to 50%, s/he shall be allowed to repeat the level, subject to rules 1 and 2 of this section.
10. When a student does not fulfil the above requirements for progression, s/he shall be notified in writing of his/ her exclusion from the programme or from progression.
11. Where a student has only one or two subjects remaining before completion and is nearing the maximum number of years for registration, s/he may apply, with appropriate motivation, to the Dean’s office for extension of the period of registration for an additional year.

Normal appeal procedures will apply

1. Credits: Credit transfers require CPUT to validate prior formal learning through evaluation of the quality of an accredited provider.
2. Subject exemptions as practised in the past are regarded as recognition of prior learning (RPL) and are dealt with in the appropriate RPL policy.
3. In the interests of student access, mobility and articulation, and to avoid unnecessary repetition of studies, consideration may be given to extending to the student:
   - 3.1 Recognition by granting credits for any subjects passed at CPUT, but in another programme, whether complete or incomplete, with a view to studying for a University programme.
   - 3.2 Recognition by granting credits whereby credits obtained at one institution may be recognised by another as meeting part of the requirements for graduation, and credits for a completed qualification may be recognised as meeting part of the requirements for another qualification.
4. The mark obtained at higher education institutions from which the credit is transferred, shall be confirmed by the Senate Executive (SENEX). The purpose of this requirement is to ensure that students who were granted credits can also be considered for cum laude awards by the University.
5. Credits will only be recorded on the student’s academic history by the Assessment and Graduation Centre (AGC) once approved by SENEX.
6. In all instances the total number of credits awarded shall not exceed 50% of the number of subjects in the programme.
7. All credits accumulated in respect of incomplete qualifications shall only be valid for a maximum of ten years.

FACULTY EXCLUSION RULES AND PROCEDURES

Diploma / National Diploma exclusions

A Diploma / National Diploma candidate shall not be permitted to renew his or her registration except by permission of the Head of Department and/or the Dean if he or she fails to complete the subjects prescribed:

where applicable, for first semester within two semesters after his/her first registration for the Diploma; and
where applicable, for first year within two years after his/her first registration for the Diploma;

- Students who fail more than 50% of their subjects/modules in any level of study or who fail any subject twice will not be re-admitted to the qualification. These students shall be referred to a FET college, or will have to work for six months in an engineering company (doing engineering related work) before being eligible for re-admission to the qualification.
- A student may also upon application to the department enrol for an accredited equivalent subject/ module at e.g. UNISA and apply for recognition of credits on successful completion of the subject/ module.
- Students who fail all the core subjects (where applicable) will not be re-admitted to the qualification.
- Students have to pass specific subjects/modules (pre-requisites) in order to continue with their qualification to the next level. See departmental rules pertaining to the qualification you are registered for.

For the second semester within four semesters after his/her first registration for the Diploma; and for the second year within four years after his/her first registration for the Diploma;

- Students who fail any of the S2 subjects more than once will be excluded from the qualification.

For the third semester within six semesters after his/her first registration for the Diploma; and for the third year within six years after his/her first registration for the Diploma;

- Students will be promoted to the third year or semester provided they have passed all first year subjects/modules, pre-requisites, all core subjects/modules at second year level and where prescribed; the experiential learning should be completed.

For the fourth semester within eight semesters after his/her first registration for the Diploma.

- Students will be promoted to the fourth semester provided they have passed all first and second year subjects, pre-requisites and all core subjects at third semester level.

Notwithstanding the above, departments have an application for re-admission process, which affords excluded candidates an opportunity to submit such an application and present mitigating factors.

Furthermore, each department has a unique set of criteria used to determine re-admission. Such departmental criteria are taken cognisance of at the time of the exclusion of the candidate based on the faculty's policy.

An excluded student may, after having been unsuccessful in his/her application for re-admission, appeal to the Dean for reconsideration.

A student, who is excluded twice in any programme, or the same programme, will not have recourse to appeal.

BTech / Advanced Diploma exclusions

Students at this level will be excluded from the programme if they have not completed the qualification within two years full-time, or four years part-time.

Extended Curriculum Exclusions

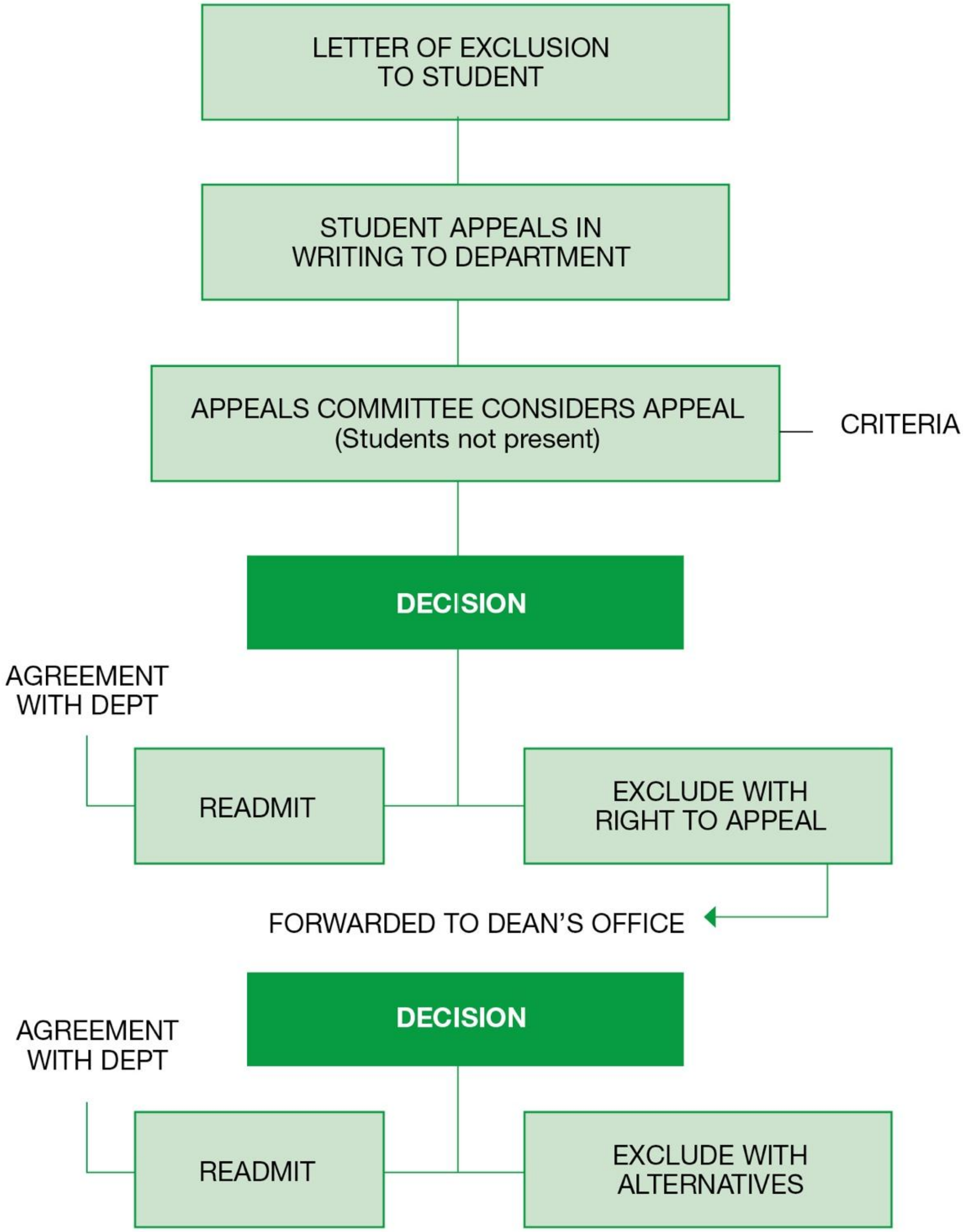
The Department of Higher Education and Training (DHET) does not recognise repeating students on the Extended Curriculum Programme (ECP) for statistical or funding purposes. The full ECP or significant sections of it cannot be repeated and, where possible, only a limited number of subjects should be repeated. The same exclusion rules as applied to regular subjects cannot be applied to the ECP. Bearing this in mind, each department needs to inform students of their exclusion rules at the start of the programme.

Process for appeals against exclusions

- A student who had been excluded must submit an application to the HoD/department applying for re-admission, along with ALL relevant information (and any other supporting documents).
- If the application is approved the student continues with the registration process.
- If the application is not approved, the student may submit an appeal to the Dean. All information (letter of appeal, outcome of application to the department and any other supporting documents) must be submitted to the relevant Faculty Office (Bellville or Cape Town) for the attention of the Faculty Officer.
- The Faculty Officer will list all applications and provide to the Dean for consideration.
- The Dean makes the decision and provides feedback to the Faculty Officer about the outcome of the appeal.

The Faculty Officer will inform the student, department and ARC respectively.

EXCLUSIONS AND READMISSIONS PROCESS



DEPARTMENT OFFICE-BEARERS

POSITION	NAME	TELEPHONE	E-MAIL
Heads of Department (Acting)	Dr M Aziz and Dr B Godongwana	021 460 4292 021 460 3170	AzizM@cput.ac.za GodongwanaB@cput.ac.za
Secretary	Ms E Alberts	021 460 3159	VanWykE@cput.ac.za
Admin Assistant	Ms S Nqwazi	021 959 6083	NqwaziS@cput.ac.za
Head of Programme: Post Graduate	Dr M Aziz	021 460 4292	AzizM@cput.ac.za
Head of Programme: Under Graduate	Dr B Godongwana	021 460 3170	GodongwanaB@cput.ac.za

DEPARTMENTAL STAFF

POSITION	NAME	QUALIFICATIONS
Professor	Prof TV Ojumu	PhD (Chemical)
Associate Professor	Dr OO Oyekola	PhD (Chemical)
Senior Lecturer	Dr M Chowdhury	DTech (Chemical)
Senior Lecturer / ECP Co-ordinator	Dr D de Jager	DTech (Chemical)
Senior Lecturer	Mr GE Hangone	MSc (Chemical)
Senior Lecturer	Dr U Narsingh	PhD (Chemical)
Lecturer	Dr M Aziz	DEng (Chemical)
Lecturer	Ms I Erdogan	MTech (Chemical)
Lecturer	Dr B Godongwana	DTech (Chemical)
Lecturer	Mr JM John	MTech (Chemical), HED (Diploma)
Lecturer	Mr B Lemine	MTech (Environmental Management)
Lecturer	Mr TF Madzimbamuto	MSc (Chemical)
Lecturer	Ms AB Marshall	MTech (Chemical)
Lecturer	Dr M Nomnqa	DEng (Chemical)
Lecturer	Ms A Reiners	MEd (Applied language and literacy)
Lecturer	Mr A Thole	MTech (Chemical)
Co-op Co-ordinator	Ms N Mti	BTech (Chemical)
Senior Technician	Mr A Bester	NHD (Electrical)
Laboratory Technician	Ms H Small	MTech (Chemical)
Laboratory Technician	Ms M Bingo	BTech (Chemical)
Laboratory Technician	Mr ND Dlamini	BTech (Chemical)

QUALIFICATIONS OFFERED

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration	Work Integrated Learning
Diploma in Chemical Engineering	D3CHME	3 years	6 years	6 months
Diploma in Chemical Engineering (Extended)	D3CHMX	4 years	8 years	6 months
Advanced Diploma in Chemical Engineering	ADCHME	1 year (full-time)	2 years (full-time)	--
Bachelor of Engineering Technology in Chemical Engineering	BPETCE	3 years	6 years	--
Master of Engineering in Chemical Engineering	MGCHMR	1 Year (full-time) 2 Years (part-time)	3 Years (full-time) 4 Years (part-time)	-- --
Doctor of Engineering in Chemical Engineering	DGCHMR	2 Years (full-time) 4 Years (part-time)	4 Years (full-time) 6 Years (part-time)	-- --

DIPLOMA IN CHEMICAL ENGINEERING

COURSE AIM

The aim of the course is to provide excellent theoretical as well as practical chemical engineering knowledge and skills, relevant to the needs of the chemical industry and society at large. Graduates of this programme will have the competence to apply engineering skills to chemical engineering problems and plant operations.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for process or chemical engineering technicians working in the process-related industries. Learners achieving this qualification have the competence to apply existing process technology to chemical engineering problems in chemical processes and plant operations.

CAREER OPPORTUNITIES

Graduates play an important role in process operations, management, research and development, as well as in environmental management. Employment is found in a wide range of industries including food processing, wine production, pharmaceuticals, biotechnology, fertilisers, fuel technology, oil refining, minerals processing, chemical manufacturing, and synthetic fibres. Employment opportunities also exist in government and higher education institutions.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%)	N/A	M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:
E (English)
M (Maths) PS (Physical Science)
TM (Technical Maths) ES (Engineering Science)

PROFESSIONAL REGISTRATION

The Diploma in Chemical Engineering (replacing the National Diploma in Chemical Engineering which is accredited by the Engineering Council of South Africa) is a new qualification introduced in 2017.

DURATION

Full-time: Three years, including 6 months experiential learning.

VENUE

Bellville

DIPLOMA IN CHEMICAL ENGINEERING (D3CHME)

(All subjects compulsory)
Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st YEAR (all subjects compulsory)									
Engineering Chemistry 1	CHM152S	01	Y	5	C	--	28	0.235	CE
Engineering Mathematics 1	MTH156S	01	Y	5	C	--	28	0.235	CE
Engineering Physics 1	EGP151S	01	Y	5	C	--	14	0.118	CE
Engineering Communication	COM151S	01	Y	5	C	--	14	0.118	CE
Engineering Computer Applications 1	ECA150S	01	S1	5	C	--	14	0.118	CE
Chemical Engineering Technology 1	CET150S	01	S2	5	C	(Co-MTH156S, CHM152S, EGP151S)	14	0.118	CE
Chemical Process Technology	CPT150S	01	S2	5	C	(Co-CET150S, CHM152S)	7	0.058	CE
2nd YEAR (all subjects compulsory)									
Transfer Processes	TFP260S	01	Y	6	C	CET150S, MTH156S, EGP151S	21	0,157	CE
Chemical Engineering Thermodynamics	CTH260S	01	Y	6	C	MTH156S, CHM152S, EGP151S, CET150S	28	0,211	CE
Process Fluid Flow	PFF260S	01	S1	6	C	MTH156S, EGP151S; CET150S	14	0,106	CE
Introduction to Social Studies & Humanities	CPB250S	01	S1	5	C	---	7	0,052	CE
Chemical Engineering Technology 2	CET260S	01	S1	6	C	MTH156S, CHM152S, EGP151S, CET150S	14	0,106	CE
Chemical Engineering Laboratory 2A	CEL260S	01	S1	6	C	CET150S (Co-CET260S, PFF260S)	7	0,052	CE
Process Design Principles 2: Safety & Loss Prevention	PSL260S	01	S2	6	C	ECA150S, (Co-CET260S, PFF260S, TFP260S, CTH260S)	14	0,106	CE
Particle Technology	PTY260S	01	S2	6	C	EGP151S, CPT150S, (Co-CET260S)	14	0,106	CE
Management & Entrepreneurial Skills	MES260S	01	S2	6	C	COM151S	7	0,052	CE
Chemical Engineering Laboratory 2B	CEL261S	01	S2	6	C	(Co-TFP260S, CTH260S)	7	0,052	CE
3rd YEAR (all subjects compulsory)									
Process Control and Instrumentation	PCI360S	01	S1	6	C	MTH156S, EGP151S, CET260S (Co-MTH361S, ICR360S)	14	0.125	CE
Introduction To Chemical Reaction Engineering	ICR360S	01	S1	6	C	CET260S, CHM152S, (Co-MTH361S)	7	0.062	CE

Separations Processes - Unit Operations	SPS360S	01	S1	6	C	CET260S, TFP260S	14	0.126	CE
Engineering Mathematics 2	MTH361S	01	S1	6	C	MTH156S, EGP151S	7	0.062	CE
Investigative Projects	IVP360S	01	S1	6	C	(Co-SPS360S, ICR360S, PCI360S, MTH361S)	14	0.125	CE
Engineering Computer Applications 2	ECA360S	01	S2	6	C	ECA150S	7	0.062	CE
Process Design Principles 3: Equipment Design	PSL360S	01	S2	6	C	PSL260S, TFP260S, (Co-SPS360S)	14	0.126	CE
Chemical Engineering Projects	CEP361S	01	S2	6	C	CEL261S	30	0.250	CE
Bioprocess and Environmental Engineering	BEE360S	01	S2	6	C	CET260S, CPT150S	7	0.062	CE

DIPLOMA IN CHEMICAL ENGINEERING (EXTENDED)

COURSE AIM

In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two-year Foundational Programme, students will integrate with the normal programme.

DURATION

Full-time: The four-year programme comprises 7 academic semesters and 1 semester of in-service training.

DIPLOMA IN CHEMICAL ENGINEERING (EXTENDED) (D3CHMX)

(All subjects compulsory)
Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
YEAR 0 (all subjects compulsory)									
Engineering Chemistry 1	CHM152X	01	Y	5	C	--	28	0,235	CE
Engineering Mathematics 1	MTH156X	01	Y	5	C	--	28	0,235	CE
Engineering Physics 1	EGP151X	01	Y	5	C	--	14	0,118	CE
YEAR 1 (all subjects compulsory)									
Engineering Communication	COM151X	01	Y	5	C	--	14	0.118	CE
Engineering Computer Applications 1	ECA150X	01	S1	5	C	--	14	0.118	CE
Process Fluid Flow	PFF260X	01	S1	6	C	MTH156X, EGP151X, (Co-CET150X)	14	0.106	CE
Chemical Engineering Technology 1	CET150X	01	S1	5	C	MTH156X, CHM152X, EGP151X	14	0.118	CE
Chemical Engineering Laboratory 2A	CEL260S	01	S2	6	C	CET150X, PFF260S, (Co-CET260S)	7	0.052	CE
Chemical Process Technology	CPT150X	01	S2	5	C	CHM152X, CET150X	7	0.058	CE
Chemical Engineering Technology 2	CET260S	01	S2	6	C	MTH156X, CHM152X, EGP151X, CET150X	14	0.106	CE
YEAR 2 (all subjects compulsory)									

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Transfer Processes	TFP260S	01	Y	6	C	CET150X, MTH156X, EGP151X	21	0.157	CE
Chemical Engineering Thermodynamics	CTH260S	01	Y	6	C	MTH156X, CHM152X, EGP151X, CET150X	28	0.211	CE
Separations Processes-Unit Operations	SPS360S	01	S1	6	C	CET260S, (Co-TFP260S)	14	0.126	CE
Engineering Mathematics 2	MTH361S	01	S1	6	C	MTH156X, EGP151X	7	0.062	CE
Process Design Principles 2:Safety & Loss Prevention	PSL260S	01	S2	6	C	ECA150X, CET260S, PFF260S, (Co-TFP260S, CTH260S)	14	0.106	CE
Chemical Engineering Laboratory 2B	CEL261S	01	S2	6	C	CET260S, PFF260S, (Co-TFP260S, CTH260S) (At least 2 subjects)	7	0.052	CE
Particle Technology	PTY260S	01	S2	6	C	EGP151X, CPT150X, CET260S	14	0.106	CE
YEAR 3 (all subjects compulsory)									
Process Control & Instrumentation	PCI360S	01	S1	6	C	MTH156X,EGP151X, MTH361S, CET260S, (Co-ICR360S)	14	0.125	CE
Introduction to Chemical Reaction Engineering	ICR360S	01	S1	6	C	CET260S, CHM152X, MTH361S	7	0.062	CE
Investigative Projects	IVP360S	01	S1	6	C	SPS360S, MTH361S, (Co-ICR360S, PCI360S)	14	0.125	CE
Introduction to Social Studies & Humanities	CPB250S	01	S1	5	C	--	7	0.052	CE
Engineering Computer Applications 2	ECA360S	01	S2	6	C	ECA150X	7	0.062	CE
Process Design Principles 3: Equipment Design	PSL360S	01	S2	6	C	PSL260S, SPS360S, TFP260S	14	0.126	CE
Chemical Engineering Projects	CEP361S	01	S2	6	C	CEL261S	30	0.250	CE
Bioprocess & Environmental Engineering	BEE360S	01	S2	6	C	CET260S, CPT150X	7	0.062	CE
Management & Entrepreneurial Skills	MES260S	01	S2	6	C	COM151X	7	0.052	CE

ADVANCED DIPLOMA IN CHEMICAL ENGINEERING

COURSE AIM

The aim of the course is to broaden and deepen the knowledge base acquired at diploma level and to consolidate concepts and theories through substantive experimental and design projects. The projects emphasise the development of students, including knowledge acquisition, presentation and research skills. Graduates can apply their knowledge and skills to chemical engineering problems, chemical process design, process operations management and relevant environmental issues, contributing to the needs of the chemical industry and society at large.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is primarily industry oriented. The knowledge emphasises general principles and application or technology transfer. The qualification provides students with a sound knowledge base in a particular field or discipline and the ability to apply their knowledge and skills to particular career or professional contexts, while equipping them to undertake more specialised and intensive learning.

The programmes leading to this qualification is a Diploma in Chemical Engineering and has a strong professional or career focus education, therefore holders of this qualification will be prepared to enter a specific niche in the labour market. Specifically this educational programme is designed to build the necessary knowledge, understanding, abilities and skills required for further learning towards becoming a competent practicing Chemical Engineering Technologist.

This qualification provides:

1. Preparation for careers in Chemical Engineering and areas that potentially benefit from Chemical Engineering skills, for achieving technical proficiency and to make a contribution to the economy and national development;
2. The educational base required for registration as a Professional Engineering Technologist with ECSA. (refer to qualification rules).
3. Entry to NQF level 8 programmes e.g. BEngTech (Honours) Chemical Engineering, Post Graduate Diploma in Chemical Engineering and BEng Chemical Engineering and then to proceed to Masters Programmes.
4. For certificated engineers, this provides the education base for achieving proficiency in mining I factory plant and marine operations and occupational health and safety.

Engineering students completing this qualification will demonstrate competence in all the Exit Level Outcomes contained in the Engineering Standard E-05-PT

CAREER OPPORTUNITIES

Graduates will be involved at any stage of a chemical engineering project, from its conception to sale of the final product. These stages include: research and development, economic evaluation, design, equipment manufacture, plant construction and commissioning, plant operation, product sales and service.

Employment is found in industries such as pharmaceuticals, biotechnology, fertilisers, fuel technology, oil refining, minerals processing, chemical manufacturing, and synthetic fibres. Opportunities also exist in environmental consultancy, and in government and higher education.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

- A 360 credit Diploma in Chemical Engineering or an equivalent qualification at NQF L6.
- A 240 credit National Diploma in Chemical Engineering together with the 120 WIL credits.
- Students should obtain a 60% pass in the exit level subjects of the 360 Diploma and 60% for the second year of the Diploma in Technology together with 60% for the 120 WIL credits
- Students who do not obtain the 60% average, and with at least 1-year relevant industrial experience may be considered on merit.

- All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

PROFESSIONAL REGISTRATION

The Advanced Diploma in Chemical Engineering is accredited by the Engineering Council for South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technologists.

DURATION

Full-time: One year

VENUE

Bellville

ADVANCED DIPLOMA IN CHEMICAL ENGINEERING (ADCHME)

(All subjects compulsory)
Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Period of Study	Year/Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
4	Y	PQD470S	Process Design 4	C	--	7	21	0.150	CE
4	Y	PMO470S	Separation Processes 4: Multi-Stage Operations	C	--	7	21	0.150	CE
4	Y	LAB470S	Laboratory 4	C	--	7	7	0.050	CE
4	S1	MAT470S	Engineering Mathematics 4	C	--	7	14	0.100	CE
4	S1	RTI470S	Chemical Reaction Engineering 4	C	--	7	7	0.050	CE
4	S1	CET360S	General Engineering for Chemical Engineers 3	C	--	6	14	0.050	CE
4	S1	ACH470S	Applied Chemistry 4: Analytical and Environmental	C	--	7	7	0.050	CE
4	S2	RES471S	Research Methodology and Project	C	--	7	14	0.100	CE
4	S2	BES470S	Bioprocessing 4 and Environmental Sustainability	C	--	7	7	0.100	CE
4	S2	CET470S	General Engineering for Chemical Engineers 4	C	--	7	7	0.050	CE
4	S2	ELW460S	Environmental Law	C	--	6	14	0.050	CE
Choose 1 (one) Elective from the subjects below									
4	S2	ENE470S	Environmental Engineering	E	--	7	14	0.100	CE
4	S2	MPR470S	Minerals Processing	E	--	7	14	0.100	CE
4	S2	OGP740S	Oil And Gas Processing	E	--	7	14	0.100	CE

BACHELOR OF ENGINEERING TECHNOLOGY IN CHEMICAL ENGINEERING

COURSE AIM

The aim of the course is to provide excellent theoretical as well as practical chemical engineering knowledge and skills, that will enable graduates to work independently, innovatively apply and modify engineering practices, solve broadly defined engineering problems and give managerial inputs.

PURPOSE AND RATIONALE OF THE QUALIFICATION

The purpose of the BEng Tech programme is to develop the necessary knowledge, understanding, abilities and skills set required to become a competent, practicing engineering technologist. Specifically, the qualification provides:

Preparation for careers in Chemical Engineering and associated areas that potentially benefit from engineering skills; for achieving technological proficiency; and for making contributions to the economy and national development.

- The educational base required for registration as a Professional Engineering Technologist with ECSA.
- For graduates with an appropriate level of achievement, the ability to enter NQF level 8 programmes and then proceed to Masters Degrees.

Engineering students completing this qualification will demonstrate competence in all the Exit Level Outcomes contained in the Engineering Standard E-02-PT.

CAREER OPPORTUNITIES

Chemical Engineering Technologists are employed across a wide range of manufacturing environments such as pharmaceuticals, petrochemicals, iron and steel, food and beverages, water, and wastewater. The knowledge and skill acquired by Chemical Engineering Technologists are also required to prevent harmful pollutants from escaping into the soil, water, and air, therefore additional career avenues exist within the field of environmental management. Graduates are not limited to formal employment areas – they also make good entrepreneurs! In addition to this, they may also find challenging opportunities in teaching and/or research.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 36 using Method 2 E (First language) 5 (60%) M 5 (60%) or TM 5 (60%) PS 5 (60%)	N/A	M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:

E (English)
M (Maths)
TM (Technical Maths)
PS (Physical Science)
ES (Engineering Science)

PROFESSIONAL REGISTRATION

The Bachelor of Engineering Technology in Chemical Engineering enables graduates to register with the Engineering Council for South Africa (ECSA) as a Professional Engineering Technologist after 4 years of suitable and documented Initial Professional Development (IPD) at the work place.

DURATION

Full-time: Three years

VENUE

Bellville campus

BACHELOR OF ENGINEERING TECHNOLOGY IN CHEMICAL ENGINEERING (BPETCE)

(All subjects compulsory)
Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Year/Sem Subject	Subject Name	Subject Code	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (All subjects compulsory)								
Y	Engineering Communication	COM156S	C	--	5	14	0.111	CE
Y	Engineering Chemistry 1	ECH150S	C	--	5	28	0.222	CE
Y	Engineering Mathematics 1	EMA158S	C	--	5	28	0.222	CE
Y	Engineering Physics	EPH152S	C	--	5	14	0.111	CE
S1	Chemical Engineering Computer Applications 1	ECA151S	C	--	5	14	0.111	CE
S1	Environmental Law	ELW150S	C	--	5	7	0.056	CE
S2	Chemical Engineering Technology 1	CET151S	C	--	5	14	0.111	CE
S2	Chemical Process Technology	CPT152S	C	--	5	7	0.056	CE

2nd and 3rd year not yet offered

MASTER OF ENGINEERING IN CHEMICAL ENGINEERING

COURSE AIM

Graduates develop the knowledge and skills required to conduct independent research in chemical engineering and environmental problems, and to contribute significantly to knowledge production through the understanding, application and evaluation of existing and new knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for chemical engineers or technologists working in process related industries. Learners achieving this qualification have the competence to conduct independent research in chemical engineering, and contribute significantly to knowledge production through the understanding, application and evaluation of existing knowledge. The research problem, its justification, process and outcome is reported in a thesis, which complies with the generally accepted norms at that level.

CAREER OPPORTUNITIES

Graduates play an important role in the development of new products, new applications for existing products or raw materials, or cheaper ways of making existing products.

Concern for the environment, the development of cleaner production technologies, waste minimisation and recycling have become major fields of research in chemical engineering. Research relates to the technical methods of assessing environmental impacts, including the preparation of emission inventories, air pollutant dispersion modelling, and ambient air and water monitoring. Graduates are employed in research and development in industry, as well as in teaching positions at higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

A level 8 qualification with a minimum aggregate of 60% in the following qualifications:

- A Postgraduate Diploma in Chemical Engineering;
- A Bachelor of Engineering Technology (Honours) in Chemical Engineering;
- A Professional Bachelor of Engineering in Chemical Engineering; or related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

RESEARCH AREAS

Environmental Engineering and Bioproducts Technology

- Chemical process risk assessment
- Membrane, ion exchange and biological process developments in environmental and process applications
- Pesticide and heavy metal analysis
- Waste water treatment
- Water re-use with membrane technology
- Food Processing and bioproducts (Rheology, Food properties, Dehydration processes)
- Biosorprtion of heavy metal removal in water treatment
- Environmental Engineering and Management
- Safety and Loss Prevention
- Pollution Control (Water/Air/Soil/Vegetation)
- Waste Management (Solid and Liquid)

Hydrometallurgy, Biotechnology and Mineral Processing

- Sorption of base and heavy metals on porous adsorbents
- Membrane Bioreactor technology
- Bioleaching of solid mineral
- Extraction of precious metals from aqueous solution in supercritical fluids

Oil/Gas Material Science

- Fuel cell technology
- Analysis and modelling of Polymer electrolyte membrane fuel cells
- Biodiesel from agricultural material and waste vegetable oil
- Renewable energy from municipal solid wastes
- Production of Ultra Clean Fuels from Syngas over gold-based Catalysts
- Pipeline Engineering - Flow Assurance along transportation pipelines
- Sand/Hydrates/Wax/Scales/Corrosion deposition and management
- Production and Processing
- Refining, Petrochemical and Storage
- Reservoir Modelling and Simulation
- Enhanced Oil Recovery studies
- Fluid Rheology

DURATION

Full-time: Minimum 1 year / Maximum 3 years
Part-time: Minimum 2 years / Maximum 4 years

VENUE

Bellville

MASTER OF ENGINEERING IN CHEMICAL ENGINEERING (MGCHMR)

Period of Study	Year/Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
6	Y	CHM690R	Thesis	C	--	9	180	1	Full Thesis

DOCTOR OF ENGINEERING IN CHEMICAL ENGINEERING

COURSE AIM

Graduates can conduct independent research in the field of chemical engineering, and contribute significantly to the body of knowledge through the understanding, application and evaluation of existing knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for chemical engineers or technologists working in process related industries. Learners achieving this qualification have the competence to conduct independent research under minimal guidance in the field of chemical engineering, and contribute significantly to knowledge production through the understanding, application and evaluation of existing knowledge. The research problem, its justification, process and outcome is reported in a dissertation which complies with the generally accepted norms for research at that level.

CAREER OPPORTUNITIES

Graduates follow a career in research and development in industry and at research institutes. They are also employed in teaching and research positions at higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

- A level 9 Masters qualification in Chemical Engineering or related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

DURATION

Full-time: Minimum 2 years / Maximum 4 years
Part-time: Minimum 2 years / Maximum 6 years

VENUE

Bellville

DOCTOR OF ENGINEERING IN CHEMICAL ENGINEERING (DGCHMR)

Period of Study	Year/Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
7	Y	CHM710R	Thesis	C	--	10	360	2.0	Full Thesis

PROGRESSION RULES AND CRITERIA

Diploma / National Diploma

a. In order for a student to proceed from Year 1 to Year 2, the student must obtain at least 80 SAQA credits (0.66 HEMIS credits).
b. First-year students who only have Chemical Engineering Technology 2 outstanding at the end of the year in order to progress to Year 2, may register this subject as a co-requisite subject. In this case a student must have attempted but failed the subject. In such a case this student will be allowed to register for Chemical Engineering Technology 2 on the Extended Programme in the following year, while continuing with second-year subjects where there are no clashes in the timetable.
c. In order for a student to proceed from Year 2 to Year 3, the student must obtain at least 210 SAQA credits (1.75 HEMIS credits).
d. Students may normally proceed to register for CE Training (P1 and P2) if they have passed all subjects in Year 1 and Year 2.
e. Students may be allowed to register for P1 and P2 if they are not owing more than two subjects and not more than one subject in each semester.

Academic exclusion rules and appeal procedure

The General Exclusion Process

Students' final assessment results are obtained from the Examinations/faculty office at the end of each semester. A committee consisting of lecturers then conducts a marks review. It makes recommendations on final mark adjustments and identifies students for exclusion based on the criteria (Exclusion Rules). Students will be excluded at the end of the year. Students who perform poorly will receive a letter of warning informing them of their poor performance at the end of Semester 1. Students who perform very poorly at the end of Semester 1 will receive a letter advising them to voluntarily withdraw from the programme; such students will be finally excluded from the programme at the end of the year if they perform very poorly in Semester 2.

A general letter from the faculty office informs the student of exclusion from the programme. This letter gives the deadline for appeals and details the steps to be taken for re-admission to the programme (General Letter). Attached to this letter is a separate letter from the Chemical Engineering Department that details the reasons for exclusion and identifies the exclusion rules that have been contravened. Students that have been excluded are blocked academically by the Faculty Office and cannot register for any subjects in the following year.

Students may appeal against exclusion on the basis of extenuating circumstances (e.g. a death in the family or illness), or other factors that have bearing by writing a letter to the HoD of the Chemical Engineering Department. This letter of appeal must be accompanied by a full academic record and other supporting material and must be submitted to the secretary by Friday of the first week that the University opens for a new year.

An Appeals Committee of the Chemical Engineering Department will evaluate the appeal. It will take into account the overall academic record of the student and the reasons provided for the poor performance. Based on this and input from subject lecturers, a decision is made on whether to re-admit the student into the programme or not. Sometimes certain restrictions will be placed on the student as a condition for re-admission. Furthermore in some cases the Chemical Engineering Department will request certain actions from the student as a condition for readmission, e.g. attendance of counselling sessions.

A written reply to the student's appeal will be given by the Appeals Committee within five working days after submission and must be collected from the secretary of the Chemical Engineering Department. If the student does not agree with or accept the answer from the Appeals Committee, the student may then appeal to the Dean of the Faculty of Engineering.

Excluded students may only appeal against the exclusion once during the programme. The Department reserves the right to decline an appeal and the student is fully informed of the decision reasoning of the appeal panel. The student may appeal to the Dean of Engineering if not satisfied with the Department's decision.

Alternative career choices for the student may be discussed with the Bureau for Student Counselling.

General Exclusion Policy

Any Diploma / National Diploma student who fails to complete the qualification within six years (seven years for the Extended Curriculum Programme) will be excluded from the programme. Any Adv Dip / BTech student who fails to complete the qualification in three years will be excluded.

The institutional policy is that any student who fails more than 50% of the number of his/her registered subjects (in any year that s/he is registered for at CPUT) will be excluded from the programme. Any student who fails any subject more than once may be excluded from the programme.

Exclusion policy for students on the Extended Curriculum Programme

A student who fails two or more subjects at the end of the first semester will be advised to withdraw from the course. A student who fails four or more subjects in Year 1, will be excluded completely.

Exclusion policy for Year 1 students

A student will be advised to withdraw from the programme if s/he fails all of the following subjects in the first semester:

- Mathematics 1
- Physics 1
- Chemistry 1

A student will be excluded completely from the programme if s/he fails one of the three abovementioned subjects twice, notwithstanding section A2.1. If a student fails two of the abovementioned subjects, s/ he will not be permitted to enrol for any second semester subjects until the subjects have been passed. In this event, a student is expected to successfully complete the required subjects in the following semester or following year before continuing with the programme.

A student will not be permitted to enrol for any third-semester subjects if s/he has failed both of the following subjects in Semester 2:

- Chemical Engineering Technology 2
- Engineering Physics 2

In the event of the above, the student must re-enrol for the subjects and complete them successfully before being promoted to the next semester.

If a student fails any of the following subjects more than once, s/he will be excluded from the programme:

- Chemical Engineering Technology 2
- Chemical Process Industries 2
- Engineering Physics 2
- Inorganic Chemistry 2
- Drawings: Chemical Engineering
- Physical Chemistry 2

The student will have to re-apply for acceptance for the following year. Alternatively, the student could enrol for the subject(s) through another institution offering an accredited equivalent course, e.g. UNISA, and on completion re-apply for enrolment and credits for the subjects under consideration.

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for degree purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

DIPLOMA SUBJECTS: CHEMICAL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.
Subjects without a number at the end do not have an equivalent at a higher level.

BIOPROCESS AND ENVIRONMENTAL ENGINEERING

Pre-requisite:	Chemical Engineering Technology 2; Chemical Process Technology
Mode of delivery	Lectures: 1.5 hours per week, Tutorials: 45 minutes per week
Subject outline:	Fundamental Principles of Microbiology and Biology; Biological Reaction Kinetics; Mass Balances; Introduction to Bioreactor Operations; Introduction to Environmental Pollution; Principles of Environmental Impact Assessments and Life Cycle Analysis.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL ENGINEERING LABORATORY 2A

Pre-requisite:	Chemical Engineering Technology 1
Co-requisite:	Chemical Engineering Technology 2; Process Fluid Flow; Transfer Processes; Chemical Engineering Thermodynamics
Mode of delivery	Lectures: 45 minutes per week, 8 practicals
Subject outline:	Practical Experiments covering topics in Process Fluid Flow; Transfer Processes and Chemical Engineering Thermodynamics.
Assessment:	Laboratory Reports and Oral Presentation. All assessments are compulsory. Sub-minimum: 50% in the Final Report and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL ENGINEERING LABORATORY 2B

Pre-requisite:	None
Co-requisite:	Chemical Engineering Technology 2; Process Fluid Flow; Transfer Processes; Chemical Engineering Thermodynamics; Particle Technology
Mode of delivery	Lectures: 45 minutes per week, 8 practicals

Subject outline:	Practical experiments covering topics in Particle Technology; Transfer Processes; Chemical Engineering Thermodynamics and Chemical Engineering Technology 2
Assessment:	Laboratory Reports and Oral Presentation. All assessments are compulsory. Sub-minimum: 50% in the Final Report and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL ENGINEERING PROJECTS

Pre-requisite:	Chemical Engineering Laboratory 2B
Mode of delivery	Lectures: 3 hours per week
Subject outline:	A combination of work-integrated learning modalities such as work-directed theoretical learning, problem-based learning and project-based learning will be utilised to investigate a chemical engineering problem
Assessment:	Assignments and Oral Presentation. All assessments are compulsory. Sub-minimum: 50% in the Final Report and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL ENGINEERING TECHNOLOGY 1

Co-requisite:	Engineering Chemistry 1; Engineering Mathematics 1; Engineering Physics 1
Mode of delivery	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Introduction to Engineering Calculations; Processes and Process variables; Problem Solving; Chemical Reaction and Stoichiometry; Introduction to Material Balances.
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL ENGINEERING TECHNOLOGY 2

Pre-requisite:	Chemical Engineering Technology 1; Engineering Chemistry; Engineering Mathematics 1; Engineering Physics
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week
Subject outline:	Material Balances; Gases, Liquids and Vapours; Energy Balances; Combined mass and energy balances
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL ENGINEERING THERMODYNAMICS

Pre-requisite:	Chemical Engineering Technology 1; Engineering Chemistry; Engineering Mathematics 1; Engineering Physics
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week
Subject outline:	Introduction and fundamental concepts; Laws of thermodynamics; Properties of fluids/solids; Fundamental concepts of solution thermodynamics; Steam Plant; Thermodynamic Cycles; Reciprocating Air Compressors; Gas Turbines; Refrigeration; Chemical Reaction Equilibrium and Phase Equilibria; Heat effects in Industrial reactions
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL PROCESS TECHNOLOGY

Pre-requisite:	None
Co-requisite:	Chemical Engineering Technology 1; Engineering Chemistry
Mode of delivery	Lectures: 1.5 hours per week, Tutorials: 45 minutes per week
Subject outline:	Petroleum Refining and Petrochemical; Mineral Processing; Water and Wastewater. At least two of the following topics: Paper and Pulp; Polymers and Textiles; Bulk Chemicals; Biotechnology; Fertilizers.
Assessment:	All assessments are compulsory. Class tests, Assignments, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING CHEMISTRY

Pre-requisite:	None
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week, 10 practicals
Subject outline:	Chemical Principles and Calculations; Chemical Reaction Equations and Stoichiometry; Atomic Structure and Periodicity; Ideal and Real Gas Laws; Physical Properties of Solids; Physical Properties of Liquids and Solutions; Reaction Kinetics; Chemical Equilibrium; Electro-Chemistry and redox Reactions; Chemical bonding – ionic and covalent Fundamentals and Applications; introduction to Organic Chemistry (Alkanes); Alkenes and Alkynes; Alkyl Halides; Aromatic Compounds; Alcohols, Phenols & Ethers Aldehydes & Ketones; Carboxylic Acids and Esters; Amines and Amides; Organic Chemistry for synthesis.
Assessment:	All assessments are compulsory. Class tests, practicals, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING COMPUTER APPLICATIONS 1

Pre-requisite:	None
Mode of delivery	Lectures: 3 hours 45 minutes per week
Subject outline:	Orientation and Components of a Computer; The Windows Environment; Word Processing; Spread sheeting; Microsoft Powerpoint; Drawing Equipment; Application of the Alphabets of Lines, lettering, Figuring and Dimensioning; Free Hand Drawing; Using Microsoft Visio (CAD Software); Using Solid Edge (CAD Software).
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING COMPUTER APPLICATIONS 2: PROGRAMMING

Pre-requisite:	Engineering Computer Applications 1
Mode of delivery	Lectures: 1½ hours per week
Subject outline:	Introduction to Computation; MATLAB basics; Beyond the Basics/Programming; Application to Mathematics and Chemical Engineering Problems
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING MATHEMATICS 1

Pre-requisite:	None
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1.5 hours per week
Subject outline:	Basic Algebra; Functions; Radian Measure; Parametric Curves; Limits and Continuity; Differentiation; Applications of Differentiation; Integration; Applications of Integration; Introduction to Statistics; Linear Algebra; Optimisation and Linear Programming; Complex numbers; Differential Equations; Tylor and Maclaurin Series.
Assessment:	All assessments are compulsory. Class tests, tutorials, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING MATHEMATICS 2

Pre-requisite:	Engineering Mathematics 1; Engineering Physics
Mode of delivery	Lectures: 1½ hours per week, Tutorials: 45 minutes per week
Subject outline:	Linear Algebra: Matrices; Linear Programming; Software packages like Matlab to solve linear functions
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING PHYSICS

Pre-requisite:	None
Mode of delivery	Lectures: 1½ hours per week, Tutorials: 45 minutes per week, 5 practicals
Subject outline:	Mechanics including Concept of Motion, Kinematics, Vectors and Co-ordinate Systems, Force and Motion, Moments of Inertia, Introduction to Fluid Statistics; Conservation Laws; Electricity; Magnetic Fields; Nuclear Physics.
Assessment:	All assessments are compulsory. Class tests, practicals, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING COMMUNICATION

Pre-requisite:	None
Mode of delivery	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Communication in the Workplace; Read with Comprehension; Write clearly; Manage and Present Information; Listening and Speaking.
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Presentations, Industrial visits, Information Literacy. Sub-minimum: Satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

INTRODUCTION TO CHEMICAL REACTION ENGINEERING

Pre-requisite:	Chemical Engineering Technology 2; Engineering Chemistry
Co-requisite:	Engineering Mathematics 2
Mode of delivery	Lectures: 1½ hours per week, Tutorials: 45 minutes per week
Subject outline:	Introduction to Reaction Engineering Concepts; Conversion and Reactor Sizing; Rate Laws and Stoichiometry; Isothermal Reactor Sizing.
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours.

	Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

INTRODUCTION TO SOCIAL STUDIES AND HUMANITIES

Pre-requisite:	None
Mode of delivery	Lectures: 1½ hours per week, Tutorials: 45 minutes per week
Subject outline:	Demography and population dynamics; developmental studies in financial, economic and cultural hubs in SA; Labour policy and globalisation; Migration and society
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

INVESTIGATIVE PROJECTS

Pre-requisite:	None
Co-requisite:	Engineering Mathematics 2; Introduction to Chemical Reaction Engineering; Process Control and Instrumentation; Separations Processes - Unit Operations
Mode of delivery	Lectures: 1½ hours per week; Practicals 1.5 hours per week
Subject outline:	The aim of the course is to provide students with a competency to apply process technology to chemical engineering related problems, process design and will illustrate technical competence thus contributing to the needs of the chemical profession. Content is dependent on availability of equipment.
Assessment:	Technical Reports and Oral Presentation. All assessments are compulsory. Sub-minimum: 50% in the Final Report and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

MANAGEMENT AND ENTREPRENEURIAL SKILLS

Pre-requisite:	Engineering Communication
Mode of delivery	Lectures: 2 hours 25 minutes per week
Subject outline:	Introduction into the Principles and Practice of Management; Introduction to Human Relations in Organisations; Introduction to Project Management; Managerial Environment; Entrepreneurial Skills; Introduction to Workplace Law
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PARTICLE TECHNOLOGY

Pre-requisite:	Chemical Process Technology; Engineering Physics
Co-requisite:	Chemical Engineering Technology 1
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week
Subject outline:	Characterization of particulate solids; Flow of particles through fluids; Types of equipment for conveying, storage and measurement of particulate materials; Principles of separation of solids from fluids; Fluidisation principles; Material Science; Corrosion
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PROCESS CONTROL AND INSTRUMENTATION

Pre-requisite:	Chemical Engineering Technology 2; Engineering Mathematics 1; Engineering Physics
Co-requisite:	Engineering Mathematics 2; Introduction to Chemical Reaction Engineering
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week
Subject outline:	Introductory Concepts; Process Control Instrumentation; Mathematical Modelling of Chemical Process; Transfer Functions and the Input-output Model.
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PROCESS DESIGN PRINCIPLES 2: SAFETY AND LOSS PREVENTION

Pre-requisite:	Engineering Computer Applications 1
Co-requisite:	Chemical Engineering Technology 2; Chemical Engineering Thermodynamics; Process Fluid Flow; Transfer Processes
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week
Subject outline:	Introduction to Process Design; Introduction to Process Analysis; Introduction to Process Synthesis and Optimization; Process Safety; Introduction to Process Economics; Equipment selection and Specification; Ethical issues in Design
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PROCESS DESIGN PRINCIPLES 3: EQUIPMENT DESIGN

Pre-requisite:	Process Design Principles 2: Safety and Loss Prevention; Transfer Processes
Co-requisite:	Separations Processes - Unit Operations
Mode of delivery	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Overview of process simulation; More on Process Synthesis and Analysis; Design of Utility Systems; Design of Heat Recovery system; Introduction to Process Intensification and Integration; Design of Control systems; Design of Reacting systems; Design of Pumping and Piping systems
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PROCESS FLUID FLOW

Pre-requisite:	Chemical Engineering Technology 1; Engineering Mathematics 1; Engineering Physics
Mode of delivery	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Fluid statics and dynamic principles; Flow of Fluids in Pipes and Channels; Pumps and Pump Systems; Mixing of Liquids in Tanks
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

SEPARATIONS PROCESSES - UNIT OPERATIONS

Pre-requisite:	Chemical Engineering Technology 2; Transfer Processes
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week
Subject outline:	Heat Transfer Fundamentals, Heat Transfer Processes; Mass Transfer Fundamentals; Mass Transfer Processes
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

TRANSFER PROCESSES

Pre-requisite:	Chemical Engineering Technology 1; Engineering Mathematics 1; Engineering Physics
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week – semester 1 Lectures: 1½ hours per week, Tutorials: 45 minutes per week – semester 2
Subject outline:	Conduction; Convection; Radiation; Processes involving Boiling and Condensation; Shell and Tube Heat Exchangers; Plate Heat Exchangers; Fundamentals of Mass Transfer; Convective Mass Transfer; Gas-liquid Mass Transfer Processes; Liquid-liquid Mass transfer Processes; Adsorption
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ADVANCED DIPLOMA SUBJECTS: CHEMICAL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.
Subjects without a number at the end do not have an equivalent at a higher level.

APPLIED CHEMISTRY 4: ANALYTICAL AND ENVIRONMENTAL

Pre-requisite:	None
Mode of delivery:	Lectures: 1½ hours per week, Tutorials: 45 minutes per week
Subject outline:	Introduction to analytical methods for environmental chemical analysis –application and fundamentals; qualitative methods; quantitative methods; modern analytical instrument methods; statistical chemical data analysis.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

BIOPROCESSING 4 AND ENVIRONMENTAL SUSTAINABILITY

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Biological reaction kinetic applications; mass balances; bioreactor operations; Bioprocesses for sustainable remediation; bioprocess for sustainable renewables.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL REACTION ENGINEERING 4

Pre-requisite:	None
Mode of delivery:	Lectures: 1½ hours per week, Tutorials: 45 minutes per week
Subject outline:	Collection and analysis of Experimental rate data, Multiple Reactions, Non-ideal flow reactors
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING MATHEMATICS 4

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 1½ hours per week
Subject outline:	Integral Theorems, Ordinary Differential Equations, Fourier Series, Partial Differential Equations, Numerical Methods, Inferential statistics
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENVIRONMENTAL ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Introduction to environmental issues; air pollution; water pollution; solid waste; measuring environmental impacts; sustainable development and pollution prevention.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENVIRONMENTAL LAW

Pre-requisite:	None
Mode of delivery	Lectures: 1½ hours per week
Subject outline:	Introduction to environmental law and legislation in SA, National Environmental Management Act No. 107 of 1998. (NEMA), Water Services Act No. 108 of 1997, National Water Act No. 36 of 1998, National Environmental Management: Air Quality Act No. 39 of 2004 (which replaced/repealed the outdated Atmospheric Pollution Prevention Act No. 45 of 1965), Occupational Health and Safety Act No. 85 of 1993
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

GENERAL ENGINEERING FOR CHEMICAL ENGINEERS 3

Pre-requisite:	None
Mode of delivery:	Lectures: 1½ hours per week
Subject outline:	Introduction to basic electricity, basic electronics, resistances, Ohms and Kirchoff laws, circuits and inductors. Welding techniques; surface roughness and its measurement; factors contributing to quality of surface finish.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

GENERAL ENGINEERING FOR CHEMICAL ENGINEERS 4

Pre-requisite:	None
Mode of delivery:	Lectures: 1½ hours per week
Subject outline:	Introduction to strength of materials; direct stress; shear stress; elastic constraints; sheer stress and bending moments; boring; broaching; grinding.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

LABORATORY 4

Pre-requisite:	None
Mode of delivery:	Lectures: 1½ hours per week, Tutorials: 45 minutes per week, 8 practicals
Subject outline:	Laboratory practicals aligned with separations processes 4; oil and gas processes; minerals processing; environmental engineering.
Assessment:	Laboratory Reports and Oral Presentation. All assessments are compulsory. Sub-minimum: 50% in the Final Report and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

MINERALS PROCESSING

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Ores and other sources of metals and minerals in Southern Africa; principles and theories involved in sorting, gravity concentration, froth flotation, magnetic separation, high tension separation and dense medium separation; sampling testing and milling calculations; plant operations and flow sheets; waste handling and treatment recovery and/or disposal in mineral processing.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

OIL AND GAS PROCESSING

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Introduction to petrochemical technology; synthetic petroleum technologies; petroleum separation processing; fine petrochemical technology.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

PROCESS DESIGN 4

Pre-requisite:	None
Mode of delivery:	Lectures: 1½ hours per week, Tutorials: 45 minutes per week
Subject outline:	Overview of equipment selection and rating; Service learning project; main design project.
Assessment:	Technical Reports and Oral Presentation. All assessments are compulsory. Sub-minimum: 40% in the Final Report and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

RESEARCH METHODOLOGY AND PROJECT

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Introduction; Scientific method (research topics and questions); literature review; methods of data collection; analysis; ethics; research proposal.
Assessment:	Assignments and Oral Presentation. All assessments are compulsory. Sub-minimum: 40% in the Final Report and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

SEPARATION PROCESSES 4: MULTI-STAGE OPERATIONS

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 1½ hours per week
Subject outline:	Fundamentals of separation processes; single equilibrium stages and flash calculations; cascades and hybrid systems; adsorption and stripping of dilute mixtures; distillation of binary mixtures; liquid-liquid extraction with ternary systems.
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

BACHELORS SUBJECTS: CHEMICAL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.
Subjects without a number at the end do not have an equivalent at a higher level.

CHEMICAL ENGINEERING COMPUTER APPLICATIONS 1

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours 45 minutes per week
Subject outline:	Orientation and Components of a Computer; The Windows Environment; Word Processing; Spread sheeting; Microsoft PowerPoint; Drawing Equipment; Application of the Alphabets of Lines, lettering, Figuring and Dimensioning; Free Hand Drawing; Using Microsoft Visio (CAD Software); Using Solid Edge (CAD Software).
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL ENGINEERING TECHNOLOGY 1

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Introduction to Engineering Calculations; Processes and Process variables; Problem Solving; Chemical Reaction and Stoichiometry; Introduction to Material Balances.
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

CHEMICAL PROCESS TECHNOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures: 1.5 hours per week, Tutorials: 45 minutes per week
Subject outline:	Petroleum Refining and Petrochemical; Mineral Processing; Water and Wastewater. At least two of the following topics: Paper and Pulp; Polymers and Textiles; Bulk Chemicals; Biotechnology; Fertilizers.
Assessment:	All assessments are compulsory. Class tests, Assignments, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

COMMUNICATION SKILLS FOR CHEMICAL ENGINEERS

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 45 minutes per week
Subject outline:	Communication in the Workplace; Read with Comprehension; Write clearly; Manage and Present Information; Listening and Speaking.
Assessment:	All assessments are compulsory. Class tests, Assignments, Projects, Presentations, Industrial visits, Information Literacy. Sub-minimum: Satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING CHEMISTRY 1

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 1½ hours per week, 10 practicals
Subject outline:	Chemical Principles and Calculations; Chemical Reaction Equations and Stoichiometry; Atomic Structure and Periodicity; Ideal and Real Gas Laws; Physical Properties of Solids; Physical Properties of Liquids and Solutions; Reaction Kinetics; Chemical Equilibrium; Electro-Chemistry and redox Reactions; Chemical bonding – ionic and covalent Fundamentals and Applications; introduction to Organic Chemistry (Alkanes); Alkenes and Alkynes; Alkyl Halides; Aromatic Compounds; Alcohols, Phenols & Ethers Aldehydes & Ketones; Carboxylic Acids and Esters; Amines and Amides; Organic Chemistry for synthesis.
Assessment:	All assessments are compulsory. Class tests, practicals, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING MATHEMATICS 1

Pre-requisite:	None
Mode of delivery:	Lectures: 3 hours per week, Tutorials: 1.5 hours per week
Subject outline:	Basic Algebra; Functions; Radian Measure; Parametric Curves; Limits and Continuity; Differentiation; Applications of Differentiation; Integration; Applications of Integration; Introduction to Statistics; Linear Algebra; Optimisation and Linear Programming; Complex numbers; Differential Equations; Tylor and Maclaurin Series.
Assessment:	All assessments are compulsory. Class tests, tutorials, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENGINEERING PHYSICS

Pre-requisite:	None
Mode of delivery:	Lectures: 1½ hours per week, Tutorials: 45 minutes per week, 5 practicals
Subject outline:	Mechanics including Concept of Motion, Kinematics, Vectors and Co-ordinate Systems, Force and Motion, Moments of Inertia, Introduction to Fluid Statistics; Conservation Laws; Electricity; Magnetic Fields; Nuclear Physics.
Assessment:	All assessments are compulsory. Class tests, practicals, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment, 50% for practical's and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

ENVIRONMENTAL LAW

Pre-requisite:	None
Mode of delivery:	Lectures: 1½ hours per week
Subject outline:	Introduction to environmental law and legislation in SA, National Environmental Management Act No. 107 of 1998. (NEMA), Water Services Act No. 108 of 1997, National Water Act No. 36 of 1998, National Environmental Management: Air Quality Act No. 39 of 2004 (which replaced/repealed the outdated Atmospheric Pollution Prevention Act No. 45 of 1965), Occupational Health and Safety Act No. 85 of 1993
Assessment:	All assessments are compulsory. Class tests, Assignments, Project, Final Integrated Summative Assessment of three hours. Sub-minimum: 40% in the Final Integrated Summative Assessment and satisfactory fulfilment of the requirements of the exit level outcomes and competencies of the subject.

DEPARTMENT OF CIVIL ENGINEERING AND SURVEYING

DEPARTMENT OFFICE-BEARERS

POSITION	NAME	TELEPHONE	E-MAIL
Head of Department	Ms A Kamalie, Master of Engineering Management, MSc (Sanitary Engineering)	021 959 6619	KamalieA@cput.ac.za
Secretary	Ms W Heuvel	021 959 6650	HeuvelW@cput.ac.za
Admin Assistant (ECP)	Ms G Pretorius	021 959 6206	PretoriusG@cput.ac.za
Admin Assistant	Mr S Makaluza	021 460 3309	MakaluzaS@cput.ac.za
Admin Assistant	Mr J Alberts	021 959 6111	AlbertsJ@cput.ac.za

DEPARTMENTAL STAFF

POSITION	NAME	QUALIFICATIONS
Senior Lecturer / Head of Programme: ND: Civil	Mr M Habets	MTech (Civil), Pr Tech Eng
Senior Lecturer / Head of Programme: Diploma Civil	Dr P Kumar	PhD (Civil), MIStrEng
Senior Lecturer / Head of Programme: Advanced Diploma: Civil	Mr C Mutsvangwa	MEng (Civil), MSc (Water & Environmental Management)
Senior Lecturer / Head of Programme: Bachelors: Civil	Dr Y Owusu-Asante	BSc Hons (Geological Engineering), BSc Hons (Geohydrology), MSc (Geohydrology), MEng (Water & Environmental Engineering), PhD (Water & Environmental Engineering)
Senior Lecturer / Head of Programme: BTech: Civil	Mr MJ Phillips	MEng (Sanitary Engineering)
Head of Programme: Diploma & Bachelors: Geomatics	Mr K Musungu	MSc Engineering (Geomatics)
Co-ordinator: Extended Programme	Mr MN Armien	MEd, HDE
Co-ordinator: WIL	Ms P Overmeyer	NHD (Civil)
Co-ordinator: WIL	Mr B Fortuin	NHD (Civil)
Adjunct Prof	Prof R Haldenwang	DTech (Civil)
Senior Lecturer	Dr B Ncube	MSc (Water Resources Engineering & Management), PhD (Production Ecology and Resource Conservation)
Lecturer	Mrs C Belford	MEng (Transportation Studies)
Lecturer	Dr BO Bello	MEd (Applied Linguistics), PhD (Language & Literacy studies)
Lecturer	Dr P Bukenya	DEng (Civil)
Lecturer	Ms P Duncan	MSc Engineering (Geomatics)
Lecturer	Mr J Erasmus	NHD (Civil)
Lecturer	M Francis	BSc (Civil)
Lecturer	Mr C Jabaar	MTech (Civil)

POSITION	NAME	QUALIFICATIONS
Lecturer	Mr BM Kabamba	BSc (Metallurgical Engineering), MTech (Civil)
Lecturer	DR MC Khahledi	MTech (Civil), HED
Lecturer	Mr R M Mambwe	BSc (Civil), MEng (Environmental)
Lecturer	Ms S Manyumwa	BSc (Eng), MSc (Eng), MBA
Lecturer	Mr PM Neal	MTech (Civil)
Lecturer	Dr C Nel	BEng, MBA, MSc (Eng), PhD (Civil), Pr Eng
Lecturer	Dr M Pourbehi	PhD (Civil)
Lecturer	Ms C Theron	MSc (Environmental)
Lecturer	Mr H Zaayman	MSc (Mathematics), HED
Junior Lecturer	Mr O Abegunde	MSc (Applied Geology)
Junior Lecturer	Mr R Anders	ND (Civil), NHD (P.S.E)
Junior Lecturer	Mrs F Maneli	BTech (Civil), BTech (Project Management)
Junior Lecturer	Ms KM Rodriguez-Garcia	BSc (Civil), HED, Pr Tech
Junior Lecturer	Mr PP Siebritz	NHD (Civil)
Senior Technician	Mr L Minnies	BTech (Civil)
Technician	Mr N George	BSc, HDE
Technician	Mr LD Maduna	ND (Civil)
Technician	Mr X Nkwanteni	BTech (Civil)
Technician (ECP)	Mr KM Roqoza	BTech (Civil)
Technician	Mrs RR Smit	BTech (Surveying)
Technician	Mr T Thuse	BTech (Surveying), MSc (Cartography)
IT Technician	Mr O Menong	BTech (Information Technology)
Lab Assistant	Mr P Kainda	Matric
Lab Assistant	Mr W Snell	Grade 11
Lab Assistant	Ms P Tekula	--
General Worker	Ms N Mralaza	Grade 12

QUALIFICATIONS OFFERED

Civil Engineering

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration	Work Integrated Learning
Diploma in Civil Engineering	D3CIVL	3 years	6 years	6 months
Diploma in Civil Engineering (Extended)	D3CIVX	4 years	8 years	6 months
Advanced Diploma in Civil Engineering	ADCIVL	1 year	2 years	--
Bachelor of Engineering Technology in Civil Engineering	BGENCV	3 years	6 years	--
Master of Engineering in Civil Engineering	MGCIVR	1 Year (full-time) 2 Years (part-time)	3 Years (full-time) 4 Years (part-time)	--
Doctor of Engineering in Civil Engineering	DGCIVR	2 Years (full-time) 4 Years (part-time)	4 Years (full-time) 6 Years (part-time)	--

Geomatics (combining Surveying & Cartography)

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration	Work Integrated Learning
Diploma in Geomatics	D3GMTS	3 years	6 years	6 months
Bachelor of Geomatics	BPGMTS	3 years	6 years	--
MTech: Cartography (Phasing out)	MTCARR	1 year	2 years	--

DIPLOMA IN CIVIL ENGINEERING

COURSE AIM

The graduate at this level functions as a technician who displays competence as a member of the engineering team in the execution of technical tasks. The course will develop the application of knowledge, independent thinking and communication skills, as well as proficiency in the identification and solution of engineering problems.

This qualification is primarily industry oriented. The knowledge emphasises general principles and application or technology transfer. The qualification provides students with a sound knowledge base in a particular field or discipline and the ability to apply their knowledge and skills to particular career or professional contexts, while equipping them to undertake more specialised and intensive learning. Programmes leading to this qualification tend to have a strong professional or career focus and holders of this qualification are normally prepared to enter a specific niche in the labour market.

PURPOSE AND RATIONALE OF THE QUALIFICATION

A learner achieving this qualification will be competent to apply theoretical knowledge, practical experience and skills in civil engineering as a civil engineering technician, who is part of the engineering team, by applying proven techniques to engineering activity, within standards and codes under remote supervision, and under close supervision if operating outside standards and codes.

Specifically the purpose of the educational programmes designed to meet this qualification are to build the necessary knowledge, understanding, abilities and skills required for further learning towards becoming a competent practicing Professional Engineering Technician. This qualification provides entry to programmes e.g. Advanced Diploma or Bachelors Degree Programmes.

CAREER OPPORTUNITIES

Graduates are employed by civil engineering contractors, consulting engineers, and government departments at local, provincial, or national level. Broadly speaking civil engineering is divided into two basic activities: planning and design on the one hand, and construction and maintenance on the other. The work will vary considerably according to the field of employment, but in both fields the technician will provide in-depth support, sometimes of a highly specialised nature, to the engineering team. Construction and maintenance projects include bridges, dams, railways, roads, harbours, sewers, pipelines, and other structures. In the planning and design field, the graduate will be engaged in survey, design, costing, estimating, drafting, traffic studies, materials investigation, and testing.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or TS 5 (60%)	N/A	M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:

E (English) PS (Physical Science)
M (Maths) TS (Technical Science)
TM (Technical Maths) ES (Engineering Science)

PROFESSIONAL REGISTRATION

The Diploma in Civil Engineering is provisionally accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.

DURATION

Full-time: Three years, including 6 months Work Integrated Learning (WIL).

VENUE

Bellville

DIPLOMA IN CIVIL ENGINEERING (D3CIVL)

(All subjects compulsory)
Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st YEAR (all subjects compulsory)									
Applied Mechanics	AME150S	01	Y	5	C	--	7	0,063	CE
Computer Skills	CMS150S	01	Y	5	C	--	7	0,062	CE
Construction Materials Technology	CCA150S	01	Y	5	C	--	14	0,125	CE
Engineering Chemistry	ECM150S	01	Y	5	C	--	14	0,125	CE
Engineering Drawing 1	DRA150S	01	Y	5	C	--	14	0,125	CE
Engineering Mathematics 1	MTH151S	01	Y	5	C	--	14	0,125	CE
Engineering Physics	EGP150S	01	Y	5	C	--	14	0,125	CE
Professional and Technical Communication	PTC150S	01	Y	5	C	--	7	0,062	CE
Surveying	SUR150S	01	Y	5	C	--	14	0,125	CE
Theory of Structures	TOS150S	01	S2	5	C	(Co-AME150S)	7	0,063	CE
2nd YEAR (all subjects compulsory). All 1st year subjects must be passed before admission to 2nd year is allowed.									
Civil Engineering Documentation	DOC260S	01	Y	6	C	PTC150S, DRA150S	14	0,111	CE
Engineering Management	MCI260S	01	Y	6	C	PTC150S, DRA150S	14	0,111	CE
Engineering Mathematics 2	MTH260S	01	Y	6	C	MTH151S	14	0,111	CE
Geotechnical Engineering	GET260S	01	Y	6	C	CCA150S	21	0,167	CE
Structural Analysis	STY260S	01	Y	6	C	EGP150S, TOS150S, MTH150S	14	0,111	CE
Transportation Engineering	TEG260S	01	Y	6	C	CCA150S, SUR150S	21	0,167	CE
Water Engineering 1	WER260S	01	Y	6	C	ECM150S, EGP150S, MTH151S, TOS150S	14	0,111	CE
Engineering Drawing 2	DRA260S	01	S1	6	C	DRA150S, SUR150S	7	0,056	CE
Introduction to Environmental Engineering	ENM260S	01	S2	6	C	ECM150S, EGP150S	7	0,055	CE

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
3rd YEAR (all subjects compulsory). All 2nd year subjects must be passed before admission to 3rd year is allowed.									
Applied Mathematics	MTH360S	01	S1	6	C	MTH260S. All Y1 and Y2 subjects passed.	14	0,111	CE
Engineering Design	END360S	01	S1	6	C	STY260S, DRA260S. All Y1 and Y2 subjects passed.	21	0,167	CE
Engineer in Society	ENY360S	01	S1	6	C	PTC150S. All Y1 and Y2 subjects passed.	7	0,056	CE
Integrated Computer Project	ICP360S	01	S1	6	C	WER260S, GET260S, TEG260S, STY260S, DRA260S. All Y1 and Y2 subjects passed. (Co-MTH360S, END360S, WER260S)	30	0,250	CE
Water Engineering 2	WER360S	01	S1	6	C	WER260S. All Y1 and Y2 subjects passed.	21	0,167	CE
Civil Engineering Industrial Project	CEP360S	01	S2	6	C	All Y1 and Y2 subjects passed. ICP360S, MTH360S, END360S, ENY360S, WER260S	30	0,250	CE

DIPLOMA IN CIVIL ENGINEERING (EXTENDED) (D3CIVX)

COURSE AIM

In the Extended Curriculum with Foundational Provision Programme, first year subjects of the National Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two year Foundational Programme, students will integrate with the mainstream programme.

DURATION

Full-time: The four year programme comprises six academic semesters and one semester of Work Integrated Learning.

Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
YEAR ZERO (all subjects compulsory)									
Applied Mechanics	AME150X	01	Y	5	C	--	7	0.063	CE
Computer Skills	CMS150X	01	Y	5	C	--	7	0.062	CE
Engineering Drawing 1	DRA150X	01	Y	5	C	--	14	0.125	CE
Engineering Mathematics 1	MTH151X	01	Y	5	C	--	14	0.125	CE
Engineering Physics	EGP150X	01	Y	5	C	--	14	0,125	CE
Professional and Technical Communication	PTC150X	01	Y	5	C	--	7	0,062	CE
Surveying	SUR150X	01	Y	5	C	--	14	0.125	CE
1st YEAR (all subjects compulsory).									
Construction Materials Technology	CCA150X	01	Y	5	C	--	14	0.125	CE
Engineering Chemistry	ECM150X	01	Y	5	C	--	14	0.125	CE
Engineering Management	MCI260S	01	Y	6	C	PTC150X, DRA150X	14	0.111	CE
Engineering Mathematics 2	MTH260S	01	Y	6	C	MTH151X	14	0.111	CE
Theory of Structures	TOS150X	01	Y	5	C	AME150X	7	0.063	CE
Engineering Drawing 2	DRA260S	01	S1	6	C	DRA150X, SUR150X	7	0.056	CE
Introduction to Environmental Engineering	ENM260S	01	S2	6	C	EGP150X	7	0.055	CE
2nd YEAR (all subjects compulsory). All year 0 and 1st year subjects must be passed before admission to 2nd year is allowed									
Civil Engineering Documentation	DOC260S	01	Y	6	C	PTC150X, DRA150X	14	0.111	CE
Geotechnical Engineering	GET260S	01	Y	6	C	CCA150X	21	0.167	CE

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Structural Analysis	STY260S	01	Y	6	C	EGP150X, TOS150X, MTH151X	14	0.111	CE
Transportation Engineering	TEG260S	01	Y	6	C	CCA150X, SUR150X	21	0.167	CE
Water Engineering 1	WER260S	01	Y	6	C	ECM150X, EGP150X, MTH151X, TOS150X	14	0.111	CE
3rd YEAR (all subjects compulsory). All 2nd year subjects must be passed before admission to 3rd year is allowed.									
Applied Mathematics	MTH360S	01	S1	6	C	MTH260S. All Y1 and Y2 subject passed.	14	0,111	CE
Water Engineering 2	WER360S	01	S1	6	C	WER260S. All Y1 and Y2 subject passed.	14	0,111	CE
Engineer in Society	ENY360S	01	S1	6	C	PTC150X. All Y1 and Y2 subject passed.	7	0,056	CE
Engineering Design	END360S	01	S1	6	C	STY260S, DRA260S. All Y1 and Y2 subject passed.	14	0,111	CE
Integrated Computer Project	ICP360S	01	S1	6	C	WER260S, GET260S, TEG260S, STY260S, DRA260S (Co-MTH360S, END360S, WER260S)	14	0,111	CE
Civil Engineering Industrial Project	CEP360S	01	S2	6	C	All Y1 and Y2 subject passed. ICP360S, MTH360S, END360S, ENY360S, WER260S	60	0,5	CE

ADVANCED DIPLOMA IN CIVIL ENGINEERING

COURSE AIM

The graduate at this level functions as a technologist who displays competence as a member of the engineering team in the execution of specialist engineering tasks. The course will develop the application of knowledge, independent thinking, and communication skills, as well as proficiency in the identification and solution of complex civil engineering problems.

PURPOSE AND RATIONALE OF THE QUALIFICATION

A learner achieving this qualification will be competent to apply theoretical knowledge, practical experience and skills gained in their specialised area of civil engineering at the level of a Professional technologist by interpreting, managing and applying current technology to complex specialist engineering activity within codes, or by adapting standards and codes, under minimal supervision.

CAREER OPPORTUNITIES

Graduates are employed by civil engineering contractors, consulting engineers, and government departments at local, provincial, or national level. Broadly speaking civil engineering is divided into two basic activities: planning and design on the one hand, and construction and maintenance on the other. The work will vary considerably according to the field of employment, but in both fields the technologist will provide in-depth support, sometimes of a highly specialised nature, to the engineering team. Construction and maintenance projects include bridges, dams, railways, roads, harbours, sewers, pipelines, and other structures. In the planning and design field, the technologist will be engaged in survey, design, costing, estimating, draughting, traffic studies, materials investigation, and testing.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

- A 360 credit Diploma in Civil Engineering or an equivalent qualification at NQF L6.
- A 240 credit National Diploma in Civil Engineering or an equivalent qualification with the 140 credits as stipulated in the ECSA E-21-PN standard for the Advanced Certificate in Engineering Technology in Civil Engineering or a related field together with the 120 WIL credits.
- Students should obtain a 60% pass in the exit level subjects of the 360 Diploma and 60% for the second year of the Diploma in Technology together with 60% for the 120 WIL credits
- Students who do not obtain the 60% average, and with at least 1-year relevant industrial experience may be considered on merit.
- All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

Recognition for Prior Learning (RPL):

RPL will be considered in the context of the CPUT's commitment to alignment with the principles of the NQF and the National Plan for Higher Education in South Africa, with specific reference to:

- Broadening the social base of higher education
- Increasing access to higher education
- Increasing mobility of students across higher education institutions
- And other learning contexts
- Accelerating progress through learning programmes
- Increasing the number of graduates
- Developing staff

PROFESSIONAL REGISTRATION

The Advanced Diploma in Engineering: Civil is accredited by the Engineering Council for South Africa (ECSA). Graduates will comply with the academic requirements for registration as a Professional technologist.

DURATION

Full-time: 1 year Full Time

VENUE

Bellville

ADVANCED DIPLOMA IN CIVIL ENGINEERING (ADCIVL)

Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Year / Semester Subject	Subject Name	Subject Code	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
4th Year (All Subjects Compulsory)								
S1	Computer Applications	CPA470S	C	--	7	7	0.050	CE
S1	Construction Materials & Technology	CMT470S	C	--	7	7	0.050	CE
S1	Engineering Chemistry	ECH461S	C	--	6	7	0.050	CE
S1	Environmental Engineering	EVE461S	C	--	6	7	0.050	CE
S1	Engineering Mathematics	EMA473S	C	--	7	14	0.100	CE
S1	Public Law	PLW470S	C	--	7	14	0.100	CE
S2	Geotechnical Engineering	GET470S	C	--	7	14	0.100	CE
S2	Hydraulic Engineering & Design	HED470S	C	--	7	14	0.100	CE
S2	Research Methodology & Project	RMP470S	C	--	7	14	0.100	CE
S2	Structural Design	SDE470S	C	--	7	14	0.100	CE
S2	Transportation Engineering & Planning	TEP470S	C	--	7	14	0.100	CE
S2	Water & Wastewater Treatment Technology	WWT470S	C	--	7	14	0.100	CE

BACHELOR OF ENGINEERING TECHNOLOGY IN CIVIL ENGINEERING

COURSE AIM

The graduate at this level functions as a technologist who displays competence as a member of the engineering team in the execution of technical tasks. The course will develop the application of knowledge, independent thinking and communication skills, as well as proficiency in the identification and solution of complex civil engineering problems.

PURPOSE AND RATIONALE OF THE QUALIFICATION

A learner achieving this qualification will be competent to apply theoretical knowledge, practical experience and skills in civil engineering as a civil engineering technologist, who is part of the engineering team, by applying current and proven techniques to engineering activity, within standards and codes and working independently and responsibly.

CAREER OPPORTUNITIES

Graduates are employed by civil engineering contractors, consulting engineers, and government departments at local, provincial, or national level. Broadly speaking civil engineering is divided into two basic activities: planning and design on the one hand, and construction and maintenance on the other. The work will vary considerably according to the field of employment, but in both fields the technician will provide in-depth support, sometimes of a highly specialised nature, to the engineering team. Construction and maintenance projects include bridges, dams, railways, roads, harbours, sewers, pipelines, and other structures. In the planning and design field, the graduate will be engaged in survey, design, costing, estimating, drafting, traffic studies, materials investigation, and testing.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 36 using Method 2 E (First language) 5 (60%) M 5 (60%) or TM 5 (60%) PS 5 (60%) or TS 5 (60%)	N/A	M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:

E (English)
M (Maths)
TM (Technical Maths)
PS (Physical Science)
TS (Technical Science)
ES (Engineering Science)

PROFESSIONAL REGISTRATION

The BEng Tech in Civil Engineering is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technologists.

DURATION

Full-time: Three years

VENUE

Bellville

BACHELOR OF ENGINEERING TECHNOLOGY IN CIVIL ENGINEERING (BGENCV)

(All subjects compulsory)
Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester / Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st YEAR (all subjects compulsory)									
Construction Materials Technology	CMT150S	01	S1	5	C	--	7	0.057	CE
Engineering Drawing	EDW150S	01	S1	5	C	--	7	0.057	CE
Engineering Mathematics 1A	EMA153S	01	S1	5	C	--	14	0.114	CE
Physical Sciences	PHY154S	01	S1	5	C	--	14	0.114	CE
Professional & Technical Communication	PTC153S	01	S1	5	C	--	7	0.057	CE
Surveying 1	SUR151S	01	S1	5	C	--	12	0.098	CE
Applied Mechanics	APM150S	01	S2	5	C	PHY154S	14	0.114	CE
Computer Technology	CPT151S	01	S2	5	C	EDW150S	10	0.080	CE
Construction Methods	CNM151S	01	S2	5	C	CMT150S	7	0.057	CE
Engineering Mathematics 1B	EMA154S	01	S2	5	C	EMA153S	14	0.114	CE
Geology	GEO151S	01	S2	5	C	--	7	0.057	CE
Soil Mechanics	SMC160S	01	S2	6	C	CMT150S	10	0.081	CE
Surveying 2	SUR260S	01	S2	6	C	SUR151S	7	0.046	CE
2nd YEAR (all subjects compulsory)									
Engineering Management	EMN260S	01	S1	6	C	PTC150S	10	0,065	CE
Engineering Mathematics 2	EMA270S	01	S1	7	C	EMA153S, EMA154S	14	0.092	CE
Structural Analysis 1	STA262S	01	S1	6	C	PHY154S, APM150S, EMA153S, EMA154S	14	0.091	CE
Structural Steel and Timber Design	SST260S	01	S1	6	C	PHY154S, APM150S, EDW150S, (Co-STA262S)	14	0.091	CE
Transportation Engineering 1	TPE260S	01	S1	6	C	SUR260S	14	0.092	CE
Civil Engineering Documentation	CED260S	01	S2	6	C	EDW150S, PTC153S EMN260S	14	0,092	CE
Geotechnical Engineering	GET261S	01	S2	6	C	GEO151S, SMC160S	14	0,091	CE

Subject Description	Subject Code	Offering type	Semester / Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Hydraulics 1	HDR270S	01	S2	7	C	EMA153S, EMA154S, PHY154S	14	0,092	CE
Hydrology	HYD270S	01	S2	7	C	PHY154S	14	0.092	CE
Reinforced Concrete and Masonry Design	RCM260S	01	S2	6	C	STA262S, PHY154S, APM150S, EDW150S (Co-STA262S)	14	0.091	CE
Urban Planning	UBP370S	01	S2	7	C	PTC150S, EDW150S	10	0.063	CE
3rd YEAR: Study Period 3 - (All subjects compulsory)									
Applied Mathematics	AMA370S	01	S1	7	C	PHY154S, EMA153S, EMA154S, EMA270S	14	0.088	CE
Engineer in Society	EIS370S	01	S1	7	C	PTC150S	7	0.044	CE
Project Management Theory	PMT370S	01	S1	7	C	EMN260S, CED260S PTC150S, EMA270S (Co-RMP370S)	14	0.088	CE
Research Methodology & Project	RMP370S	01	S1	7	C	PTC150S, (Co-PMT370S)	14	0.088	CE
Structural Analysis 2	STA370S	01	S1	7	C	STA262S, EMA270S	14	0,088	CE
Transportation Engineering 2	TPE370S	01	S1	7	C	TPE260S, EMA270S	14	0.088	CE
Water and Waste Water Management	WWW370S	01	S1	7	C	PHY154S, EMA270S	14	0.088	CE
Construction Materials Technology 2	CMT370S	01	S2	7	C	CMT150S, EMA270S	10	0.063	CE
Environmental Engineering	ENE370S	01	S2	7	C	PHY154S, EMA270S	14	0.088	CE
Hydraulics 2	HDR370S	01	S2	7	C	HDR270S, EMA270S	14	0.088	CE
Integrated Technology Project	ITP260S	01	S2	6	C	PTC150S, TPE260S, (Co-HDR270S, CED260S, RCM260S)	10	0.065	CE
Reticulation Design and Management	RDM370S	01	S2	7	C	HDR270S, EMA270S	10	0.063	CE
Solid Waste Management	SWM370S	01	S2	7	C	PHY154S, EMA270S	10	0.063	CE

MASTER OF ENGINEERING IN CIVIL ENGINEERING

COURSE AIM

The graduate at this level functions independently as a technologist who displays competence as a member of the engineering team in the execution of specialist engineering tasks.

PURPOSE AND RATIONALE OF THE QUALIFICATION

A learner achieving this qualification will be competent to conduct research under minimal guidance and contribute to knowledge production in the engineering environment with success.

CAREER OPPORTUNITIES

Graduates of this programme follow a career in research and development in industry or may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

A level 8 qualification with a minimum aggregate of 60% in the following qualifications:

- Postgraduate Diploma in Civil Engineering;
- A Bachelor of Engineering Technology (Honours) in Civil Engineering;
- A Professional Bachelor of Engineering in Civil Engineering; or related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

DURATION

Full-time: Minimum 1 year / Maximum 3 years
Part-time: Minimum 2 years / Maximum 4 years

VENUE

Bellville

CONTACT

Dr M Khahledi
ThamaeMC@cput.ac.za / Tel: 021 460 3512

MASTER OF ENGINEERING IN CIVIL ENGINEERING (MGCIVR)

Period of Study	Year/Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit
6	CVL690R	Research Project & Dissertation	C	--	9	180	1.000	Full thesis

DOCTOR OF ENGINEERING IN CIVIL ENGINEERING

COURSE AIM

The purpose of this programme is to develop the competence to conduct independent research under minimal guidance in the field of civil engineering. Such research should contribute significantly to the body of knowledge through the understanding, application and evaluation of existing knowledge. The research problem, including its justification, process and outcome, is reported in a dissertation and in scientific publications that comply with the generally accepted norms for research at this level.

PURPOSE AND RATIONALE OF THE QUALIFICATION

A learner achieving this qualification will be competent to conduct research independently, and contribute to advanced and significant knowledge production in the field of civil engineering.

CAREER OPPORTUNITIES

Graduates of this programme follow a career in research and development in industry or may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

- A level 9 Masters qualification in Civil Engineering or related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

DURATION

Full-time: Minimum 2 years / Maximum 4 years
Part-time: Minimum 4 years / Maximum 6 years

VENUE

Bellville

CONTACT

Dr M Khahledi
ThamaeMC@cput.ac.za
Tel: 021 460 3512

DOCTOR OF ENGINEERING IN CIVIL ENGINEERING (DGCIVR)

Period of Study	Year/Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit
7	CVL710R	Research Project & Dissertation	C	--	10	360	2	Full thesis

DIPLOMA IN GEOMATICS

COURSE AIM

The aim of the course is to prepare students for a career in geospatial science where they will work with spatial information. Graduates will be able to manipulate data and provide information about the earth to planners, engineers, environmental managers and commerce. Applicants should have an aptitude for Mathematics and computers, good spatial perception, and an eye for detail. An interest in geography is strongly recommended.

Surveying (or geomatics) is the science of surveying (measuring) and mapping the face of the earth. Mapping forms the foundation of physical planning and land development. A surveyor is responsible for the collection, representation, management and retrieval of spatial data (natural and man-made features on the earth).

GIS practitioners are responsible for analysing, modelling and presenting spatial information.

PURPOSE AND RATIONALE OF THE QUALIFICATION

To prepare students for a career in surveying, GIS and geomatics. Diplomates will be able to register with the South African Council for Geomatics.

CAREER INFORMATION

A geomatics practitioner will be able to do field surveying using GPS, design and create maps and analyse spatial information. You will work with geo-information technology, satellite imagery and remote sensing – to enable effective decision-making in areas from urban planning, management of natural resources and the environment, health to emergency services.

CAREER OPPORTUNITIES

Surveyors can practice privately or may be employed by state departments, land surveying firms or municipalities. GIS practitioners will work with mapping organisations, local authorities, planners and state departments.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or TS 5 (60%)	N/A	M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:

E (English)	PS (Physical Science)
M (Maths)	TS (Technical Science)
TM (Technical Maths)	ES (Engineering Science)

EXPERIENTIAL LEARNING

6-month Industrial Project in the specific field - Survey or GISc.

DURATION

Full-time: The first two and a half years involve full time academic study at the University, followed by a 6-month Industrial Project

VENUE

Bellville

DIPLOMA IN GEOMATICS (D3GMTS)

Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st YEAR (all subjects compulsory)									
Mathematics 1	MTH152S	01	Y	5	C	--	24	0,200	CE
Communication Skills	CMK150S	01	S1	5	C	--	10	0,083	CE
Computer Skills	CMS151S	01	S1	5	C	--	10	0,083	CE
Surveying 1A: Theory	SRV150S	01	S1	5	C	--	10	0,083	CE
Surveying 1A: Practical	SRV151S	01	S1	5	C	(Co-SRV150S)	5	0,043	CE
Technical Drawing 1	DRR150S	01	S1	5	C	--	6	0,050	CE
Topographical Drawing 1	DRR151S	01	S1	5	C	--	6	0,050	CE
Computer Aided Drafting 1	CAD150S	01	S2	5	C	--	10	0,083	CE
Geography 1	GEO150S	01	S2	5	C	--	12	0,100	CE
Physics	PHY151S	01	S2	5	C	--	12	0,100	CE
Surveying 1B: Theory	SRV160S	01	S2	6	C	SRV150S	11	0,092	CE
Surveying 1B: Practical	SRV161S	01	S2	6	C	SRV151S, (Co-SRV160S)	4	0,033	CE
2nd YEAR. All 1st year subjects must be passed before admission to 2nd year is allowed.									
Civil Engineering	CIV250S	01	S2	5	C	--	12	0,100	CE
Geographic Information Systems 2	GIS260S	01	S1	6	C	GEO150S, CMS151S	12	0,100	CE
Mathematics 2	MTH261S	01	S1	6	C	MTH152S	14	0,117	CE
Photogrammetry 2	PRY260S	01	S1	6	C	--	12	0,100	CE
Statistics 2	STS260S	01	S1	6	C	--	12	0,100	CE
Database Theory 2	CMA260S	01	S2	6	C	CMS151S	11	0,091	CE
Map Projections 2	MPJ260S	01	S2	6	C	SRV150S	12	0,100	CE
Spatial Data Acquisition 2	SDA260S	01	S2	6	C	PRY260S	14	0,117	CE
Survey Software 2	SSW260S	01	S1	6	C	CAD150S, SRV160S	6	0,050	CE
Electives for Surveying stream:									
Control Surveying 2: Theory	CSU260S	01	S2	6	E	SRV160S	8	0,067	CE
Control Surveying 2: Practical	CSU261S	01	S2	6	E	SRV161S, (Co-CSU260S)	7	0,058	CE
Electives for GISc stream:									
Cartography 2	CAR260S	01	S2	6	E	CAD150S	15	0,125	CE

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
3rd YEAR. All 2nd year subjects must be passed before admission to 3rd year is allowed.									
Land Law	LAL360S	01	S1	6	C	--	12	0,100	CE
Management	MCL360S	01	S1	6	C	--	12	0,100	CE
Electives for Surveying stream:									
Adjustment of Errors 3	AOE360S	01	S1	6	E	STS260S, SRV160S	12	0,100	CE
Cadastral Surveying 3	CDS360S	01	S1	6	E	SRV160S	12	0,100	CE
Surveying 3	SRV360S	01	S1	6	E	SRV160S	12	0,100	CE
Electives for GISc stream:									
Data Quality Management 3	DQM360S	01	S1	6	E	GIS260S	12	0,100	CE
Remote Sensing 3	RES360S	01	S1	6	E	PHY151S	12	0,100	CE
Spatial Analysis 3	SPA360S	01	S1	6	E	GIS260S	12	0,100	CE
Optional Elective									
Hydrography 2	HDY360S	01	S1	6	E	--	12	0,100	CE
Electives for Surveying stream:									
Surveying Industrial Project 2	SUP360S	01	S2	6	E	CSU261S	60	0,500	CE
Electives for GISc stream:									
GIS Industrial Project 2	GSP360S	01	S2	6	E	GIS260S	60	0,500	CE

BACHELOR OF GEOMATICS

COURSE AIM

The aim of the course is to produce technologists for a career in geospatial science where they will work with spatial information. Graduates will be able to manipulate data and provide information about the earth to planners, engineers, environmental managers and commerce. Applicants should have an aptitude for mathematics, physical science and computers, good spatial perception, and an eye for detail. An interest in geography is strongly recommended.

Geomatics is an umbrella term, and includes the tools and techniques used in the disciplines of land surveying, photogrammetry, remote sensing, geographic information systems (GIS), geodesy, and cartography. The Bachelors of Geomatics has two streams: students can choose to specialise in surveying or in Geographic Information Science (GISc).

Surveying is the science of measuring and mapping the surface of the earth. Mapping forms the foundation of physical planning and land development. A surveyor is responsible for the collection, representation, management and retrieval of spatial data (natural and man-made features on the earth).

GIS practitioners are responsible for the input, storage, manipulation, analysis, modelling and presentation of spatial data.

PURPOSE AND RATIONALE OF THE QUALIFICATION

The Bachelors of Geomatics prepares students for a career in geomatics (either surveying or GIS). Graduates will typically go on to register as technologists, who may start up their own practices in either the surveying or GIS fields. The geomatics profession has been declared a scarce skill by the government and as such it is essential that the required manpower is supplied to the industry. We are the only university offering a 3-year Bachelors degree in geomatics in the Western Cape, Eastern Cape, Northern Cape, or Free State. We are thus the sole providers of geomatics technologists for a large section of industry.

CAREER OPPORTUNITIES

The Bachelor of Geomatics has two streams – Surveying and Geographic Information Science (GISc). The Surveying stream produces survey technologists and the GISc stream produces GISc technologists.

- Surveying is the science of surveying (measuring) and mapping the face of the earth. Mapping forms the foundation of physical planning and land development. A survey technician is responsible for the collection, representation, analysis, management, and retrieval and modelling of spatial data (natural and man-made features on the earth), It involves field work for data capturing and computer data processing. You will work with geo-information technology, satellite imagery and remote sensing – to enable effective decision-making in areas from urban planning, management of natural resources and the environment, health to emergency services.

- Geographical Information Science is the science of capturing, processing, analysing and mapping spatial data (information about the earth). Geographical Information Systems (GIS) technology is used to explore, visualise and analyse data. Computer-based systems bring advanced information management techniques to science, business and governments across the globe

CAREER OPPORTUNITIES

Survey or GIS technologists may open a practice and/or join a partnership with other technologists or professionals. Technologists may carry out survey or GIS work unsupervised and may also supervise and certify the work of technicians.

COMPETENCIES

A Survey technologist may be in private practice or in the employ of a private or state organisation, and conduct a wide variety of surveying jobs, such as triangulation, levelling, topographical surveying, engineering surveying and spatial data processing.

A GIS technologist may be in private practice or in the employ of a private or state organisation, and conduct a wide variety of GIS jobs, such as cartography, spatial modelling, simulation, spatial analysis, data collection and research.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 36 using Method 2 E (First language) 5 (60%) M 5 (60%) or TM 5 (60%) PS 5 (60%) or TS 5 (60%)	N/A	M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:

E (English)
M (Maths)
TM (Technical Maths)
PS (Physical Science)
TS (Technical Science)
ES (Engineering Science)

PROFESSIONAL REGISTRATION

The Bachelor of Geomatics is accredited the South African Geomatics Council (SAGC). Graduates will comply with the academic requirements and may apply for registration as a Surveying Technologist or Geographical Information Science Technologist.

DURATION

Full-time: The three years involve full time academic study at the University, including a 6-month Project

VENUE

Bellville

BACHELOR OF GEOMATICS (BPGMTS)

Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st YEAR (all subjects compulsory)									
Communication Skills	CMK151S	01	S1	5	C	--	10	0.084	CE
Drawing	DRR152S	01	S1	5	C	--	12	0.100	CE
Geography	GEO152S	01	S1	5	C	--	12	0.100	CE
Mathematics 1A	MTH158S	01	S1	5	C	--	12	0.100	CE
Surveying 1A	SRV152S	01	S1	5	C	--	13	0.108	CE
Civil Engineering	CIV150S	01	S2	5	C	--	12	0.100	CE
Geomatics Computing 1	GMC150S	01	S2	5	C	--	12	0.100	CE
Mathematics 1B	MTH159S	01	S2	5	C	MTH158S	12	0.100	CE
Physics	PHY155S	01	S2	5	C	--	12	0.100	CE
Surveying 1B	SRV153S	01	S2	5	C	SRV152S	13	0.108	CE

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
2nd YEAR. All 1st year subjects must be passed before admission to 2nd year is allowed.									
Geographic Information Systems 2	GIS261S	01	S1	6	C	GEO152S, GMC150S	12	0.100	CE
Geomatics Computing 2A	GMC260S	01	S1	6	C	GMC150S	10	0.084	CE
Map Projections	MPJ261S	01	S1	6	C	SRV152S	12	0.100	CE
Mathematics 2A	MTH264S	01	S1	6	C	MTH159S	12	0.100	CE
Geomatics 2	GMS260S	01	S2	6	C	SRV152S	12	0.100	CE
Geomatics Computing 2B	GMC261S	01	S2	6	C	GMC150S	10	0.083	CE
Land Law	LAL260S	01	S2	6	C	--	12	0.100	CE
Statistics	STS261S	01	S2	6	C	--	12	0.100	CE
Electives for Surveying stream:									
Surveying 2A	SRV260S	01	S1	6	E	SRV153S	12	0.100	CE
Surveying 2B	SRV261S	01	S2	6	E	SRV153S	12	0.100	CE
Survey Camp	SRC260S	01	S2	6	E	SRV153S, SRV260S	4	0.033	CE
Electives for GISc stream:									
Cartography 2	CAR261S	01	S1	6	E	SRV152S	12	0.100	CE
Remote Sensing	RES260S	01	S2	6	E	GIS261S	12	0.100	CE
GIS Camp	GIC260S	01	S2	6	E	GIS261S	4	0.033	CE

Year 3 not yet offered.

MTECH: CARTOGRAPHY

This qualification is being phased out and will not accept new students. Only existing students are being accommodated to complete it.

COURSE AIM

Graduates develop the knowledge and skills required to conduct independent research in cartography, and to contribute significantly to knowledge production through the understanding, application and evaluation of existing and new knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

To make a significant contribution, through research, to the understanding, application and evaluation of existing knowledge in a specialised area of technology, and to demonstrate a high level of overall knowledge in that specialised area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

CAREER OPPORTUNITIES

Graduates are employed in research and development, as well as by government and in teaching positions in higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

A BTech in Cartography (or an equivalent qualification), with a pass in Research Methodology, is required.

DURATION

Full-time: Minimum 1 year / Maximum 3 years
Part-time: Minimum 2 years / Maximum 4 years

VENUE

Bellville

MTECH: CARTOGRAPHY (MTCARR)

Period of Study	Year/ Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre-requisites/ (Co-requisites are listed as -Co)	NQF Exit Level	SAQA Credits	HEMIS Credit	Assessment Type
5	Y	R5CA01R	Thesis	C	--	8	120	1.000	Full thesis

PROMOTION CRITERIA & EXCLUSION RULES

All students are expected to complete all pre-requisite subjects in order to progress to the next study level.
Students will be excluded, for a period, when they fail more than 50% of the subjects at a study level.
A student is expected to complete all academic requirements for eligibility to Work Integrated Learning.

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for degree purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

DIPLOMA SUBJECTS: CIVIL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.
Subjects without a number at the end do not have an equivalent at a higher level.

APPLIED MATHEMATICS

Pre-requisite:	Engineering Mathematics 2
Mode of delivery:	4 Lectures (per week) of 40 min each, 2 Tutorials per week of 40 min each. Projects and/or assignments
Subject outline:	• Differential Equations: D-operator methods, Theorems Solution of higher order differential equations, Applications in Engineering • Laplace and inverse Laplace transforms of elementary functions, Laplace transforms of derivatives, Theor 1 First shift theorem, Theorem 2 Multiplication, Theorem 3 Division by T, Special Functions: Heaviside step function and Dirac Delta Function, solving second order ordinary differential equations with boundary conditions, Solving engineering Applications in Civil Engineering. • FS of elementary periodic and non-periodic functions, Even and odd function and half-range FS, FS over any range, Use SciLab in real engineering applications
Assessment:	Tutorials & Assignments (20%), Class Test 1 (20%), Class Test 2 (20%), FISA (40%) with a subminimum of 40%

APPLIED MECHANICS

Pre-requisite:	None
Mode of delivery:	Lectures, tutorials, practicals, industrial visits.
Subject outline:	Revision of basics functions in mathematics, trigonometry and unit conversion; Definition and operation of vectors. Determination of components, resultant and equilibrant vectors of a system of concurrent forces. Moment and Equilibrium: Determination of reactions of beams and simply supported frames. Calculation of unknown forces and determination of static equilibrium of a system. Determination of the centre of gravity and the centroid of various shapes and bodies using adequate calculations. Determination of moment of inertia first and second moment of areas, section modulus, parallel axes theorem and radius of gyration of different shapes. Statically determinate frames and simple space frames: pin-jointed frames and structures. Requirements for statically determinacy. Determination of reactions of simply supported beam and frames. Frames: solving of forces in members using the resolution of joints, and the method of sections. Relationship between load shear force and bending moments: Bending moment and shear force diagrams; Determination of maximum bending moments and position of inflection.
Practicals:	Components and resultants of vectors calculation; Moment, vectors and reactions on support calculation; Centroid and centre of gravity, measurement and calculation; Beam analysis - calculating shear forces on a beam and

	drawing shear force diagrams; Beam analysis - calculating bending moments on a beam and bending moment diagrams.
Assessment:	Lab Practicals 6%, 4 x Mini tests 13.5% each, FISA 40%. A sub-minimum mark of 40% for the FISA is required to pass the subject.

CIVIL ENGINEERING DOCUMENTATION

Pre-requisite:	None
Mode of delivery:	Lectures & tutorials
Subject outline:	• **Estimating:** Calculate unit costs of rates of CEQ toward SoQ • **Civil Engineering Quantities:** Drafting of SoQ upon which CE contracts are based • **Specification:** Write specifications of CE projects with aid of 'Standard Specifications' • **General Conditions of Contract:** Describe conditions of contract for CE and legal implications for industry
Assessment:	Tutorials (20%), Class Test 2 (20%), Project (20% (, FISA (40%)

CIVIL ENGINEERING INDUSTRIAL PROJECT

Pre-requisite:	All 1st and 2nd year subjects passed. Applied Mathematics, Engineering Design, Engineer in Society, Water Engineering 1.
Co-requisite:	Integrated Computer Project
Mode of delivery:	Lectures, Tutorials & Industry Visits
Subject outline:	Four assessment to be completed on workplace practices and reflections: Oral, Logbook, Ethics Report, Technical Experience Report
Assessment:	Assignments (10%), Assignment (30%), Assignment (20%), Assignment (40%)

COMPUTER SKILLS

Pre-requisite:	None
Mode of delivery:	Lectures, tutorials.
Subject outline:	• **Introduction to Computers and Microsoft Windows:** Basic operation of a computer and use of files. • **Word processing:** Create professional documents including tables and equations. • **Presentations:** Create a presentation to an audience. • **Spreadsheets:** Use a spread sheet to perform general and engineering calculations and create graphs. • **CAD:** Use appropriate software to create engineering drawings.
Assessment:	CE assessment of tests, assignments, tutorials, Integrated projects.

CONSTRUCTION MATERIALS TECHNOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures, tutorials, practicals, industrial visits, Learner Management System.
Subject outline:	**Soil:** Nature of soil, origin, types; Fields of identification, soil samples; Soil Properties and relevant tests; Soil Stabilization. **Concrete:** Concrete specification and mix requirements; Concrete ages; Properties and relevant tests; Materials for concrete; Form Work; Mix proportion design; Reinforcement, Joints; Precast and Pre-stressed concrete. **Bitumen:** Sources of Bitumen, Composition; Production of Bitumen; Behavior and characteristics; Types of Bitumen, properties and Test on bitumen; Safety. **Others Materials:** Types of bricks, properties and manufacturing process; Calculating quantities; Timber; Anatomy and classification of trees, moisture content and other properties; Seasoning; Conservation; Use of timbers; Ferrous metal; Manufacturing of steel and steel products; Structural steel Reinforcement; Aluminum and Aluminum alloy; Classification of alloys. **Environmental Issues:** Environmental Engineering; Interdependence of conservation and development; Causes of and how to prevent: Soil Erosion, Water Pollution, Toxic Waste, Air pollution. Sewerage and sewerage treatment.

Practicals:	**Soil:** Visual Classification of soils; Sieve Analysis; Liquid Limit (Atterberg test); Liquid limit (Cone penetrometer test); Plastic Limit; Plastic Index; Shrinkage Limit **Concrete:** Concrete mix design; Slump test; Compressive strength test **Bitumen:** Softening point by the ball and ring methods; Penetration Method
Assessment:	Mid semester test 20%, Laboratory Practical 10%, Project (Poster & oral presentation) 10%, Assignment 10%, Project (Model & Expo) 10%, FISA 40%. A sub-minimum mark of 40% for the project & laboratory report, and 50% for the FISA is required to pass the subject.

ENGINEER IN SOCIETY

Pre-requisite:	Professional and Technical Communication
Mode of delivery:	Lectures, Tutorials
Subject outline:	The Management Process, Ethical Behaviour & Social Responsibility, Leading, Foundations of Individual behaviour, Motivation Theory and Practice, Teams and Teamwork, Communication & Conflict Negotiation, Professional registration
Assessment:	Tests (30%), Assignments (70%)

ENGINEERING CHEMISTRY

Pre-requisite:	None
Mode of delivery:	Lectures, tutorials, practicals.
Subject outline:	**Part A: General Chemistry** • **Introduction:** Basic chemical concepts: atoms, atomic mass, elements and the periodic table • **Chemical Bonds:** Chemical bonds and intermolecular forces and molecular mass and reactivity series • **The Mole concept:** The mole (Avogadro's number) and molar units • **Chemical reactions and stoichiometry:** Chemical equations, balancing chemical reactions, types of reactions, reactions involving gases • **Redox reactions:** Definitions, oxidation state, ionic balance, types of redox reactions & balancing redox equations • **Chemical equilibrium:** Reversible reactions, law of mass action, solubility calculations, acid-base equilibria, • **Introduction to organic chemistry**: Organic chemicals, nomenclature, alkanes, alkenes and alkynes, aromatic compounds, functional groups **Part B: Engineering Chemistry** • **Water and wastewater:** Physical properties of water, states of solutions (laws of solubility), aqueous solutions and concentration units. Some water and wastewater treatment chemicals and their reactions • **Lime, Cement and concrete:** Chemical composition of lime & cement; chemical reactions in formation of concrete • **Bitumen and asphalt:** Chemical composition and reactions • **Paints and varnishes:** Chemical composition and reactions
Practicals:	Titrations, Precipitation reactions, Acidity & alkalinity determination.
Assessment:	CE assessment of tests, assignments, tutorials, and laboratory work.

ENGINEERING DESIGN

Pre-requisite:	Structural Analysis, Engineering Drawing 2
Mode of delivery:	Lectures, Tutorials
Subject outline:	Introduction to steel and timber, Load transfer mechanics, Timber axial forces, Timber shear forces, Timber beam (bending), Wind Load, Connections in steel, Axial Tension/Compression in steel, Beam Design (Lateral support), Beam Deflection

Assessment:	Midterm (30%), Project (30%), FISA (40%)

ENGINEERING DRAWING 1

Pre-requisite:	None
Mode of delivery:	Two 45 min lectures, one 45 min tutorial session, one 3 hour session. Practicals/projects and/or assignments per week. Learner management system (LMS).
Subject outline:	• **Instrumental Drawing:** General engineering drawing terms; Drawing equipment and drawing techniques; Use of drawing equipment; Dimensioning; Lettering and figuring; Symbols; Line types; Freehand sketches; Reproduction of drawings at different scales • **Geometric Construction:** Plane geometry, geometry of points, lines and planes in space, perpendicular and parallel lines, circles, arcs, ellipses. • **Projections:** Isometric projection and the application of the isometric scale; First and second auxiliary projection; First and third angle orthographic projection with the use of hidden detail, sectional views and auxiliary views; Symbols and abbreviations. • **Topo, Long Sections, Mass Haul:** Draw a grid system to scale, entering co-ordinate values correctly onto the grid and indicate true north; Plot co-ordinated points on the grid system; Plot spot-heights; Interpolate and draw contours; Plot relevant detail using the correct symbols; Correctly position a structure on a contour plan; Draw a longitudinal section of a road, pipeline and a dam wall; Indicate on the longitudinal section the chainages, ground levels, formation levels and slopes of the structure; Determine the cross-section areas by trapezoidal rule; Calculate volumes using the end area rule and plot mass haul diagrams; Determine the freehaul volume and freehaul given the freehaul distance; Determine the overhaul volumes of borrow or spoil. • **Reinforced Concrete Detailing:** Introduction to SABS codes 82 and 0144; Application of tables and shape codes to produce complete and nearly dimensioned concrete drawing of simple structures such as reinforced concrete bases, columns, slabs and beams. These should include relevant reinforcing drawings for these structures and provide the bending schedules. • **Reinforced Concrete Detailing:** Application of steel tables and codes to produce accurate, neat and correctly dimensioned drawings of typical bases-to-column connections showing holding down bolts, typical welded and bolted column-to-beam connections, typical welded and bolted beam-to-beam connections and different types of welded and bolted roof trusses, lattice girders and portal frames. • **AutoCAD:** Compile computer draughting portfolio using AUTOCAD. In order to achieve this students should demonstrate a clear understanding of software fundamentals.
Assessment:	Class tests 15%, Assignments 30%, Integrated Projects 20%, Tutorials 15%, FISA 20%. A sub-minimum mark of 40% for the Integrated Projects, and 40% for the FISA is required to pass the subject.

ENGINEERING DRAWING 2

Pre-requisite:	Engineering Drawing 1
Mode of delivery:	Two 45 min lectures, one 45 min tutorial session, one 3 hour session. Practicals/projects and/or assignments per week. Learner management system (LMS).
Subject outline:	The purpose of the unit is to equip the students with knowledge and skills of using computer aided drawing software package (AutoCAD) to create, draw various objects, produce and plot civil engineering layout plans. To these layouts in varying scales and paper sizes. To properly dimension, drawings and attach other files onto the original layout without changing the information on the attached files. This includes the preparation and production of structural steel plans, road design layout plans and other civil engineering layouts.
Assessment:	Mid semester test 20%, Project 20%, Tutorials 20%, FISA 40%.

ENGINEERING MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Two 45 min lectures, as well as one 45 min session (lectures / tutorials / class discussions / group work) per week. Learner management system (LMS).
Subject outline:	The aim of this subject is to equip students with basic knowledge on the various aspects of engineering management including construction management and the application of such in the civil engineering sector.

- **The Working Environment of Technical people:** Role of the technician, skills & knowledge required and how this interacts with the economy.
- **Principles of General Management:** Planning, organizing, controlling and leadership.
- **Human Resource Management:** Planning, recruiting, selection, training and development
- **Employment Relations and Labour Legislation:** Employment relations, basic conditions of employment Act, Grievance, Discipline, Strikes
- **Managing people and teams:** Human relations, Conflict, Teamwork
- **Engineering Contracts and Law:** Law of Contract (agreement, formalities, performance, and breach), Introduction to General Conditions of Contract, Tender documents, Schedule of Quantities.
- **Safety Management:** Theory and concepts of safety management, Safety and the law, Ethics, Safety audits and risk assessment.
- **Maintenance management:** Maintenance planning. Organising maintenance resources. Controlling maintenance performance. Maintenance approaches & strategies.
- **Entrepreneurship:** Forms of enterprises, Opportunities. Starting up a venture
- **Construction planning:** The purpose of planning, the planning phases, decision to tender and site visit reports. Method statements, pre-tender planning program, cost estimating, quotations from subcontractors and submitting tenders. Pre-contract planning and organizing, appointing sub-contractors/suppliers, site layout plan and commencing requirements.
- **Project Management:** Activities & Time relation; Program Types, Support Diagrams, CPN, Precedence Diagram, Bar Charts, Line of Balance, Labour Histograms
- **Financial Planning & Control:** Financial statements and setting up budget, Crash Cost Analysis, Profit and cash flow, Cost estimating and cost evaluation (Nett & Gross cash flow forecast), Interest and the time value of money concept.
- **Monitoring and control of work program:** Report writing

Assessment:	Assignment 10%, Project 20%, Class tests 20%, Final test 50%. A sub-minimum mark of 40% for the FISA is required to pass the subject.

ENGINEERING MATHEMATICS 1

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials

Subject outline: To be able to use Mathematics as a language and solve mathematical problems. The subject should improve the student's logical reasoning. To enable the student to do subjects like Applied Mechanics and Construction Methods.

- **Trigonometry:** Solution of triangle formulas, the 6 basic trigonometric functions; graphs of y = sin x and y = cos x and y = tan x; Inverse Trigonometric functions and techniques to solve trigonometric functions.
- **Logarithms:** Laws of Logarithms and applications and the introduction of natural logarithms.
- Partial Fractions: Techniques to split into partial fractions.
- **Radian Measurement:** Formulas for basic two dimensional shapes and basic 3 dimensional shapes – area and volume; Definition and formulas for length of arc, area of sector and area of segment and applications.
- **Binomial Theorem:** How to expand a binomial via Pascal's triangle and how to expand a binomial with the Binomial Theorem where n is negative or a fraction.
- Differentiation: First principles and limits, sum, product, quotient and chain rule and implicit differentiation and logarithmic differentiation.
- **Applications of Differentiation:** Equation of a tangent, velocity and acceleration problems and optimisation problems as well as the numerical method of Newton Rhapson to determine the roots of a cubic equation and other functions.
- **Integration:** Basic techniques to find Indefinite integral plus finding the Definite Integral and finding the area under a curve.
- **Linear Algebra:** Operations with Matrices and Determinants and the value of a determinant and Cramer's rule to find the solution of 3 linear equations with 3 unknowns. The Inverse of a Matrix and solving of a linear system using the inverse matrix method.

	• **Statistics:** Probability, The Binomial and Poisson distributions, The Normal distribution, Linear correlation, Linear regression, Sampling and estimation theories, Significance Testing
Assessment:	Class test 1 20%, Class test 2 20%, Class test 3 20%, Tutorials and attendance 20%, FISA 20%. A sub-minimum mark of 40% for the FISA is required to pass the subject.

ENGINEERING MATHEMATICS 2

Pre-requisite:	Engineering Mathematics 1
Mode of delivery:	Lectures, tutorials, practicals.
Subject outline:	The aim of this course is to enable the student to do basic mathematics, to introduce the student to tertiary mathematics and mathematical problem solving and to develop a link between mathematics and engineering. This course will provide a wide base to ensure the mastering of all the important concepts and principles • **Derivatives of functions:** Standard differential derivates to calculate derivatives of functions, including hyperbolic, inverse hyperbolic and inverse trigonometric functions: Sum, product, quotient and chain rules; Implicit and logarithmic differentiation; Derivatives of functions with two or more independent variables. • **Partial differentiation:** Use partial derivatives to determine the rate at which related variables change at specific times in engineering processes. • **Tables and standard integration techniques:** Use table of standard integration formulae to calculate definite and /or indefinite integrals; Apply standard integration techniques to polynomials, trigonometric, logarithmic and exponential functions; Use integration by parts to integrate selected products of functions; Use partial fractions and completion of the square methods to integrate selected fractions; Use trigonometric identities to integrate products of sine and cosine functions and powers and products of trigonometric functions • **Areas and volumes:** Using integration to determine the area between two curves; Using integration to determine volumes of solids of revolution. • **Matrix operations:** Use of matrices to perform matrix operations, determinant and the inverse of a matrix, solve a system of linear equations using an inverse matrix. • **Classification of different First Order Differential Equations:** Different types of FODE's; classification of linear or non-linear DE's. • **Different methods of solving FODE's:** Method of separation of variables, exact method, homogeneous method, linear method, and Bernoulli method to solve FODE's. • **D-operator methods:** Use of different D-operator techniques to solve Second Order Differential Equations. • **D-operators applications:** Use the D-operator method to solve engineering type applications.
Assessment:	Class test 1 20%, Class test 2 20%, Class test 3 20%, Tutorials and attendance 20%, FISA 20%. A sub-minimum mark of 40% for the FISA is required to pass the subject.

ENGINEERING PHYSICS

Pre-requisite:	None
Mode of delivery:	Lectures, tutorials, practicals.
Subject outline:	• **Introduction:** Aims & Objectives; Measurement & Mathematics; basic concepts of physics: units of measure, rounding off rules, conversion tables. • **Vectors:** Scalar, vector, magnitude, bearing, and resultant. Distinguish between given scalar and vector quantities; Express the direction of a vector quantity as a bearing or as an angle relative to some given direction; Graphical representation of a vector quantity; Resultant of two given vectors; implications of a "closed" vector diagram. • **Mechanics: Kinematics:** distance and displacement; speed and velocity; uniform motion, rectilinear motion, uniform acceleration, and free fall, projectile. • **Mechanics: Dynamics:** Force, balanced and unbalanced forces, normal force, inertia, mass, tension, weight, reaction-pair. Newton's three laws of motion, and the behaviour of moving and stationary objects in terms of these laws. Forces acting on a given body. Distinguish carefully between a pair of balanced forces and a reaction-pair.

- **Mechanics: Momentum, Power, Work and Energy:** Momentum, impulse, elastic and inelastic collisions. Newton's 2nd law, conservation of momentum. Potential energy, kinetic energy, closed system, conservative and dissipative forces, power. Principle of conservation of energy. Perform numerical calculations using: the formula for determining work done; the formulae for potential energy and kinetic energy and also the principle of conservation of energy; the formula for power. Predict the motion of bodies after more complex collisions by applying both the principle of conservation of momentum and the principle of conservation of energy.
- Fluid Statics: Density; Pressure; Buoyancy: fluid, ideal fluid, laminar or streamline flow, turbulent flow, density and relative density, absolute pressure and gauge pressure, hydraulics, buoyancy, draught, freeboard. Pascal's principle and Archimedes' principle; Density and relative density; Principle of a hydrometer.
- **Electricity: Electrostatics and Electric fields:** elementary charge, electric field, electric field lines, electric field strength, test charge, electrical potential energy, potential difference, volt. Properties of (electric) field lines. The law of conservation of charge; Coulomb's law.
- **Electricity: Electrical energy & power:** Electron current, conventional current, conductor, circuit, series connection, parallel connection, potential difference, current strength, resistance, resistivity; Ampere, coulomb, ohm, Ohm's law. Mechanism and heating effect of a (direct) electric current in a metallic conductor. Resistance in metallic conductors. Interpret and draw circuit diagrams, using the correct symbols for the various components. Problems involving electric circuits; Problems involving the cost of electrical energy.
- **Optics: Sight; Reflection:** Normal and incident rays, reflected ray, angles of incidence and reflection, angle of deviation, glancing angle, regular and diffuse reflection, plane mirror, lateral inversion, convex and concave mirrors, principal axis, centre of curvature, radius of curvature, focal point (focus), focal length, pole, real and virtual images, aperture, spherical aberration. The laws of reflection, the characteristics of real and virtual images. Ray diagrams.
- **Optics: Refraction (including fibre optics, prisms, lenses):** Light as a wave; Electromagnetic waves; Refraction, total internal reflection, critical angle, apex angle, angle of minimum deviation, optical centre, step-index fibres, GRIN fibres, numerical aperture (NA). Numerical calculations using: Snell's law and combinations thereof; the several given formulae for refractive index; the lens formula, the formulae for magnification; the combination formula; the numerical aperture (NA) of a step-index fibre; Total internal reflection; Convex and concave lenses; Fibre optic use as a high speed communications medium for digital signals.

Assessment:	CE assessment of tests, assignments, and tutorials

GEOTECHNICAL ENGINEERING

Pre-requisite:	Construction Materials Technology
Mode of delivery:	Two contact sessions a week of 90 minutes each (lectures / practicals).
Subject outline:	The significance of this subject is to enable learners through the application and integration of knowledge of soil mechanics to examine solutions for foundation design and foresee possible failure of a super-structure. Within the scope of this subject the learner's achievement of this main task will be accomplished through the examination of past case histories and thereby avoid possible soil failure. The theoretical aspect is accompanied with laboratory practice where soil is examined for its properties and tested till failure. Results are used to predict soil failure under loading. • **Properties of soils:** Referencing industrial documents; Testing and interpreting test/laboratory results; Graphs or charts that interpret properties of soils; Identify, describe and use civil engineering construction materials. • **Properties of weaker road building materials:** Comparison of laboratory results with standards; Develop a design appropriate for roads with low traffic volumes; Geo-technical construction methods; Road construction methods • **Standards, specifications and proposals for Road works, Earth backfill, and Footings below structures:** Review and interpret results from a soil survey; Make design proposals to improve the structural integrity of an alignment; Design a filter layer to allow drainage of soils; Evaluate the footings below soil stratum and design footing sizes based on settlement data. • **Road embankments and design of sheet piles:** Safety of slopes by evaluating slip circles; Safety factors in non-cohesive and cohesive soils; Produce a calculation sheet for depth of installation of sheet piles.

Assessment:	Class test 20%, Practical 10%, Lab work 10%, FISA 20%. A sub-minimum mark of 40% for all assessments is required to pass the subject.

INTEGRATED COMPUTER PROJECT

Pre-requisite:	Water Engineering 1, Geotechnical Engineering, Transportation Engineering, Structural Analysis, Engineering Drawing 2
Co-requisite:	Applied Mathematics, Engineering Design, Engineer in Society, Water Engineering 1
Mode of delivery:	Lectures
Subject outline:	Knowledge of Year 1 and 2 is integrated and used to complete assignments on Management, Geotechnical Engineering, Transportation Engineering, Structural Engineering and Water Engineering using computer packages such as CAD, Civil Designer, etc.
Assessment:	Assignments (20% x 5)

INTRODUCTION TO ENVIRONMENTAL ENGINEERING

Pre-requisite:	Engineering Chemistry
Mode of delivery:	Two 80 minute contact sessions per week, plus additional time for tutorial sessions and/or group work on projects and/or assignments.
Subject outline:	Environmental Engineering is a branch of Civil Engineering concerned with the application of scientific and engineering principles for sustainable development in terms of, amongst others, energy efficiency, waste management and studies on the environmental impact of proposed construction projects. Focus is directed towards the effect of technological advances on the environment, prevention of pollution and the development of regulation to prevent mishaps. Environmental Engineering and its applications therefore provides a concise and comprehensive knowledge towards sustainable development. • **Introduction:** Environment, Humans and the Environment, Environmental Engineering, Introduction to Environmental Law: Relationship between engineering and the environment and understand the impact of human activities. • **Ecosystems:** Energy flow; nutrient cycles; eutrophication; biodiversity; ecosystem services; understand ecology as a discipline together with relevant ecological concepts. • **Sustainability:** Sustainable Development; Three pillars of sustainability incorporating the triple bottom line into informed management of sustainability; life cycle assessments, ecological footprints and Environmental Performance Indexes; Green Engineering and be able to design and implement engineering solutions with an awareness of potential benefits and problems in terms of environment, economy and society throughout the design lifetime; Energy Efficiency; Zero-energy building, energy efficiency and renewable energy; Environmental Sustainability and Environmentally friendly construction methods & materials. • **Environmental risk and hazards:** Effective management and enhancement of the environment to ensure sustainability for future generations, guided by emerging national and international laws and legislation, environmental policies and guidelines; Environmental Management tools such as environmental impact assessment (EIAs), EMPs and audits; hazards, risk perception, risk management, risk communication. • **Introduction to Water and Wastewater Treatment:** Basic water related issues with regards to treatment, water quality standards; water purification • **Solid waste management:** Basic overview and landfill siting, engineering design, construction, operation, monitoring and closure; Sources, composition and properties of solid waste and in depth understanding of the system approach; Understanding of waste reduction through recycling, composting, incineration. • **Air pollution:** Composition of air pollution, structure of the atmosphere, transport of air, air pollution, emission estimation and control, air quality modelling and forecasting • **Noise pollution:** Sources; physical properties; human perception; noise management; health effects; noise control; practical design solutions to minimize the effect. • **Climate change:** Impact, mitigation and adaptation; Global Warming and the Enhanced Greenhouse Effect, climate observation, climate change mechanisms, modelling of climate change, importance of natural variability, impact, mitigation, adaptation; Impacts of climate change on biophysical, natural, social and economic and environments; causes, risks, impacts and implications for future environmental risk assessment

	and implement adaptation and mitigation measures; Introduction to Climate Change, General Circulation Models and Regional Climate Models.
Assessment:	Mid semester test 20%, Assignments/Tutorials 10%, Project 30%, FISA 40%. A sub-minimum mark of 40% for the FISA is required to pass the subject.

PROFESSIONAL AND TECHNICAL COMMUNICATION

Pre-requisite:	None
Mode of delivery:	Four 45 min lectures per week, as well as the Learner management system (LMS).
Subject outline:	The aim of this course is to develop and improve students' ability to communicate effectively in English within the disciplines of Civil Engineering. • **Information Literacy:** Accessing resources; Conduct research: collecting, evaluating and selecting information; types of sources; reading strategically, critically and with comprehension, using different reading strategies where appropriate; summarizing information effectively; Understanding of the principles of citation and of plagiarism; Conventions of academic writing. • **Plagiarism:** Harvard referencing; what plagiarism is, how to avoid it, and understanding the consequences of plagiarism. • **Essay Writing:** Present a researched topic in an objective, logical and coherent manner; Appropriate formatting; Application of information literacy skills; Interpreting of task; Interpreting contrasting perspectives; Balance own perspective with researched information; Justifying own point of view in relation to information; Application of conventions of academic writing - writing style appropriate to technical writing; process approach to writing; Sentence and paragraph structure; Essay structure: Strategies for introduction and conclusions, development of ideas in body; Effective integration of visual material. • **Report Writing:** Types and formats of reports; Identifying and defining engineering problems; Conceptualise feasible design solutions and communicate these logically and coherently; Accessing, selecting and using research from various sources of information; Producing a comprehensive report; Avoiding of conceptual "gaps" and drawing logical specific conclusions; precision, accuracy and objectivity; formatting; Integration of visual material; balanced summaries; Working in a team/group • **Oral Presentations:** Producing logical, coherent and well- researched information for the purpose of a formal presentation; Producing presentations suited to time, audience and purpose; Nonverbal communication; Selection and integration of visual aids appropriate to presentation content; Responding to, and interacting with audience; listening actively, attentively and purposefully. • **Professional Work Ethics:** Adhering strictly to deadlines, avoiding plagiarism, punctuality, accountability and responsibility; Basic awareness of social and environmental issues relating to engineering. (Ethical issues relating to social/environmental awareness form part of essay and presentation topics.) • **Poster Design:** Designing and creating an academic poster; aesthetic appeal; balance between text and images; logical structure and clear layout with accurate content. Correct integration of images (Harvard style); Working in a team/ group.
Assessment:	Information literacy Test: 15%, Class Test: 15%, Oral presentation: 20%, Assignment 1: 20%, Assignment 2: 20%, Assignment 3: 10%

STRUCTURAL ANALYSIS

Pre-requisite:	Theory of Structures, Applied Mechanics
Mode of delivery:	Two 80-minute contact sessions per week, plus additional time for tutorial sessions and/or group work on projects and/or assignments. Learner management system (LMS).
Subject outline:	Structural analysis is a sub branch of structural engineering in the Civil Engineering discipline where students are taught how to calculate the stability, strength and rigidity of man-made structures such as multi-storey buildings and bridges. In this way, students learn how to design the 'bones and muscles' that form and shape structures. • **Determinacy of structures:** static determinacy of beams, trusses and frames.

- **Shear forces and bending moments:** Three pinned connected portal frames & arches. The relationship between shear forces and bending moment for beams, portal frames and arches. Types of loads; Load distribution; Concentrated loads; Triangular loads; Hinges between supports; Inclined loads
- **Axially compressed members:** Understanding of the axially loaded members. Effective length, slenderness ratio and end restraints; Euler, Rankine and Perry Robertson formulae
- **Direct compressive and bending stresses:** Eccentricity around 1 axis; Eccentricity around 2 axes; Moments on columns; Column footings
- **Retaining walls:** Type of retaining walls; Horizontal forces; Safety factors; Bending moments; Retaining walls with surcharge; Retaining walls with slope filling; Active and passive pressures
- **Deflection:- Determinate trusses and frames Strain Energy method:** Derive Strain Energy due to Direct and Bending stress; Apply Strain Energy due to Direct Stress to calculate deflections at truss joints; Apply Strain Energy due to Bending Stress to calculate deflections in statically determinate frames.
- **Indeterminate beams - Shear Force and Bending Moment:**
- **Moment Area Method:** Origin and derivation of Mohr's moment-area theorems; Apply Mohr's moment-area theorems to calculate slope and deflection in statically determinate cantilever beams of uniform and varying stiffness; Extend Mohr's moment-area theorems to calculate reactions in propped cantilever and fixed-ended beams (statically indeterminate beams); Draw the shear force, bending moment and deflection diagrams of propped cantilever and fixed-fixed beams.
- **Clapeyron Method:** Analyse continuous beams – Clapeyron three moment theorem with Sinking of Beam Supports; shear force and bending moment diagram of continuous beams.
- **Moment Distribution:** Stiffness, distribution and carry over; Application of Moment Distribution to continuous beams; shear force and bending moment diagram of continuous beams; Application of Moment Distribution to Non Sway frames; shear force and bending moment diagram of Non Sway frames; Introduce the concept of Sway; Application of Moment Distribution to Sway Frames; shear force and bending moment diagram of Sway frames.

Assessment:	Mid-year test 20 %, Class tests and lab work 60%, FISA 20 %

SURVEYING

Pre-requisite:	None
Mode of delivery:	Four contact Lectures, and 1 practical session of 5 periods per week.
Subject outline:	To provide students with the necessary background and the basic concepts of surveying, especially the South African surveying system. As this is the entry level of the subject, theory lectured will cover basic concepts, different instrumentation in use and the manner and format of performing calculations, usage of surveying equipment such as surveyor's levels, levelling staffs, electronic total stations, prisms and prism poles, as well as the use of Electronic Distance Measurement, GNSS, various techniques in Height Determination (Distances & Zenith Angles) and Setting-out of structures and heights on site. Purpose of surveying, different types of surveys and the end products of surveys; Introduction to the South African co-ordinate system, calculation of angles, directions, joins and polars; Field procedure of taking observations, measuring of angles and directions and the measuring of slope distances and horizontal distances by making use of electronic total stations; Calculate and apply orientation corrections to horizontal observations; Introduction to the South African height network, reference plane (mean sea-level) instruments used (automatic surveyor's level, levelling staffs and footplates); Calculation of formation heights, areas and volumes; Surveys to enable the production of a detail plan; Calculation of areas of any figure (also irregular) and the volumes of excavations or fills; Communicate effectively through report writing on surveys. Use and determine the errors of an electronic distance meter, Apply the distances from EDMS in calculating co-ordinates; Determine the co-ordinates of a point using various instruments, post processing of coordinates, processing of real Time Kinematic observations; Determine the heights of points using a total station and prism (& pole) by tacheometry, Comparing such heights to values from traditional levelling, drawing of detail plans based on such heights; Calculating joins and coordinates for features of interest on a site. Interpreting engineering drawings, checking surveyed coordinates; Do general setting-out and staking of a circular curve, and a vertical curve.
Practicals:	Theodolite / Total station to measure angles; Setting up and observing observations (Horizontal and vertical); Measure horizontal and slope distances; Observe oriented directions and measure required distances; Demonstrate ability to handle levelling instrument; Survey and draw long- and cross sections; Calculation of Areas and Volumes; Setting out with a Total Station; Setting out with GNSS; Tacheometry; Setting out circular curves and vertical curves such as roads.

Assessment:	3 x Tests 10% each, Practicals 30%, FISA 40%. A sub-minimum mark of 40% for the Practicals AND FISA is required to pass the subject.

THEORY OF STRUCTURES

Pre-requisite:	None
Co-requisite:	Applied Mechanics
Mode of delivery:	Two 80-minute contact sessions per week, plus additional time for tutorial sessions and/or group work on projects and/or assignments. Learner management system (LMS).
Subject outline:	At the end of the course the student will be able to determine the sectional properties of selected sections, be familiar with the stresses selected materials undergo when under load, as well as understand and analyse the behaviour of statically determinate structures and pin-jointed frameworks. • **Statically determinate frames and simple space frames:** Requirements for statically determinacy; solving of forces in members using the resolution of joints; solving of forces in member using the method of sections • **Section properties:** Centroids; First and second moment of areas; Section modulus; Parallel axes theorem; Radius of gyration • **Simply supported beams and cantilever beams:** Relationship between load shear force and bending moments; Bending moment and shear force diagrams; Determination of maximum bending moments and position of inflection • **Stresses and Strains:** Direct stress-strain; Stress-strain relationship for steel; Shear stress and strain; Volumetric stress and strain; Hooke’s law; Safety factors; Compound stresses • **Theory of elastic bending:** Application of this theory on simple steel beams to determine bending stresses and size requirements of beams • **Deflection:** Slope and Defection using Macaulay’s method
Practicals:	Shear forces; Bending moments
Assessment:	4 x Tests 12.5% each, PROKON assessments 6%, Practicals 4%, FISA 40%. A sub-minimum mark of 40% for the FISA is required to pass the subject.

TRANSPORTATION ENGINEERING

Pre-requisite:	Construction Materials Technology
Mode of delivery:	Two contact lecture sessions per week, laboratory practicals, computer lab sessions, plus additional time for tutorial sessions and/or group work on projects and/or assignments. Learner management system (LMS).
Subject outline:	Transportation Engineering is the application of scientific principles and technologies to the planning, design, analysis, operation, and management of transportation systems for a full range of modes of transportation, organised around society’s need to provide an adequate transportation infrastructure and involves broad interaction with other disciplines. The curriculum is focused on four important aspects: a) overall planning of the transportation system including land-use trends, impact study and transportation policies; b) roadway engineering involving highway alignment design, planning the cuts and fills for construction, alternative evaluation and layout; c) traffic engineering for capacity and level of service analysis of urban streets and interchange/intersections and methods to manage traffic demand; and d) pavement engineering for traffic load analysis and flexible pavement design. Computer simulation programs and some equipment are also provided to students for transportation study and conducting laboratory & field projects. **Module A:** For student to be introduced to a broader background of transportation systems in general, the planning and geometric design of roads and railways with emphasis on the calculations for the various design elements • **Transportation Planning:** Spatial and Strategic Planning • **Transportation Engineering:** Systems and modes

- **Traffic Engineering:** Road transportation; traffic engineering and capacity aspects
- **Road Design:** Geometric design with emphasis on the calculation the design elements, cross sectional element and the various standards of road design
- **Rail Design:** Theoretical aspects applicable to design
- **Earthworks Design:** Produce earthworks calculation, ground modelling information, contour levels of both the existing and proposed levels, possibly resulting in a 3D ground model. The model is interrogated until a complete cut and fill balance has been achieved with the goal that zero material to be imported or exported from site.

Module B: To become familiar with and appreciate the properties, capabilities, limitations and characteristics of Pavement Engineering materials.

- **Pavement Design & Management:** Exploration of criteria to be considered in this process (e.g. Stresses and strain, Subgrade modulus reaction) as well as the various methods of design, e.g. Group index, CBR, AASHTO and Shell Asphalt Pavement design models, Basic introduction to the SA mechanistic Design Method, Catalogue Method, Remedial Action for road surfacing: road defects and recommended surface repairs
- **Drainage:** Drainage and Subgrade Treatment
- **Pavement Materials:** ***Bitumen:*** Types, Manufacture, Specification & Testing, Handling, Bitumen Distributors; ***Bituminous Applications:*** Primes and Pre-coating Fluids, Surfacing methods and design principles, Micro – surfacing and Surfacing enrichment; ***Seals:*** Function, Types of Seals, Resealing & Repair, Calculations; ***HMA:*** Manufacture (& Rothfuch Calculation), Design principles, Placing, Compaction, Quality Control and Acceptance, Laboratory Test Procedures, Recycles Asphalt Pavements (RAP) and Asphalt Reinforcement; ***Stabilisation:*** Methods & Agents.

Assessment:	Tests15%, Computer Laboratory 10%, Practicals 20%, Tutorials 5%, Project 10%, FISA 40%. A sub-minimum mark of 40% for the practical AND FISA is required to pass the subject.

WATER ENGINEERING 1

Pre-requisite:	None
Mode of delivery:	Lectures, Tutorials & Practicals
Subject outline:	Basic Principles & Concepts, Fluid Dynamics, Pipe Flow and Open Channel, Flow Measurement, Water Sources & Demand, Water Quality requirements for Potable Water, Conventional Water Treatment Processes, Generation of Wastewater and Quantities and Standards, Conventional Wastewater Treatment Processes and Treatment Units and Sludge Treatment and Disposal.
Assessment:	Tests (30%), Practical (10%), Project (20%) & FISA (40%)

WATER ENGINEERING 2

Pre-requisite:	Water Engineering 1
Mode of delivery:	Lectures, Tutorials & Practical
Subject outline:	Introduction to meteorological data, Evapotranspiration & Infiltration, Groundwater, Surface Runoff & Streamflow, Hydrograph analysis, Hydrological forecasting, Water demand forecast, Pipe Flow, Open Channel Flow, Pumps, Water storage reservoir, Sanitary sewer design, Stormwater sewer design, Sanitation – design of a septic tank.
Assessment:	Tests (30%), Tutorial (20%, Practical (10%), FISA (40%)

BACHELOR OF ENGINEERING TECHNOLOGY SUBJECTS: CIVIL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.
Subjects without a number at the end do not have an equivalent at a higher level.

APPLIED MATHEMATICS

Pre-requisite:	Physical Sciences, Engineering Mathematics 1A, Engineering Mathematics 1B, Engineering Mathematics 2
Mode of delivery:	Lectures (3 hours contact time per week)
Subject outline:	Introduction to Statistics and Data Analysis; Properties of Probability. Random variables, continuous and discrete probability. Confidence Intervals. Hypothesis Testing: Two samples, Goodness fit testing; tests for independence and homogeneity, t-test; Goodness of fit test, F-Test, Chi Test. Linear/Non-linear and Multiple regression. Engineering Applications with software programs: SPSS & Excel.
Assessment:	Tutorial (10%), Test (40%), Prac (10%), FISA (40%)

APPLIED MECHANICS

Pre-requisite:	Physical Science
Mode of delivery:	Lectures (3 hours contact time per week)
Subject outline:	• **Introduction to applied mechanics:** Analyze measurements application with SI unit conversion. • **Forces:** Calculation of forces that exist in engineering mechanics, Calculate resultant of forces and forces in equilibrium. Moments: Analyse and calculate moments caused in engineering mechanics, Use the principle moments to solve problems in engineering mechanics. • **Equilibrium of rigid bodies:** Calculate support reactions at beams. Internal forces: Calculate internal forces of structural components (beams), Draw shear force and bending moment diagrams. • **Plane trusses:** Calculate member forces in trusses using method of joints and sections. • **Centres of gravity, centroids, and moment of inertia:** Analyse and calculations of applicable concepts of centroids and moments of inertia in engineering mechanics. • **Simple stress and strain:** Understand the concept of stress and strain and their application in engineering mechanics
Assessment:	Practical (15%); Project (15%); Test (30%); FISA (40%)

CIVIL ENGINEERING DOCUMENTATION

Pre-requisite:	Engineering Drawing, Professional & Technical Communication, Engineering Management
Mode of delivery:	Lectures (3 hours contact time per week)
Subject outline:	Documentation overview; Specification; Civil Engineering Quantities; Introduction to CESMM3 guidelines; Site investigations, clearance; Earthworks; Concrete; Pipelines and roadworks; Introduction to estimating and Preparation of unit rates; Plant and Earthworks; Concrete and steel; Introduction to General Conditions of Contract. GCC 2015 highlights; GCC 2015.
Assessment:	Test (30%); Test (30%); FISA (40%)

COMPUTER TECHNOLOGY

Pre-requisite:	Engineering Drawing
Mode of delivery:	Lectures (3 hours contact time per week)
Subject outline:	• **AutoCAD:** Introduction - the working environment: Accessing AutoCAD, Screen layout, Ribbons, Quick access toolbar, the drawing area, Status bar, Command line, Setting up your work space, Drawing “to scale”. • **Working with files:** New, Open, Saving, Retrieving, Close, Templates.

	• **Drawing commands:** Line – drawing using: Polar co-ordinates, Absolute co-ordinates, Relative co-ordinates. **Further drawing commands:** Circle, Polyline, Arcs, Rectangles, Hatching. • **Editing (or Modifying) commands:** Move, Copy, Trim, Rotate, Trim/extend, Mirror, Fillet/chamfer, Scale, Modify hatch, Linetype scale. • **Zoom:** Pan, Regen, Scroll, All, Extents, Window. • **Layers:** Create layer names, Colours, Linetypes, Lineweights. Dimensioning and annotating drawings. • **Excel:** introduction – exploring Excel, basic workbook skills, entering, copying & moving data, Creating simple formulas, managing worksheets, formatting data and cells. Saving, working with columns & rows, using large spreadsheets, printing, setting up of graphs, manipulating data. • **Prokon:** introduction – framework analysis & exercises, Beams analysis & exercises. Section properties & exercises using Prokon.
Assessment:	Tutorial (40%); Test (20%); Assignment (20%); FISA (20%)

CONSTRUCTION MATERIALS TECHNOLOGY 1

Pre-requisite:	None
Mode of delivery:	Lectures (3 hours contact time per week)
Subject outline:	Introduction to Construction Materials Technology. • **Soil:** Nature of soil, origin, types, Field of identification, soil samples, Soil Properties and relevant tests, Soil Stabilization. • **Concrete:** concrete specification and mix requirements, Concrete ages, Properties and relevant tests, Materials for concrete, Form Work, Mix proportion design, Reinforcement, Joints, Precast and Prestressed concrete. • **Bitumen:** Sources of Bitumen, Composition, Production of Bitumen, Behavior and characteristics, Types of Bitumen, properties and Test on bitumen, Safety. • **Others Materials:** Bricks, Timber, Metal, Reinforcement (steel), Classification of alloy. • **Environmental Issues**Interdependence of conservation and development, etc. • **New technologies**: Innovative construction materials, Sustainable development materials – properties (eg insulation) Polymers in building and construction, Fibre-reinforced polymer composites Nanomaterials, Composites – reinforcing bars in concrete, fibre reinforcement in concrete, steel/concrete composite bridge decks, fibre reinforced plastics, structural insulated panels Environmental impact and life cycle evaluation of materials, New technologies – zero cement concrete, 3d printing, photocatalytic admixtures, self healing concrete, hemp lime, bamboo, recycled building material as aggregate, tyres as aggregate, glass in rooftiles, low strength precast products made of recycled material (eg kerbs), rammed, earth construction, sewage water for concrete mix, etc. • **Comparison of different materials:** Comparison of different materials Comparing strength of materials, Comparing environmental impact - Types of impact, measurement of impact Health and Safety – specific hazards when using materials, hazard from fire.
Assessment:	Test (20%); Prac (10%); Assignment (10%); Lab (10%); Project (10%); FISA (40%)

CONSTRUCTION MATERIALS TECHNOLOGY 2

Pre-requisite:	Construction Materials Technology 1, Engineering Mathematics 2
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	**Naturally occurring materials:** Aggregate, Water, Soil **Manufactured materials:** Lime, Concrete, Asphalt, Bricks, Blocks, Geotextiles and Others.
Assessment:	Test (20%), Project (10%); Assignment (10%); Lab (10%); Project (10%); FISA (40%)

CONSTRUCTION METHODS

Pre-requisite:	Construction Materials Technology
Mode of delivery:	Lectures, practical (3 hours contact time per week)

Subject outline:	Construction Methods is an introductory overview of the various methods applied in construction industry. The principal objectives of the subject is to introduce students to the Methods followed in Civil Engineering Construction, gain an understanding of the main Civil Engineering Fields, and to be provided with a sound theoretical background to enable them to apply this knowledge during practical working experience. • **Earthworks:** Knowledge of soil properties as it applies to foundations, difference between foundation types, basic loads and minimum widths of foundations, excavations and methods of making it safe from collapse, timbering supports, regulations pertaining to excavations, types of retaining walls, types of construction plant used on site as it pertains to earthworks • **Structures:** Different parts of structure, components of concrete and steel structures, use of formwork as applied to concrete structures, application of scaffolding, brickwork • **Road Engineering:** Road design, mass haul diagram, difference between flexible and rigid pavements and their properties, road drainage, parking bays. • **Dams:** Function, types (earth and concrete dams), process involved during the planning, design and construction considerations, importance of water conservation. • **Bridges:** Design principles, different types (concrete and steel), component parts. • **Tunnels:** Purpose, methods, difference in application in varying soil and rock conditions, tunnelling machinery. • **Harbours:** Functions, terms used in harbour design, types, structures and facilities. • **Railways:** functions of track structure, terms, functions of each element of a track structure, structures and facilities of rail. • **Airports:** phases of airport design, elements of airport structure, importance of airport pavements, importance of drainage facilities. • **Safety:** role of safety in construction, procedures to ensure a safe working environment, Acts relating to safety and workplace. • **Drainage:** importance and application of drainage systems, components and the materials, testing methods used on pipelines, design process of a typical drainage system, importance of applying good drainage practice. • **Labour – Enhanced Construction (LEC):** concept, application of LEC to South African conditions, objectives and principles behind LEC, process in the national approach to LEC
Assessment:	Test (30%); Assignment (10%); Project (20%); FISA (40%)

ENGINEER IN SOCIETY

Pre-requisite:	Professional & Technical Communication
Mode of delivery:	Lectures, (3 hours contact time per week)
Subject outline:	• **Introduction of Engineering in society:** The role of an engineer in society and responsibility that is required to make financial decision, ethical judgment and mathematical calculations. • **Creativity in Engineering:** Creative problem solving, innovation to create new solutions. • **Ethics and employability:** Reliability at workplace. Confidentiality. Operating within specific level of competency. The Virtue of Engineering. • **Professionalism:** An engineer's professional responsibility. • **Statement of Ethical principles:** Accuracy and rigour, honesty and integrity, respect for life, law and public good, responsible leadership: listening and informing. • **The roles of an engineer:** Technical, management and Ethics. • **Engineering responsibility:** The influence of engineering and technology on society. Limit the harm that engineering products have on communities. Engaging in projects that makes a positive contribution and that help in solving problems that are faced by the society. • **Engineers without borders:** Use of engineering skills to address global challenges. Making a difference.
Assessment:	Assign (30%), Assignments (30%); Test (40%)

ENGINEERING DRAWING

Pre-requisite:	None
Mode of delivery:	Lectures, practical (3 hours contact time per week)

Subject outline:	**Module A - Drawing Basics:** Instrumentation, demonstration and practice, lettering, sketching, line types, dimensioning, isometric drawings and orthographic views. **Module - Drawing application:** Topographical drawings.
Assessment:	Test (15%); Tutorial (15%); Project (20%c; Assignment (20%); FISA (40%)

ENGINEERING MANAGEMENT

Pre-requisite:	Professional & Technical Communication
Mode of delivery:	Lectures, (3 hours contact time per week)
Subject outline:	Pre-tender, Pre-contract, Contract phase, Site visit report; P&G's, Cost estimate, Tender Adjudication; Method statement (compiling), Method statement, leading to logical relation programming, WBS; Network diagrams, Network diagrams; Crash time analysis; Gant charts + Early start / Late start Cash flow; Labour Histogram / Line of Balance program; Line of Balance program; Cash flow.
Assessment:	Practical (15%); Test (30%); Assignment (15%); FISA (40%)

ENGINEERING MATHEMATICS 1A

Pre-requisite:	None
Mode of delivery:	Lectures, (3 hours contact time per week)
Subject outline:	• **Functions:** Types of functions (Exponential functions including natural logs, Inverse functions, Inverse trigonometric functions, Inverse logs including properties of natural logs, Solving equations involving natural). Limits (Definition of a limit, one sided limits, infinite limits, Limit laws, the squeeze theorem). • **Continuity:** Definition of continuity, Intermediate value theorem, Limits at infinity, Derivatives from 1st principle and rates of change. • **Differentiation:** The rules of differentiation (constant multiple rule, sum and difference rule and power rule), Product and quotient rule, Chain rule, Implicit differentiation rule, Logarithmic differentiation rule, Rates of change, Hyperbolic functions, identities, inverse hyperbolic functions, derivative of hyperbolic functions, derivatives of inverse functions. • **Applications of Differentiation:** Curve sketching (minimum and maximum values), Extreme value theorem, Fermat's theorem, Closed interval theorem. Applications of the mean value theorem, Rolle's theorem, Local extreme values, concavity test, the second derivative test, L'Hospital's rules, indeterminate forms, Optimization problems, Antiderivatives. Integration: Areas and distances, estimating the area using left end points, right end point, and mid-point rule. The definite integral, Theorem 2, 3 and 4, comparison properties, The fundamental theorem of calculus (part 1 and part 2), Indefinite integrals, Substitution rule
Assessment:	Tutorial (20%); Test (20%); Assignment (20%); FISA (40%)

ENGINEERING MATHEMATICS 1B

Pre-requisite:	Engineering Mathematics 1A
Mode of delivery:	Lectures, tutorials (3 hours contact time per week)
Subject outline:	• **Binomial Series Expansion:** definition, use of Pascal's triangle to expand a binomial expression. • **Integration:** Antiderivatives. Areas and Distances (Area under a straight line, Area under a curve using Left-end point rule, Right-end point rule, The midpoint rule), Definite Integral (Theorem 2, 3 and 4; Properties of the definite integral; Comparison properties of the integral; The Fundamental Theorem of Calculus. Indefinite Integrals; Simple applications on Integration; Substitution Rule for Integration; Use the Standard Differentiation and Integration Tables. • **Techniques of Integration:** Integration by Parts; Trigonometry Integration; Trigonometric Substitution Integrals; Integration of Rational Functions by Partial Fractions. • **Applications of Integration and Modelling:** Area between Curves; Volumes; Mathematical Modelling-Introduction-Linear Models; Modelling with differential equations. • **Vectors:** Representation of a vector; Properties of a vector; Applications of vectors (The Dot Product, The Cross Product).

	• **Matrices:** Addition, Subtraction, Multiplication of matrices, and Inverse of a matrix; Determinant of a 2x2 and 3x3 matrix; Solving a System of Linear Euations using Cramer's Rule and Inverse matrix method.
Assessment:	Tutorial (20%); Test (20%); Assignment (20%); FISA (40%)

ENGINEERING MATHEMATICS 2

Pre-requisite:	Engineering Mathematics 1A, Engineering Mathematics 1B
Mode of delivery:	Lectures, tutorials (3 hours contact time per week)
Subject outline:	• **Linear Algebra:** Add, subtract and multiply matrices, determinants, Solving sets of linear equations using Cramer's rule and the inverse matrix method. • **Differential Equations:** D-operator methods- Solution of linear differential equations; D-operator methods and Theorems Solution of higher order differential equations; D-operator methods- Applications in engineering. • **Laplace Transforms:** Laplace and inverse Laplace transforms of elementary functions; Laplace transforms of derivatives. Laplace transforms: Theorem 1: First shift theorem, Theorem 2: Multiplication by t, Theorem 3: Division by t. Special functions: Heaviside step function and Dirac Delta function. Solving second order ordinary differential equations with boundary conditions. Solving engineering applications in Civil Engineering
Assessment:	Tutorial (20%); Test (20%); Assignment (20%); FISA (40%)

ENVIRONMENTAL ENGINEERING

Pre-requisite:	Physical Sciences, Engineering Mathematics 2
Mode of delivery:	Lectures, (3 hours contact time per week)
Subject outline:	Water and Groundwater Resources in South Africa. Management of Surface and Groundwater Pollution. Water and wastewater quality. Sludge treatment and disposal. Waste Management and Clean Technologies. The Engineer and the environment. Introduction to Environmental Chemistry for Engineers (water).
Assessment:	Test (10%); Assignment (20%); Project (30%); FISA (40%)

GEOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction of Engineering Geology:** Geology Vs. Engineering Geology, Civil Engineering and Engineering Geology • **The Earth:** Surface, structure, chemical composition, etc. • **Mineralogy**: Properties of Common Rock forming minerals, clay minerals, Silicates, etc. • **Major Rock Types:** Igneous, Sedimentary, Metamorphic rocks, formation and properties; weathering and geomorphic processes, Engineering concerns of rocks. • **Geological Structures:** Dip and strike, Folds, faults, joints, etc. • **Stratigraphy and Geological Maps:** Stratigraphy of South Africa, Interpretation of geological maps, Geological sections, Geological time scales, etc. • **Rocks and Civil Engineering**: Classification of rocks, Engineering properties of rocks, Evaluation of rocks as aggregates (quarrying)
Assessment:	Project (20%); Test (20%); Assignment (20%); FISA(40%)

GEOTECHNICAL ENGINEERING

Pre-requisite:	Geology, Soil Mechanics
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction to soil mechanics:** How soils respond to loading; stresses and strains.

- **Laboratory Testing:** Test to evaluate stresses and strains. Consolidation/shear/triaxial/unconfined compressive stress.
- **Earth Pressure:** Evaluating passive and active forces against vertical surfaces.
- **Problematic Soils in South Africa***:* Recognising problematic soils in the field and tests to expose weaknesses. **Foundation Design:** Design principles for deep foundations; piling, deep strip foundations, controlling settlement of footings in weak soils.
- **Rocks and Civil Engineering:** Classification of rocks, engineering properties of rocks, evaluation of rocks as aggregates (quarrying,).
- **Remedial action for structures undergoing settlement and cracking:** Responsibilities of the site agent; other subsurface investigations. Applying different methods to rescue buildings.

Assessment:	Practical (20%); Test (20%); Project (20%); FISA (40%)

HYDRAULICS 1

Pre-requisite:	Engineering Mathematics 1A, Engineering Mathematics 1B, Physical Sciences
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	Revision of the following: (Properties of Fluids, Fluid Statics, Fluid Flow Concepts and Measurements, Flow of Incompressible Fluids in Pipelines, Flow in Open Channels). Pipe Network Analysis. Application of relevant computer and simulation models. Pump-Pipeline System Analysis and Design. Steady Flow in Open Channels. Gradually Varied Unsteady Flow from Reservoirs. Mass Oscillations and Pressure. Transients in Pipelines. Unsteady Flow in Channels. Hydraulic Structures
Assessment:	Lab (20%); Test (40%); FISA (40%)

HYDRAULICS 2

Pre-requisite:	Hydraulics 1, Engineering Mathematics 2
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	Revision of the following: (Properties of Fluids, Fluid Statics, Fluid Flow Concepts and Measurements, Flow of Incompressible Fluids in Pipelines, Flow in Open Channels). Pipe Network Analysis. Application of relevant computer and simulation models. Pump-Pipeline System Analysis and Design. Steady Flow in Open Channels. Gradually Varied Unsteady Flow from Reservoirs. Mass Oscillations and Pressure. Transients in Pipelines. Unsteady Flow in Channels. Hydraulic Structures
Assessment:	Lab (20%); Test (40%); FISA (40%)

HYDROLOGY

Pre-requisite:	Physical Sciences
Mode of delivery:	Lectures, practical (3 hours contact time per week)

Subject outline:

- **Introduction:** Hydrologic cycle and hydrologic budget.
- **Precipitation:** Collection, analysis and interpretation of precipitation data.
- **Evapotranspiration:** Methods of determining evaporation & evapotranspiration and instrumentation.
- **Infiltration:** Methods of determining infiltration rate and instrumentation.
- **Groundwater:** Occurrence and movement of ground water, basic well and aquifer hydraulics.
- **Surface runoff:** estimation of surface runoff and stream flow. Mass curves to determine reservoir storage.
- **Runoff Modelling:** Rational method, the SCS method and unit hydrographs.
- **Hydrological forecasting:** Forecast the risk and probability of the recurrence of droughts and floods.
- **Flood routing:** Determine the effect of storage on flood peaks and lag times of attenuated floods using the Muskingum method.

Assessment:	Lab (20%); Test (40%); FISA (40%)

INTEGRATED TECHNOLOGY PROJECT

Pre-requisite:	Professional & Technical Communication, Transportation Engineering 1
Co-requisite:	Hydraulics 1, Civil Engineering Documentation, Reinforced Concrete and Masonry Design
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	Introduction to Civil Designer Working with a digital terrain module and developing contours. Using CAD to design the residence layout. Access to streets and main arterials. Utilizing the Roads Module to design the horizontal and vertical alignments. Incorporating TRH17 to design layer works. Comparing designs with TRH4 using RNIS station data for heavy vehicle traffic flow. Utilizing the Water Reticulation Module to design and balance the pressure distribution network. Install and design a suitable pump and gravity feed water tower. Introduction to Prokon to design a reinforced masonry structure (pump house). Set up a bending schedule for all steel work. Check and analyze the bearing capacity of soils. Laboratory tests for geotechnical analysis of the shear strength soils. Utilizing the Sewer Module to design and install all sewage systems to and outfall. Design a parking lot suitable for a new shopping mall. Design will be based on projected access to the mall and traffic flow to the area. A traffic hand count will be done. Trip generation report to be compiled.
Assessment:	Assign (20%); Assign (20%); Assign (20%); Assign (20%); Assign (20%)

PHYSICAL SCIENCES

Pre-requisite:	None
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction**: Basic chemical concepts: atoms, atomic mass, elements and the periodic table. • **Chemical Bonds**: Chemical bonds and intermolecular forces and molecular mass and reactivity series. • **The Mole concept**: The mole (Avogadro's number) and molar units. • **Chemical reactions and stoichiometry:** Chemical equations, balancing chemical reactions, types of reactions, reactions involving gases. • **Redox reactions**: Definitions, oxidation state, ionic balance, types of redox reactions & balancing redox equations. **Chemistry in practice**: Water and wastewater treatment chemicals and their reactions; concrete (lime, cement & reactions) and road construction materials. • **Physics Introduction:** What is physics? SI units, dimensional analysis. • **Vectors and scalars:** Adding vectors, components, resultants, unit vectors. • **Linear motion:** Displacement, velocity & acceleration; equations of motion for constant acceleration. • **Newton's laws:** Newton's first, second and third laws (and projectiles). • **Friction:** Properties, drag force and terminal speed. • **Work, power & energy:** Work and kinetic energy, potential energy and conservation of energy. • **Introduction to electricity:** Current & resistance & DC circuits
Assessment:	Lab (10%); Test (50%); FISA (40%)

PROFESSIONAL & TECHNICAL COMMUNICATION

Pre-requisite:	None
Mode of delivery:	Lectures (3 hours contact time per week)
Subject outline:	Communication Theory; Information literacy; Reading and Note-taking; Listening; Written communication (Essays, Report Writing, Communication at the work place: Business Correspondence); Graphic communication (Academic Poster design, Oral presentation)
Assessment:	Test (30%); Lab (20%); Project (10%); FISA (40%)

PROJECT MANAGEMENT THEORY

Pre-requisite:	Engineering Management, Civil Engineering Documentation, Professional & Technical Communication, Engineering Mathematics 2
Co-requisite:	Research Methodology & Project
Mode of delivery:	Lectures (3 hours contact time per week)
Subject outline:	Definition and concepts, Project objectives of project management, benefits of value management, project cycle for a civil engineering projects, Perform a feasibility study of civil engineering project and appraisal. Stakeholder analysis. Project management and quality, quality monitoring and control, risk plans:-TQM; BPR; and Enviromental management. Project Finance:-Developing financial and human resources, construction, sources of finance, debt financing, financial risks, cost estimates. Planning:-programming, network analysis, software and modelling and programming, resource scheduling. Project implementation, Construction Management; Critical path Analysis. Basics of costs and schedule monitoring, planning and deterministic scheduling. Contracts management, supply chain management. Perform phase review, Perform project closure and evaluation.
Assessment:	Test (10%); Test (20%); Project (30%); FISA (40%)

REINFORCED CONCRETE AND MASONRY DESIGN

Pre-requisite:	Structural Analysis 1, Physical Sciences, Applied Mechanics, Engineering Drawing
Co-requisite:	Structural Analysis 1
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction to structures:** Course overview, Typical types of structures (Reinforced concrete)-Broad overview to identify and familiarise with symbols, materials, loads, Limit State design. • **Materials, Loads:** Arrangement of loads: Identify Dead, Live, Wind, Environmental, Seismic ; Load path & patterns; Load calculations (Dead, Live). Limit States approach (Load combinations and effects); Ultimate and Serviceability Limit States. Overview of structural analysis methods for statically determinate and indeterminate structures. Deflection, cracking, durability, fatigue and fire resistance considerations. • **Beams:** Design of statically determinate and indeterminate rectangular and flanged beams for: Flexure, Shear; deflection; torsion; combined shear and torsion. Detailing and curtailment of reinforcement. • **Slabs:** Solid slabs: Introduction One-way- and two-way spanning & cantilever slabs. Design for flexure, shear, torsion, deflection. Design examples with reinforcement detailing. Flat slabs: Introduction. Division of panels, proportioning slab thickness, column head and drops. Continuous frame analysis, simplified analysis for bending shear and punching shear. Deflection check. Composite slabs: Introduction to composite design (concrete and steel). Reinforcement detailing and curtailment of bars. • **Columns:** Braced and un-braced short columns bent uni-axially. Un-braced slender columns bent uni-axially. Bi-axial bending. Detailing of reinforcement. • **Staircases:** Introduction. Loading, effective span, analysis and design. Detailing of reinforcement. • **Retaining walls:** Introduction. Gravity, cantilever and counterfort. Modes of failure, soil parameters, pressures & design approach. • **Foundation Design:** Introduction. Sizing of foundations. Isolated bases, combined bases and strapped bases. Design for bending, vertical shear and punching shear. • **Masonry design:** Design considerations. Structural design of unreinforced masonry for (i) compression and (ii) combined bending and axial loading. Unreinforced masonry by simple rules. Reinforced masonry. • **Design methods:** Analysis and design of reinforced concrete and masonry elements using current Civil Engineering industry norms and standards for structural analysis, design, drawings and detailing.
Assessment:	Lab (20%); Test (40%); FISA (40%)

RESEARCH METHODOLOGY & PROJECT

Pre-requisite:	Professional & Technical Communication
Co-requisite:	Project Management Theory
Mode of delivery:	Lectures, (3 hours contact time per week)
Subject outline:	• **Introduction to research:** Definition and concepts; Searching information and how to use data bases, search engines etc. Defining a research topic. • **Literature review:** Writing a literature review.

	• **Research Methods:** Outlining the various methods and tools applied in conducting a research project (Data collection; Experimental, interviews, surveys and questionnaires; Analysis of data including Statistical analysis, hypothesis testing; Presentation of results and conclusions). • **Critical analysis of data:** Analysis and discussion of results and comparing with data from the literature. • **Formulation of a research proposal:** Writing a research proposal. Students to conduct a research project and to apply the above methods and skills. • **Presenting scientific information:** Scientific posters and oral presentation. • **Research Project:** The final product from the above acquired knowledge will culminate in producing a mini-research dissertation
Assessment:	Test (10%); Proposal (15%); Oral (10%); Dissertation (65%)

RETICULATION DESIGN AND MANAGEMENT

Pre-requisite:	Hydraulics 1, Engineering Mathematics 2
Mode of delivery:	Lectures, computer simulations (3 hours contact time per week)
Subject outline:	• **Pipe network analysis and Design**. Application of relevant computer and simulation models. • **Sewer reticulation and Design**. Application of relevant computer and simulation models. • **Storm water drainage and Design**. Application of relevant computer and simulation models. • **Dam design**. Application of relevant computer and simulation models. • **Canal Design and Culverts**. Application of relevant computer and simulation models. • **Design of pumps and pump stations. Network Construction:** Site preparations, excavations, Trench dewatering, Tunnel excavation, Pipe laying; laying in trenches, Pipe jointing; laying above ground, Anchorage and supports, Backfilling; testing and disinfection, Pipe material and Specifications. • **Management of systems:** Water distribution Organisation, Economics of pipe lines, Tasks, Structure and size, Network operation and maintenance; Rehabilitation of existing sewer lines.
Assessment:	Project (30%); Test (10%); Test (20%); FISA (40%)

SOIL MECHANICS

Pre-requisite:	None
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction to soil mechanics:** How soils respond to loading; stresses and strains. • **Laboratory Testing:** (Test to evaluate stresses and strains, particle size analysis by sieving, consolidation test, shear box test, triaxial test, unconfined compressive stress test, oedometer test, permeability tests, etc.). • **Earth Pressure:** Evaluating passive and active forces against vertical surfaces. • **Problematic Soils in South Africa:** Recognising problematic soils in the field and tests to expose weaknesses. • **Foundation Design:** Design principles for deep foundations; piling, deep strip foundations, controlling settlement of footings in weak soils. • **Remedial action for structures undergoing settlement and cracking:** Responsibilities of the site agent; other subsurface investigations. Applying different methods to rescue buildings
Assessment:	Practical (20%); Project (20%); Test (20%); FISA (40%)

SOLID WASTE MANAGEMENT

Pre-requisite:	Physical Sciences, Engineering Mathematics 2
Mode of delivery:	Lectures, (3 hours contact time per week)

Subject outline:	Characteristics of solid waste. Legal aspects. Solid waste disposal methods. Design, operation and Management of landfill sites. Operation and management of waste removal systems. Third world applications. Waste reduction, re-use and recycling. Emergency waste management.
Assessment:	Test (10%); Assign (20%); Project (30%); FISA (40%)

STRUCTURAL ANALYSIS 1

Pre-requisite:	Physical Sciences, Applied Mechanics, Engineering Mathematics 1A, Engineering Mathematics 1B
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction to structural analysis:** Determinacy of beams and frames. • **Analysis of statically determinate structures:** support reactions of three pinned structures (portal frames and arches); internal forces in frames and arches, axial force, shear force and bending moment diagrams for statically determinate frames; member forces in cables. • **Deflection of structures:** deflection of beams using double integration method, moment area method and Virtual work method. • **Influence lines:** influence lines of statically determinate beams and trusses
Assessment:	Lab (10%); Test (50%); FISA (40%)

STRUCTURAL ANALYSIS 2

Pre-requisite:	Structural Analysis 1, Engineering Mathematics 2
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Moment distribution:** Analyse continuous beams, frames with inclined legs and multi-storey frames using the method of moment distribution. • **MaCauley method of analysis of virtual displacements:** To solve statically indeterminate beams, trusses and frames for determine deflection, moment and shear. Plastic analysis of beams and frames. • **Slab Analysis:** Yield line analysis; Hillerborg strip methods. Stiffness Method to analyse beams, frames and trusses. Compound structures (Moment, shear and deflection). Introduction to Finite Element Analysis
Assessment:	Lab (10%); Test (50%); FISA (40%)

STRUCTURAL STEEL AND TIMBER DESIGN

Pre-requisite:	Physical Sciences, Applied Mechanics, Engineering Drawing
Co-requisite:	Structural Analysis 1
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction to structures:** Course overview, Typical types of structures (Steel, Timber) - Broad overview to identify various structural elements. • **Materials, Loads:** Load types (identify Dead, Live, Wind, Environmental, Seismic); Load paths; Load calculations (Dead, Live, Wind only) and Limit States (Load combinations and effects). • **Design of Tension & Compression elements:** Axially loaded; Combined Axial & Bending. • **Design of Beams:** Flexure, Shear; deflection; bearing. • **Truss Design:** Pin jointed & Fixed - Statically determinate and indeterminate trusses (Axially loaded; Combined Axial & bending). • **Timber Framed structures:** Design of Axial tension, Compression member, bending. • **Elementary Connections:** Steel (bolted & welded); Timber (nailed; & bolted). • **Design methods:** Analysis and design of structural steel and timber elements (covering the above aspects), using current Civil Engineering industry norms and standards (e.g. design codes; computer software) used for structural analysis, design, drawings and detailing. Classic methods (i.e. hand calculations) will be used to check computer analysis and designs.

Assessment:	Lab (60%); Test (20%); FISA (20%)

SURVEYING 1

Pre-requisite:	None
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction to Surveying:** Purpose of surveying, different types of surveys and the end products of surveys. **South African Surveying System (co-ordinates)**: Introduction to the South African co-ordinate system, calculation of angles, directions, joins and polars. • **Observations, horizontal, vertical, electronic measurement of distances.** Field procedure of taking observations, measuring of angles and directions and the measuring of slope distances and horizontal distances by making use of electronic total stations. • **Orientation of Observations**: Calculate and apply orientation corrections to horizontal observations. • **Levelling**: Introduction to the South African height network, reference plane (mean sea-level) instruments used (automatic surveyor's level, levelling staffs and footplates). Reduction of levelling field books. • **Long- and Cross Sections**: Calculation of formation heights, areas and volumes. • **Detail Surveys**: Surveys to enable the production of a detail plan.
Assessment:	Practicals (30%, Theory (30%); FISA (40%)

SURVEYING 2

Pre-requisite:	Surveying 1
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Revision; Circular curves (**geometry of the circular curve) • **Setting out; Placing and fixing of points** (double polar) • **Vertical curves; GPS/GNSS (**Basic Principles of GPS/GNSS, Expected errors, Different systems in use, Applications) • **Maps and Plans**
Assessment:	Practicals (30%, Theory (30%); FISA (40%)

TRANSPORTATION ENGINEERING 1

Pre-requisite:	Surveying 2
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Transport Planning:** Transport Evolution, Land use patterns, networks, planning process, road classification and transportation systems, modelling (4 step model) traffic impact studies, safety and economic evaluation, ticketing, timetabling. • **Traffic Engineering:** Speed/Delay studies, O/D studies, Modelling, Capacity, Level of Services, Traffic Management, Parking, Safety, Traffic flow models, statistical applications, traffic control. • **Geometric Design:** Route Location, Design Criteria, Alignment, Cross Sectional Elements, Intersection Design. • **Rail Design:** Structure, Components, Track work, Alignment, Maintenance. • **Earthworks:** Mass Haul, Balance, Quantities. • **Design Considerations:** Life Cycle, behavior, traffic estimation, investigation and capacity
Assessment:	Practical (20%); Test (20%); Project (20%); FISA (40%)

TRANSPORTATION ENGINEERING 2

Pre-requisite:	Transportation Engineering 1, Engineering Mathematics 2
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Geometric Design Review:** A Review of Route Location, Design Criteria, Alignment, Cross Sectional Elements, Intersection Design from Transport 1. • **Earthworks Review:** A Review of Mass Haul, Balance, Quantities. • **Materials & Design:** Properties and behavior of granular, bituminous, asphaltic and cementitious materials, stabilization, behaviour and transfer functions. • **Design Elements:** Flexible, Rigid and Block Pavements, Elastic Layer Theory. • **Design Considerations:** Life Cycle, behavior, traffic estimation, investigation and capacity. • **Design Methods:** CBR Design, Mechanistic Design and Low Volume Design. • **Post Construction:** Monitoring, Distress, Maintenance, Rehabilitation and Reconstruction. • **Asphalt Laboratory:** Design an asphalt briquette through an economical blend and gradation of aggregates (within the limits of the project specifications) that yields a mix which has sufficient: (asphalt to ensure a durable pavement; mix stability to satisfy the demands of traffic without distortion or displacement; voids in the total compacted mix to allow for a slight amount of additional compaction under traffic loading without flushing, bleeding, and loss of stability, yet low enough to keep out harmful air and moisture and; workability to permit efficient placement of the mix without segregation. • **Design Project:** A *pavement design* for a new road with design emphasis on (Material selection; Life Cycle, behavior, traffic estimation, investigation and capacity; Design Method; Monitoring and Maintenance). A *pavement rehabilitation* for a particular class of road with design emphasis on (Road audit; Material selection; Life Cycle, behavior, traffic estimation, investigation and capacity; Design Method, Monitoring and Maintenance).
Assessment:	Practical (20%); Test (20%); Project (20%); FISA (40%)

URBAN PLANNING

Pre-requisite:	Professional & Technical Communication, Engineering Drawing
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	• **Introduction:** Urbanization in South Africa and worldwide. • **An overview of the various fields within planning**, such as housing, community development, transportation, environmental planning, urban sprawl and growth management. Our focus will be on the major policy issues and problems within each of the fields. Planning Theory, Planning tools, demographics, the legal basis of planning, growth planning, Planning and politics. The social issues in planning. The comprehensive plan and tools of land use planning. • **Urban Design:** Urban shrinkage and metropolitan growth. Transportation planning, housing planning. Urban renewal and community development. Economic development planning. Growth management and sustainable development. Environmental and energy planning. Planning for metropolitan regions, Regional Planning.
Assessment:	Test (30%); Project (30%); FISA (40%)

WATER AND WASTE WATER MANAGEMENT

Pre-requisite:	Physical Sciences, Engineering Mathematics 2
Mode of delivery:	Lectures, practical (3 hours contact time per week)
Subject outline:	Water requirements and demand. Water sources. Water quality. Water treatment processes. Wastewater quantities and standards. Wastewater treatment processes. Water and sanitation in rural and peri-urban areas.
Assessment:	Project (15%); Test (30%); Lab (15%); FISA (40%)

ADVANCED DIPLOMA SUBJECTS: CIVIL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.
Subjects without a number at the end do not have an equivalent at a higher level.

COMPUTER APPLICATIONS

Pre-requisite:	None
Mode of delivery:	2 Lectures per week of 45 min each, 2 Tutorials per week of 45 min each.
Subject outline:	• **Introduction to AllyCAD:** Understanding the interface*;* Setting up the drawing settings*;* Cartesian and Surveyor modes; Scale of drawings; Visual displays; Short cuts and quick and jumps keys • **Setting up the Terrain Module:** Starting a new project and saving the data; What is a DTM and how to set it up; Importing co-ordinates; Triangulation and Intelli-lines; Producing contours; How to manipulate the terrain; Viewing the terrain in 3D • **Using CAD to draw objects and creating a residential township:** Using online databases (CCC) to create a residential township; Importing from other formats; Creating street access and servitudes; Exporting to a sheet file • **Road module. Regression analysis of the alignment of existing roads, sight distance checks and climbing/passing lane calculations:** Understanding terminology; Horizontal alignment; Vertical alignment; Super elevations; Automatic junctions and intersections; Producing contours and merging two surfaces; Setting up and editing a road template, placing curbs and road side furniture; Exporting a completed design to sheet files • **Water reticulation:** Setting up a water network to serve dwellings; Designing pipes, valves and pumps; Installing reservoirs; Analysis of nodes for pressure and flow; Exporting network to sheet files • **Sewer and storm water networks:** Installing sewer lines and manholes*;* Testing typical flow rates based on Rational method*;* Establishing hydrographs • **Earthworks and mass haul diagrams*:*** Establishing volumes for earthworks*;* roducing a database for road works*;* Calculating road volumes for asphalt and layer works*;* Culvert trench quantities according to SABS 1200 with user-defined depth increments • **Producing project plans for examination:** Finalizing plans for approval*;* Comparing design with standard specifications
Assessment:	Assignments (20%), Project (20%) with a subminimum of 40%, Class Tests (20%), FISA (40%) with a subminimum of 40%

CONSTRUCTION MATERIALS & TECHNOLOGY

Pre-requisite:	None
Mode of delivery:	2 Lectures per week of 40 min each, 1 Tutorials per week of 40 min, Laboratory Practicals: 2½ sessions per week of 40 min each. Independent Project work
Subject outline:	**Professional Introduction:** Legal considerations; Health & safety and the Environment; SAICE; ECSA **Technical Introduction:** The science of construction materials; Construction Materials Industry; Quality Management (during the stages of design and construction processes) **Introduction to natural occurring Civil Engineering materials:** Geology; Classification, properties; Soil indicators, densities; CBR; DCP; proctor tests; Soil mechanics; Water; Engage in further reflection on the use of soil and water as a construction material; Take the self-assessment; lab flow chart and report; case study; through the planning of the project task, Learn how to set personal and goals and improve academic performance **Introduction to manufactured materials:** Lime; Cement; Concrete; Bitumen; Asphalt; Bricks; Geotextiles; Fibers; Metals – steel & aluminium. **Teams and teamwork during the practical laboratory sessions and project work:** • Take the self-assessment -least preferred co-worker scale • Prepare for the team exercise- leadership and participation in decision making • Solve the career situation for leadership • Analyse the case study

- Engage in further reflection on your team contributions
- Take the self-assessment – team leader skills
- Solve the career situations in teamwork
- Prepare for the team exercise – work team dynamics
- Analyse the case study

Assessment:	Assignments (10%), Practical (10%), Project (30%) with a subminimum of 40%, Class Tests (10%), FISA (40%) with a subminimum of 40%

ENGINEERING CHEMISTRY

Pre-requisite:	None
Mode of delivery:	2 Lectures per week of 45 min each, 4 Laboratory Practicals per semester.
Subject outline:	• Chemical concepts: atoms, atomic mass, elements and the periodic table • Chemical bonds and intermolecular forces and molecular mass and reactivity series. Chemical equations, balancing chemical reactions, types of reactions, reactions involving gases. Definitions, oxidation state, ionic balance, types of redox reactions & balancing redox equations • Reversible reactions, law of mass action, solubility calculations, acid-base equilibrium, • Organic chemicals, nomenclature, alkenes and alkynes, aromatic compounds, functional groups • Physical and chemical properties of water, states of solutions (laws of solubility), aqueous solutions and concentration units. Chemistry of coagulation and flocculation. • 1st and 2nd treatment chemicals and their reactions. Nitrification and de-nitrification. Aerobic, anaerobic, anoxic and facultative respirations. COD, BOD reactions and Bioreactors order reactions, BOD Kinetics. water and wastewater • Chemical composition of lime and cement; chemical reactions in formation of concrete
Assessment:	Practicals (20%), Project (20%), Mid-term Test (20%), FISA (40%) with a subminimum of 40%

ENGINEERING MATHEMATICS

Pre-requisite:	None
Mode of delivery:	4 Lectures (per week) of 40 min each, 2 Tutorials per week of 40 min each. Projects and/or assignments
Subject outline:	• **Linear Algebra:** Matrices and Linear Systems, Determinants, Solving simultaneous linear equations using matrices-rank of a matrix, Eigenvalues and Eigenvectors, The canonical form of a matrix-diagonalization of a matrix, Solving differential equations by means of matrices • **Differential Equations:** Sturm-Liouville Problem: Regular, Periodic, Singular • **Partial Differential Equations:** Concepts, Linear Partial Differential Equations. Methods of solving boundary-value problems: General Solutions, Separation of Variables, Laplace Transform Methods. The Wave Equation: Motion on an interval, Motion in an infinite medium, Laplace Transform techniques. The Heat Equation: Initial and Boundary Conditions, The Heat Equation on [0, L], Laplace Transform techniques, Heat conduction in a Rectangular Plate. Fourier sine and cosine transform methods.
Assessment:	Tutorials & Assignments (20%), Class Test 1 (20%), Class Test 2 (20%), FISA (40%) with a subminimum of 40%

ENVIRONMENTAL ENGINEERING

Pre-requisite:	None
Mode of delivery:	2 Lectures per week of 45 min each, 2 Tutorials per week of 45 min, Laboratory Practicals: 2 sessions. Independent Project work
Subject outline:	• **Pollution control & Management:** Water pollution, Soil pollution, Air Pollution Control, Noise Pollution, Radiation Protection Public Health Issues (Water quality:- Physical, chemical and biological parameters; Standards/Guidelines:- SANS 241: 2006; Water Services Act (No. 108 of 1997). Water and health issues:- Water borne and water related diseases.), Pollution (and deterioration), Monitoring. • **Solid waste management:** Waste avoidance, Waste stream reduction, Responsible waste disposal,

Classification, Storage-collection- transport, Waste Management System, Recycling and materials recovery, composting, Waste-to-energy, Disposal/Treatment/Bioremediation, Hazardous Waste Management, Landfill operation

- A clear understanding of waste reduction through recycling, composting, incineration, etc. Air pollution, composition, structure of the atmosphere, emission estimation and control
- **Sustainable Development:** Environmental Sustainability, Energy Efficiency, Renewable Energy, Life cycle thinking, “SMART” Growth, New Urbanization, Inner City Reclamation, Green Engineering (eg materials, permeable paving, green roofs), Water security, Strategic Water Resources (DWA), Social aspects
- **Environmental Economics:** Conduct a cost/benefit analysis based on the four standards: Efficiency standard, safety standard, neo- classical sustainability standard and ecological sustainability standard; Valuation of resources will be done using Contingent valuation, Travel- cost method, Hedonic pricing and cost/benefit analysis; Environmental solutions should be outlined and assessed in terms of non-economical and economical criteria.
- **Environmental Law:** On completion of this module, students will be knowledgeable on the role of emerging national and international laws and framework environmental legislation, environmental policies and guidelines that include the following: The Constitution of SA (Act No. 108 of 1996), Local Government: MSA (Act No. 32 of 2000), NEMA (Act 107 of 1998), ECA (Act No. 73 of 1989), Atmospheric Pollution Prevention Act (Act No. 45 of 1965), Hazardous Substances Act, (Act No. 15 of 1973), NWA (Act 36 of 1998), Biodiversity Act (Act no 10 of 2004) and Integrated Environmental Management Plans.
- Students should know the key concepts, legislative measures, case law and principles dealing with Environmental Law and be able to give their own interpretation as well as apply these measure and principles to factual solutions (e.g. Environmental Justice, polluter pays principle, etc)
- **Environmental Management:** Students will be educated on the effective management and enhancement of the environment to ensure sustainability for future generations. This process is guided by emerging national and international laws and legislation, environmental policies and guidelines. Environmental Management tools such as EIA, IMEP, SoE, EMP and audits will also be introduced to the student.

Assessment: Assignments & Laboratory Practicals (20%) with a subminimum of 40%, Project (20%), Class Tests (20%), FISA (40%) with a subminimum of 40%

GEOTECHNICAL ENGINEERING

Pre-requisite: None

Mode of delivery: 4 Lectures (per week) of 40 min each, 2 Tutorials per week of 40 min each. Projects and/or assignments

Subject outline:

The significance of this subject is to enable learners through the application and integration of knowledge of soil mechanics to examine solutions for foundation design and foresee possible failure of a super-structure. Within the scope of this subject the learner’s achievement of this main task will be accomplished through the examination of past case histories and thereby avoid possible soil failure. The theoretical aspect is accompanied with laboratory practice where soil is examined for its properties and tested till failure. Results are used to predict soil failure under loading.

- **Properties of soils:** Referencing industrial documents; Testing and interpreting test/laboratory results; Graphs or charts that interpret properties of soils; Identify, describe and use civil engineering construction materials.
- **Properties of weaker road building materials:** Comparison of laboratory results with standards; Develop a design appropriate for roads with low traffic volumes; Geo-technical construction methods; Road construction methods
- **Standards, specifications and proposals for Road works, Earth backfill, and Footings below structures:** Review and interpret results from a soil survey; Make design proposals to improve the structural integrity of an alignment; Design a filter layer to allow drainage of soils; Evaluate the footings below soil stratum and design footing sizes based on settlement data.
- **Road embankments and design of sheet piles:** Safety of slopes by evaluating slip circles; Safety factors in non-cohesive and cohesive soils; Produce a calculation sheet for depth of installation of sheet piles.

Assessment: Practicals (20%) with a subminimum of 40%, Tutorials (20%), Class Tests (20%), FISA (40%) with a subminimum of 40%

HYDRAULIC ENGINEERING & DESIGN

Pre-requisite:	None
Mode of delivery:	4 Lectures (per week) of 40 min each, 2 Tutorials per week of 40 min each. Projects and/or assignments
Subject outline:	The knowledge emphasises advanced principles of hydraulics and hydrology in the design of hydraulic structures. The main objective of this subject is to solve complex hydraulic design problems through the application of acquired theoretical knowledge. Introduction to Engineering hydrology; flood routing, reservoir yield. Application of relevant computer and simulation models. Pipe network analysis and Design. Application of relevant computer and simulation models. Sewer reticulation and Design. Application of relevant computer and simulation models. Storm water drainage and Design. Application of relevant computer and simulation models. Dam design. Application of relevant computer and simulation models. Canal Design and Culverts. Application of relevant computer and simulation models. Design of pumps and pump stations.
Practicals:	• **Hydrology and Flood Routing/simulation**: Rainfall simulation • **Hydraulic analysis of Spillways:** Hydraulic analysis of Spillways (O-gee, drop inlet and weirs, etc)
Assessment:	Assignments (20%), Class Tests (20%), Project (20%), FISA (40%)

PUBLIC LAW

Pre-requisite:	None
Mode of delivery:	4 Lectures (per week) of 40 min each, 2 Tutorials per week of 40 min each. Projects and/or assignments
Subject outline:	• **Introduction:** Foundation and historical development of South African law and the administration of justice in South Africa; Classification of different fields of Law such as Criminal Law, Constitutional, and Administrative Law etc. • **Administrative Law:** Relationship between administrative Law and the different types of administrative acts; requirements for validity of administrative acts; judicial control of administrative acts, constitutional provisions • **Constitutional Law:** Knowledge in constitutionalism, rule of law and legality, democracy, separation of powers, devolution of powers and collective government; knowledge on human rights litigation and application of the Bill of Rights, *locus standi*, and jurisdiction of the courts, interpretation and limitation of human rights, remedies; Critically reflect on the structures and general principles underlying them which include: - the legislature, executive and judiciary, national, provincial and local government. • **Criminal Law:** Detailed knowledge on the theories of punishment; the principle of legality; elements of a crime, namely conduct, causation, unlawfulness, criminal liability and fault; participation in crime • **Private Law:** Laws of persons:- Family Law:- Engagement, entering into marriage and legal impediments; personal consequences of marriage; matrimonial property law; divorce; parental power; co-ownership; the property clause; servitudes; pledge; mortgage; notarial bond and judicial pledge; Law of Succession execution, amendment and revocation of wills; the capacity to inherit; content of wills; conditions; massing of estates and election; accrual; succession by contract; the interpretation and rectification of wills and the administration of estates; Law of Contract:- The obligation; requirements for a valid contract, viz., consensus, capacity to act, obligations arising from agreement; discharge of the obligation; breach of contract and appropriate remedies; cession and extinction of personal rights, representation and authority. • **Public Procurement Law:** The nature of public procurement and the purposes of public procurement regulation both locally and internationally; the regulation of procurement in South Africa and the law that applies to the different stages in the procurement process; the relevance and application of the Constitution and other legislation; the importance and application of the requirements of competition, fairness and transparency in procurement.
Assessment:	Assignments (20%), Class Test 1 (20%), Class Test 2 (20%), FISA (40%) with a subminimum of 40%

RESEARCH METHODOLOGY & PROJECT

Pre-requisite:	None
Mode of delivery:	2 Lectures (per week) of 45 min each - Virtual

Subject outline:	• **Introduction to research:** The research process; defining a research topic; research question and problem statement; the importance of ethics in research and engineering; what plagiarism is and the consequences of plagiarism in res+++earch • **Literature search and review:** Understanding what information literacy is; different types of publications and how to reference; the purpose of a literature review; the criteria for writing a good literature review. • **Research Design:** Elements of research proposal; research design types, data collection: - sample design, sampling methods, survey research methods, respondent selection • **Statistical Analysis:** motivation for using statistics in data analysis; measurement error, one-dimensional, two-dimensional and multi-dimensional statistics and null hypothesis testing • **Research report:** Conducting a scientific investigation based on the principles of the scientist method; Identifying a research problem supported by a literature review properly referenced; design and conduct experimental work; analysis of the results with verification using statistical analysis and draw conclusions; Working in a standard scientific format.
Assessment:	Assignments (10%), Research Project (50%), Class Tests (20%), FISA (20%) with a subminimum of 40%

STRUCTURAL DESIGN

Pre-requisite:	None
Mode of delivery:	4 Lectures per week of 45 min each
Subject outline:	Moment distribution, Virtual work, Use MaCauley method to solve continuous beams and indeterminate frames;, Influence lines, Course overview of typical structures comprising Steel, Timber, Masonry & Concrete. Load types & Load paths & calculations, Limit States, Design in steel & timber elements, Pin-jointed , simply supported design, Simply supported Steel and Timber frames design. Design methods of various structures, materials, loading combinations and properties and stresses. Enhancement of Auto CAD application in Civil Engineering Drawings, e.g. detailing, scheduling, labelling and dimensions.
Assessment:	Assignments (20%), Class Tests (20%), Project (20%), FISA (40%)

TRANSPORTATION ENGINEERING & PLANNING

Pre-requisite:	None
Mode of delivery:	4 Lectures per week of 45 min each
Subject outline:	Transportation Systems and modes, and characteristics. Basic concepts of geometric design. Traffic counting techniques. Traffic flow models. Traffic capacities and levels of service. Design of signal setting. Road transportation and capacity aspects, Design of pavements. Design of single and double stone surfacing. Design of sand seals, slurries and diluted emulsions. Maintenance, rehabilitation and construction of pavements
Assessment:	Assignments (20%), Class Tests (20%), Project (20%), FISA (40%)

WATER & WASTEWATER TREATMENT TECHNOLOGY

Pre-requisite:	None
Mode of delivery:	2 Lectures per week of 45 min each, 3 Laboratory Practicals per semester.
Subject outline:	Water sources and demand, generation of wastewater. Water requirements and methods to predict future demand, modelling of inflows to a water treatment plant. Water quality requirements for potable water. Oxygen sag curve and Environmental pollution. Advanced conventional water and waste water treatment processes and treatment units (sedimentation, coagulation and flocculation, hydraulics of filtration, chlorination, Activated sludge, Biological nutrient removal (BNR), Percolating filters, wastewater stabilization ponds, On-site sanitation facilities. Kinects of BOD removal and modelling of 1st order reactor processes. Sludge treatment and disposal (process design for gravitational, centrifugation and dissolved air flotation in sludge thickening). Introduction to water and sanitation in rural and peri-urban areas (VIP, septic tanks, rotating biological contactors (RBC).
Assessment:	Practicals (20%), Project (20%), Mid-term Test (20%), FISA (40%) with a subminimum of 40%

DIPLOMA SUBJECTS: GEOMATICS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.
Subjects without a number at the end do not have an equivalent at a higher level.

CARTOGRAPHY 2

Pre-requisite:	Computer Aided Drafting 1
Mode of delivery:	Lectures and tutorials
Subject outline:	Map production procedures, map design, cartographic representation, CAD, map data sources, copyright, digital mapping, map production.
Assessment:	Tests, assignments and tutorials.

CIVIL ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures, Tutorials
Subject outline:	An introduction to the nature and function of civil engineering structures such as Earthworks, Structures, Concrete, Road Engineering, Bridges, Dams, Tunnels, Harbours, Drainage, Labour-enhanced construction, Safety, Airports and Railways
Assessment:	Tests (60%), Assignments (40%)

COMMUNICATION SKILLS

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Read with Comprehension, Write Clearly, Integrate grammatical structures and conventions in the context of reading and writing, Speak and listen to others, manage and present information.
Assessment:	Tests, assignments and presentations.

COMPUTER AIDED DRAFTING 1

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Create drawings by computer: regular and irregular shapes, dimensions, contour plans, areas & volumes.
Assessment:	Tests, assignments and presentations.

COMPUTER SKILLS

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	• **Introduction to Computers and Microsoft Windows:** Basic operation of a computer and use of files. • **Word processing:** Create professional documents including tables and equations. • **Presentations:** Create a presentation to an audience. • **Spreadsheets:** Use a spread sheet to perform general and engineering calculations and create graphs. • **CAD:** Use appropriate software to create engineering drawings.
Assessment:	CE assessment of tests, assignments, tutorials, Integrated projects.

CONTROL SURVEYING 2: PRACTICAL

Pre-requisite:	Surveying 1, Surveying 2, Mathematics, CAD
Mode of delivery:	Lectures and practicals
Subject outline:	Triangulation, traversing, trilateration, Global Positioning Systems, reconnaissance, cost estimate for various surveys.
Assessment:	Practical assignments

CONTROL SURVEYING 2: THEORY

Pre-requisite:	Surveying 1, Surveying 2, Mathematics, CAD
Mode of delivery:	Lectures and tutorials
Subject outline:	Triangulation, traversing, trilateration, Global Positioning Systems, reconnaissance, cost estimate for various surveys.
Assessment:	Theory tests

DATABASE THEORY 2

Pre-requisite:	Computer skills
Mode of delivery:	Lectures and tutorials
Subject outline:	Introduction to database theory and database management systems. Relational and other database models. Design and development of databases and applications with Microsoft Access. A group project to develop a fully functional relational database. Introduction to computer programming in Python. Use of variables, input/output, conditions and loop structures in programming.
Assessment:	Tests and assignments

GEOGRAPHIC INFORMATION SYSTEMS 2

Pre-requisite:	Computer skills
Mode of delivery:	Lectures, practicals and tutorials
Subject outline:	GIS fundamentals, basic cartographic principles, GIS data, basic GIS analysis, and practical applications of GIS
Assessment:	Tests, assignments and practical

GEOGRAPHY 1

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Area and spatial analysis: comprises the reading, analysis and interpretation of spatial information. Physical and Human Systems: emphasis falls on Geomorphology and Climatology, their link with Ecology and Ecosystems, and the consequent impact on relevant aspects of Population Geography.
Assessment:	Tests and assignments.

MAP PROJECTIONS 2

Pre-requisite:	Surveying 1
Mode of delivery:	Lectures and tutorials
Subject outline:	The shape of the Earth, the process of map projection, spherical trigonometry, calculations of projections, the SA coordinate system, choice of projections.
Assessment:	Tests and assignments

MATHEMATICS 1

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Trigonometry, Radian Measure, Linear Algebra, Binomial Theorem, Logarithms, Differentiation, Applications of Differentiation, Integration, Linear Programming.
Assessment:	Tests and assignments.

MATHEMATICS 2

Pre-requisite:	Mathematics 1
Mode of delivery:	Lectures and tutorials
Subject outline:	Introduction to differentiation including hyperbolic, trigonometric functions and their inverses; finding solutions through Newton Raphson, use and application of partial derivatives, standard integration techniques and their application to areas and volumes; use matrices for problem solving.
Assessment:	Tests

PHOTOGRAMMETRY 2

Pre-requisite:	Physics
Mode of delivery:	Lectures, practicals and tutorials
Subject outline:	Introduction to remote sensing, aerial cameras, digital sensor, stereoscopy, flight plans, photogrammetric applications.
Assessment:	Tests and assignments

PHYSICS

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Kinematics, Newton's laws of motion, Friction, Momentum, Work, Energy and power, Density, Buoyancy, Electrostatics, Electrical energy and power, Direct current circuits, Geometric optics: Reflection; Refraction, Electromagnetic waves.
Assessment:	Tests and assignments.

SPATIAL DATA ACQUISITION 2

Pre-requisite:	Photogrammetry 2
Mode of delivery:	Lectures and tutorials
Subject outline:	The concept of spatial data, types of spatial data, methods of spatial data acquisition, spatial data formats, quality assessment, sources of spatial data, spatial data storage and best practices.
Assessment:	Tests and assignments

STATISTICS 2

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Introduction to frequency distributions and probability, sampling and probability distributions, inferences about the mean (z and t-tests), inferences about standard deviation (chi squared tests), regression and correlation, introduction to non-parametric statistics and Anova
Assessment:	Tests and projects

SURVEY SOFTWARE 2

Pre-requisite:	Computer Skills, Control Surveying 2
Mode of delivery:	Lectures
Subject outline:	Surveying calculations, importing data, generating contours, exporting data and using CAD functions to finalise drawings.
Assessment:	Tests

SURVEYING 1A: PRACTICAL

Pre-requisite:	None
Mode of delivery:	Practical sessions
Subject outline:	Use of levels, theodolites and total stations, levelling, tacheometry, traversing.
Assessment:	Assignments and practical test.

SURVEYING 1A: THEORY

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Introduction and definitions, Levelling Instrumentation, Sections, Co-ordinate system and calculations, The theodolite and its application, Observations, Traversing, Tacheometry & Areas and Volumes.
Assessment:	Tests and assignments.

SURVEYING 1B: PRACTICAL

Pre-requisite:	Surveying 1B: Theory
Mode of delivery:	Practical sessions
Subject outline:	Tacheometry, Fixing points by double polars, traversing, resection, intersection, setting out circular curves.
Assessment:	Assignments and practical test.

SURVEYING 1B: PRACTICAL

Pre-requisite:	Surveying 1A: Theory & Practical
Mode of delivery:	Lectures and tutorials
Subject outline:	Electronic distance meters, Traversing, Modern Tacheometry, Long and cross sections, Maps and Plans, Circular curves, Setting out structures, Placing and checking points, Double Polars, Triangulation.
Assessment:	Tests and assignments.

TECHNICAL DRAWING 1

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Basic drafting skills, Orthographic projections, Isometric projections, Free hand sketching.
Assessment:	Tests and assignments.

TOPOGRAPHICAL DRAWING 1

Pre-requisite:	None

Mode of delivery:	Technical Drawing 1
Subject outline:	Lectures and tutorials
Assessment:	Draw grids, plot survey stations, interpolate contours, Introduction to Cadastral maps, General Plans, erf diagrams, Servitudes, Location plans and sketches.

BACHELORS SUBJECTS: GEOMATICS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

CARTOGRAPHY 2

Pre-requisite:	Computer Aided Drafting 1
Mode of delivery:	Lectures and tutorials
Subject outline:	Map production procedures, map design, cartographic representation, CAD, map data sources, copyright, digital mapping, map production.
Assessment:	Tests, assignments and tutorials.

CIVIL ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures, Tutorials
Subject outline:	An introduction to the nature and function of civil engineering structures such as Earthworks, Structures, Concrete, Road Engineering, Bridges, Dams, Tunnels, Harbours, Drainage, Labour-enhanced construction, Safety, Airports and Railways.
Assessment:	Tests (60%), Assignments (40%)

COMMUNICATION SKILLS

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Read with Comprehension, Write Clearly, Integrate grammatical structures and conventions in the context of reading and writing, Speak and listen to others, manage and present information.
Assessment:	Tests, assignments and presentations.

DRAWING

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Basic drafting skills, Projections, Topographic map work, cadastral maps
Assessment:	Tests and assignments.

GEOGRAPHIC INFORMATION SYSTEMS 2

Pre-requisite:	Computer skills
Mode of delivery:	Lectures, practicals and tutorials
Subject outline:	GIS fundamentals, basic cartographic principles, GIS data, basic GIS analysis, and practical applications of GIS
Assessment:	Tests, assignments and practical

GEOGRAPHY 1

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials

Subject outline:	Area and spatial analysis: comprise the reading, analysis and interpretation of spatial information. Physical and Human Systems: emphasis falls on Geomorphology and Climatology, their link with Ecology and Ecosystems, and the consequent impact on relevant aspects of Population Geography.
Assessment:	Tests and assignments.

GEOMATICS 2

Pre-requisite:	Surveying 1A
Mode of delivery:	Lectures, practicals and tutorials
Subject outline:	Introduction to remote sensing, aerial cameras, digital sensor, stereoscopy, flight plans, photogrammetric applications.
Assessment:	Tests and assignments.

GEOMATICS COMPUTING 1

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Introduction to computers, Word processing, Spreadsheets, Basic CAD functions, Dimensions and coordinate systems.
Assessment:	Tests and assignments.

GEOMATICS COMPUTING 2A

Pre-requisite:	Geomatics Computing 1
Mode of delivery:	Lectures and tutorials
Subject outline:	Surveying Software (survey routines), Surveying Software (Downloading of electronic field books and processing of data), Computer Aided Drafting.
Assessment:	Tests and assignments

GEOMATICS COMPUTING 2B

Pre-requisite:	Geomatics Computing 1
Mode of delivery:	Lectures and tutorials
Subject outline:	Database theory, Database management systems, Database design & applications, Python Programming, Programming structures.
Assessment:	Tests and assignments

GIS Camp

Pre-requisite:	Geographic Information Systems 2
Mode of delivery:	Tutorials
Subject outline:	This camp aims to consolidate knowledge and skills learnt in the course GIS, Photogrammetry, Data Quality and Remote sensing Courses. The practical work will be conducted in groups and the outcomes should be reported as a critical evaluation of the processes and methods used.
Assessment:	Pass/Fail based on achieving the learning outcomes of the course

LAND LAW

Pre-requisite:	None

Mode of delivery:	Lectures
Subject outline:	General Introduction to the South African Legal System and Practice, South African System of Government, General Principles of the Law of Contract, Introduction to the Law of Property, Land tenure and Types of Land Ownership, Rights and restrictions on ownership, Corporate Law and Forms of Enterprises, Ethics & Professional registration.
Assessment:	Tests

MAP PROJECTIONS 2

Pre-requisite:	Surveying 1
Mode of delivery:	Lectures and tutorials
Subject outline:	The shape of the Earth, the process of map projection, spherical trigonometry, calculations of projections, the SA coordinate system, choice of projections.
Assessment:	Tests and assignments

MATHEMATICS 1A

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Trigonometry, Partial fractions, Radian measurement, Binomial Theorem, Limits, Differentiation.
Assessment:	Tests and tutorials

MATHEMATICS 1B

Pre-requisite:	Mathematics 1A
Mode of delivery:	Lectures and tutorials
Subject outline:	Differentiation, Applications of differentiation, Integration, Linear Programming.
Assessment:	Tests and tutorials

MATHEMATICS 2A

Pre-requisite:	Mathematics 1A and Mathematics 1B
Mode of delivery:	Lectures and tutorials
Subject outline:	Differentiation, Integration Techniques, Applications of Integration, Matrix Algebra.
Assessment:	Tests

PHYSICS

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Kinematics, Newton’s laws of motion, Friction, Momentum, Work, Energy and power, Density, Buoyancy, Electrostatics, Electrical energy and power, Direct current circuits, Geometric optics: Reflection; Refraction, Electromagnetic waves.
Assessment:	Tests and assignments.

REMOTE SENSING

Pre-requisite:	Physics 1, Geographic Information Systems 3
Mode of delivery:	Lectures and practicals
Subject outline:	Sensors/platforms used in remote sensing, the application of electromagnetic radiation in remote sensing, image analysis (pre-processing, enhancement, classification, integration), practical applications of remote sensing.
Assessment:	Test, assignments and practical test

STATISTICS

Pre-requisite:	None
Mode of delivery:	Lectures and tutorials
Subject outline:	Introduction to frequency distributions and probability, sampling and probability distributions, inferences about the mean (z and t-tests), inferences about standard deviation (chi squared tests), regression and correlation, introduction to non-parametric statistics and Anova
Assessment:	Tests and projects

SURVEY CAMP

Pre-requisite:	Surveying 1A, Surveying 1B
Mode of delivery:	Tutorials and practical sessions
Subject outline:	Electronic distance meters, Traversing, Modern Tacheometry, Long and cross sections, Maps and Plans, Circular curves, setting out structures, Placing and checking points, Double Polars, Triangulation
Assessment:	Assignments and practicals

SURVEYING 1A

Pre-requisite:	None
Mode of delivery:	Lectures, tutorials and practical sessions
Subject outline:	Introduction and definitions, Levelling Instrumentation, Sections, Co-ordinate system and calculations, The theodolite and its application, Observations, Traversing, Tacheometry & Areas and Volumes.
Assessment:	Tests and assignments

SURVEYING 1B

Co-requisite:	Surveying 1A
Mode of delivery:	Practical sessions
Subject outline:	Introduction and definitions, Levelling Instrumentation, Sections, Co-ordinate system and calculations, The theodolite and its application, Observations, Traversing, Tacheometry & Areas and Volumes.
Assessment:	Practicals

SURVEYING 2A

Pre-requisite:	Surveying 1A
Mode of delivery:	Lectures and tutorials
Subject outline:	Electronic distance meters, Traversing, Modern Tacheometry, Long and cross sections, Maps and Plans, Circular curves, setting out structures, Placing and checking points, Double Polars, Triangulation.
Assessment:	Tests and assignments

SURVEYING 2B

Co-requisite:	Surveying 1B
Mode of delivery:	Practical sessions
Subject outline:	Electronic distance meters, Traversing, Modern Tacheometry, Long and cross sections, Maps and Plans, Circular curves, setting out structures, Placing and checking points, Double Polars, Triangulation.
Assessment:	Practicals

DEPARTMENT OF CLOTHING & TEXTILE TECHNOLOGY

DEPARTMENT OFFICE-BEARERS

POSITION	NAME	TELEPHONE	FAX	E-MAIL
Head of Department	Dr A Patnaik PhD (Textile Technology)	021 959 5542	086 778 0368	PatnaikA@cput.ac.za
Secretary	Ms C Parenzee Diploma (Secretarial Studies & Public Relations), BTech (Marketing)	021 959 6466	086 778 0368	ParenzeeC@cput.ac.za

DEPARTMENTAL STAFF

POSITION	NAME	QUALIFICATIONS
Senior Lecturer	Mr S Isaacs	BTech (Clothing Management)
Lecturer	Ms N Drotskie	BTech (Clothing Management)
Lecturer	Ms B Kolisi	MTech (Design)
Lecturer	Ms L Mhembere	MTech (Business Administration)
Lecturer	Dr D Moyo	PhD (Textile Science)
Lecturer	Mrs I Norton	MTech (Business Administration)
Lecturer	Dr S Patnaik	PhD (Textile Science)
Lecturer	Dr C Tshifularo	PhD (Textile Science)
Lecturer	Ms N Tyalana	MSc (Textile Science)
Junior Lecturer	Ms D Windvogel	BTech (Design)
Technician	Mr S T Mbilini	BTech (Quality)
Technician	Mr F Gqotile	ND (Clothing Management)

QUALIFICATIONS OFFERED

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration	Work Integrated Learning
Diploma: Clothing & Textile Technology	D3CLTT	3 years	6 years	6 months
Diploma: Clothing & Textile Technology (Extended)	D3CLTX	4 years	7 years	6 months
Advanced Diploma: Clothing & Textile Technology	ADCLTT	1 year	2 years	--

DIPLOMA IN CLOTHING & TEXTILE TECHNOLOGY

COURSE AIM

The course equips students to conduct basic research, analyse and implement systems and policies, and combine a wide range of clothing and textiles-related technological knowledge, skills and experience with a specialised area of clothing and textile technology.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Persons achieving this qualification will be able to conduct basic research, analyse and implement systems and policies related to the clothing and textiles industry, and combine a wide range of clothing and textile-related technological knowledge, skills and experience within the specialised area of clothing and textile technology.

CAREER OPPORTUNITIES

Graduates find employment in the clothing and textile manufacturing industries as well as related retail industries forging careers in areas such as work study, CAD pattern making, garment production, production organisation, product development, cutting room and quality management, fashion buying and merchandising, marketing, clothing and textile manufacture, garment and textile technology and general clothing and textile management.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 26 with Maths or 28 with Maths Literacy, using Method 1 E (First language) 4 (50%) M 3 (40%) or TM 5 (60%) or ML 4 (50%)	Selection test and interview	M (N4) 50% CP (N4) 60%	E (5) (60%), ML (5) (60%) or M 3 (40%)

Legend:
E (English)
M (Maths) PS (Physical Science)
TM (Technical Maths) ES (Engineering Science)
ML (Maths Literacy) CP (Clothing Production)

DURATION

Full-time: The three-year programme comprises five academic semesters and one semester of Work Place Based learning in industry.

VENUE

Bellville Campus

DIPLOMA IN CLOTHING & TEXTILE TECHNOLOGY (D3CLTT)

(All subjects compulsory)
Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1ST YEAR (All subjects compulsory)									
Academic Practice & Communication 1	APC150S	01	Y	5	C	--	9	0.075	CE
Applied Textiles Science 1	PTE150S	01	Y	5	C	--	19	0.158	CE
Basic Industrial Engineering 1	BIE150S	01	Y	5	C	--	16	0.133	CE
Clothing & Textiles Management 1	BUT150S	01	Y	5	C	--	15	0.125	CE
Clothing & Textiles Manufacture 1	CTM150S	01	Y	5	C	--	18	0.150	CE
Garment Construction 1	GAC150C	01	Y	5	C	--	18	0.150	CE
Mathematics and Statistics 1	MTS150S	01	Y	5	C	--	7	0.059	CE
Pattern Construction and CAD 1	PCD150A	01	Y	5	C	--	18	0.150	CE
2nd YEAR (All subjects compulsory)									
Academic Practice & Communication 2	APC260S	01	Y	6	C	APC150S	6	0.050	CE
Applied Textiles Science 2	PTE260S	01	Y	6	C	PTE150S	19	0.158	CE
Clothing & Textiles Management 2	BUT260S	01	Y	6	C	BUT150S	18	0.150	CE
Clothing & Textiles Manufacture 2	CTM260S	01	Y	6	C	CTM150S	18	0.150	CE
Garment Construction 2	GAC260S	01	Y	6	C	PCD150S, GAC150S	18	0.150	CE
Mathematics & Statistics 2	MTS260S	01	Y	6	C	MTS150S	5	0.042	CE
Operations Management 1	POG260S	01	Y	6	C	BIE150S	18	0.150	CE
Pattern Construction & CAD 2	PCD260S	01	Y	6	C	PCD150S, GAC150S	18	0.150	CE
3rd YEAR: NB! Students must pass ALL 2nd YEAR subjects before being allowed to register for 3rd year subjects) (All subjects compulsory)									
Applied Textile Science 3	PTE360S	01	S1	6	C	**ALL 2nd YEAR subjects must be passed before being allowed to register for 3rd year subjects)** APC260S, BUT260S, CTM260S, GAC260S, MTS260S, PCD260S, POG260S, PTE260S	14	0.116	CE
Clothing & Textiles Management 3	BUT360S	01	S1	6	C		18	0.150	CE
Garment Construction 3	GAC360S	01	S1	6	C		20	0.167	CE
Operations Management 2	POG360S	01	S1	6	C		12	0.100	CE
Pattern Construction & CAD 3	PCD360S	01	S1	6	C		20	0.167	CE
Professional Practice & Communication 3	APC360S	01	S1	6	C		6	0.050	CE
Clothing & Textiles Professional Practice	CME360S	01	S2	6	C	APC360S, BUT360S, GAC360S, PCD360S POG360S, PTE360S	30	0.250	CE

Note: Students must pass ALL 1st Semester 3rd year subjects before being allowed to register for Clothing & Textiles Professional Practice (In-Service).

DIPLOMA IN CLOTHING & TEXTILE TECHNOLOGY (Extended) (D3CLTX)

COURSE AIM

In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the National Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two year Foundational Programme, students will integrate in the second year with the normal programme, provided they pass all the subjects in the Foundation Programme in the minimum time.

DURATION

Full-time: The four-year programme comprises seven academic semesters and one semester of Clothing Management Practice also known as Work Place Based Learning in industry.

VENUE

Bellville Campus

Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
YEAR 0 (All subjects compulsory). NOTE: Students must pass all YEAR 0 subjects before being allowed to register for YEAR 1 subjects. Students failing any one of the subjects in YEAR 0 will be EXCLUDED from the programme.									
Academic Practice & Communication 1	APC150X	01	Y	5	C	--	9	0.075	CE
Applied Textiles Science 1A	PTE150X	01	Y	5	C	--	10	0.079	CE
Clothing & Textiles Manufacture 1A	CMT150X	01	Y	5	C	--	9	0.075	CE
Garment Construction 1A	GAC150X	01	Y	5	C	--	9	0.075	CE
Mathematics & Statistics 1	MTS150X	01	Y	5	C	--	7	0.059	CE
Pattern Construction & CAD 1A	PCD150X	01	Y	5	C	--	9	0.075	CE
1st YEAR (All subjects compulsory). NOTE: YEAR 0 is a pre-requisite for YEAR 1. Students must pass all YEAR 0 subjects before being allowed to register for YEAR 1 subjects. Students failing any one of the subjects in YEAR 1 will be EXCLUDED from the programme.									
Applied Textiles Science 1B	PTE151X	01	Y	5	C	APC150X, MTS150X, CTM150X, GAC150X, PCD150X, PTE150X	9	0.079	CE
Basic Industrial Engineering 1	BIE150X	01	Y	5	C	APC150X, MTS150X, CTM150X, GAC150X, PCD150X, PTE150X	16	0.133	CE
Clothing & Textiles Management 1	BUT150X	01	Y	5	C	APC150X, MTS150X, CTM150X, GAC150X, PCD150X, PTE150X	15	0.125	CE

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Clothing & Textiles Manufacture 1B	CMT151X	01	Y	5	C	APC150X, MTS150X, CTM150X, GAC150X, PCD150X, PTE150X	9	0.075	CE
Garment Construction 1B	GAC151X	01	Y	5	C	APC150X, MTS150X, CTM150X, GAC150X, PCD150X, PTE150X	9	0.075	CE
Pattern Construction & CAD 1B	PCD151X	01	Y	5	C	APC150X, MTS150X, CTM150X, GAC150X, PCD150X, PTE150X	9	0.075	CE
2nd YEAR (All subjects compulsory) **NOTE: No student can proceed to 2nd year if they have not successfully completed ALL the outstanding ECP Year 0 & 1 subjects within the minimum prescribed time of two years. Students not completing ECP Year 0 & 1 in the minimum prescribe time will be EXCLUDED from the programme!**									
Academic Practice & Communication 2	APC260S	01	Y	6	C	APC150X, BIE150X, BUT150X, CTM150X, CTM151X, GAC150X, GAC151X, MTS150X, PCD150X, PCD151X, PTE150X, PTE151X	6	0.050	CE
Applied Textiles Science 2	PTE260S	01	Y	6	C		19	0.158	CE
Clothing & Textiles Management 2	BUT260S	01	Y	6	C		18	0.150	CE
Clothing & Textiles Manufacture 2	CTM260S	01	Y	6	C		18	0.150	CE
Garment Construction 2	GAC260S	01	Y	6	C		18	0.150	CE
Mathematics & Statistics 2	MTS260S	01	Y	6	C		5	0.042	CE
Operations Management 1	POG260S	01	Y	6	C		18	0.150	CE
Pattern Construction & CAD 2	PCD260S	01	Y	6	C		18	0.150	CE
3rd YEAR (All subjects compulsory): **NOTE: Students must pass ALL 2nd YEAR subjects before being allowed to register for 3rd year subjects)**									
Applied Textiles Science 3	PTE360S	01	S1	6	C	**ALL 2nd Year subjects must be passed before being allowed to register for 3rd year subjects)** APC260S, BUT260S, CTM260S, GAC260S, MTS260S, PCD260S, POG260S, PTE260S	14	0.116	CE
Clothing & Textiles Management 3	BUT360S	01	S1	6	C		18	0.150	CE
Garment Construction 3	GAC360S	01	S1	6	C		20	0.167	CE
Operations Management 2	POG360S	01	S1	6	C		12	0.100	CE
Pattern Construction & CAD 3	PCD360S	01	S1	6	C		20	0.167	CE
Professional Practice & Communication 3	APC360S	01	S1	6	C		6	0.050	CE
Clothing & Textiles Professional Practice	CME361S	01	S2	6	C	APC360S, BUT360S, GAC360S, PCD360S POG360S, PTE360S	30	0.250	CE

Note: Students must pass ALL 1st Semester 3rd year subjects before being allowed to register for Clothing & Textiles Professional Practice.

ADVANCED DIPLOMA CLOTHING AND TEXTILE TECHNOLOGY

COURSE AIM

The Advanced Diploma in Clothing and Textile Technology is designed to prepare graduates to study at level 7 to obtain advanced knowledge in specialisation fields of work of the Clothing and Textile industries. The Advanced Diploma will improve on the skills acquired in the Diploma in Clothing and Textile Technology, as well as augment student's knowledge with an understanding of new techniques and technologies that are in line with present-day trends in Clothing and Textile Technology which is quite focused on technology and looking after the environment and the possible impact the clothing and textile industry has on it. The course equips graduates to evaluate clothing and textile production processes and product performances under varying conditions, understand the influences of global trends, relate these strategically to the productivity and profitability of the industry, and expand personal interests by conducting research in a specialised area within the clothing and textile industry.

Innovative products and processes in textiles and clothing, product performance and control in textiles and clothing, supply processes and systems in textiles and clothing, green, smart and sustainable textile technologies, research methodology and projects are the subjects that are taught within the Advanced Diploma qualification where students develop an in-depth understanding of these subject areas. These subjects have been carefully chosen as part of the qualification due to its relevance in the industry. Students are required to showcase their analytical skills through the preparation of their research projects in areas of clothing and textile technology. The programme is conducted in an integrated manner, accommodating the needs of students from both the retailing and manufacturing technology sides.

PURPOSE AND RATIONALE OF THE QUALIFICATION

The purpose of this HEQSF-aligned Advanced Diploma in Clothing and Textile Technology is to equip the student with advanced principles, scientific and technical knowledge in the field of Textiles and Clothing. Additionally, this HEQSF-aligned Advanced Diploma in Clothing and Textile Technology aims to prepare students for Postgraduate study through the deepening of their knowledge and professional practices in Textiles and Clothing. There is also an emphasis in developing the ability to formulate and resolve more complex theoretical and practice-related problems through the selection and through the use of textile and clothing related testing and analytical methods, tools and techniques. Persons achieving this qualification will be able to evaluate clothing and textile production processes and product performance under varying operating conditions, understand the influences of global trends, relate these strategically to the productivity and profitability of the industry, and expand personal interests by conducting research in a specialised area within the clothing and textile industries.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

A National Diploma/Diploma in Clothing Management or Textile Technology or Fashion/Textile Design with an average pass mark of at least 60% for the final year subjects of the National Diploma/ Diploma, OR Applicants who do not obtain 60% average, but have at least one year post diploma work experience in clothing and textile manufacturing, product development, retail and design may be considered on merit.

DURATION

Full-time: One year / **Part-time:** Two years

VENUE

Bellville Campus

ADVANCED DIPLOMA CLOTHING AND TEXTILE TECHNOLOGY (ADCLTT)

(All subjects compulsory)
Assessment Type: CE – Continuous evaluation / EX – Exam
Offering type: 01 - Full Time / 02 - Part Time

Period of Study	Year/ Semester Subject	Subject Name	Subject Code	Offering type	Compulsory or Elective	Pre-requisites/ (Co-requisites are listed as -Co)	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
4	Y	Innovative Products & Processes in Textiles & Clothing	IPT470S	01/02	C	--	7	24	0.200	CE
4	Y	Product Performance & Control in Textiles & Clothing	PPT470S	01/02	C	--	7	24	0.200	CE
4	Y	Supply Processes & Systems in Textiles & Clothing	SPT470S	01/02	C	--	7	22	0.183	CE
4	Y	Green, Smart & Sustainable Textile Technologies	GTT470S	01/02	C	--	7	22	0.183	CE
4	Y	Research Methodology & Projects	RES472S	01/02	C	--	7	28	0.234	CE

PROMOTION CRITERIA

a) First-year mainstream Clothing and Textile Technology students have to pass 60% of their subjects to be allowed to stay on the programme. If they fail a subject at first-year level they have to repeat it before they can do the corresponding second-year course, though they are allowed do some second-year subjects at the same time. This might cause a timetable clash, in which case the priority is the first-year subject.
b) ECP students have to pass all their subjects to progress from ECP Year 0 to ECP Year 1 and have to have passed all subjects in ECP Year 1 to progress to second year when they join the mainstream class.
c) Students are not allowed to progress from second year to third year if they have not passed all second-year subjects (there are no exceptions).
d) Third-year students must pass at least five first semester subjects in 3rd year to be eligible for industry placement, which is the Clothing and Textiles Professional Practice Work Place Based Learning component of the second semester part of the qualification.
e) Any recognition of prior learning or subjects passed is dealt with on an individual basis, as per CPUT regulations.

ACADEMIC EXCLUSION RULES & APPEAL PROCEDURE

If mainstream students fail repeated subjects twice, they will be excluded by the department. However, they have the option of appealing to the Dean for re-admission. If they are re-admitted at the discretion of the Dean, it will be subject to a binding Student Re-admission Agreement Contract between the student and the department.

ECP students have to pass all their subjects in ECP Year 0 before progressing to ECP Year 1, and also pass all their subjects in ECP Year 1 before being allowed to progress to mainstream Year 2. If they fail any ECP Year 0 or 1 subjects they will be excluded by the department.

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

PRE-REQUISITE: A pre-requisite subject must be passed in the previous year/semester in order for a student to register for the next follow-up subject. For example, a student doing Applied Textiles Science 1 must pass the subject in year 1 in order to register for Applied Textiles Science 2 in year 2.

DIPLOMA SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

ACADEMIC PRACTICE & COMMUNICATION 1

Pre-requisite:	None
Mode of delivery:	Lectures and computer work
Subject outline:	This subject focuses on the following: • **Academic literacy:** academic writing and reading, language, vocabulary and terminology development; conceptual development; comparing and contrasting; extracting information; summarising and paraphrasing; report-writing. • **Visual literacy:** interpreting graphs, tables, mind maps, concept maps, organograms; flow charts. Information literacy – how to source and evaluate information and sources, especially on the Internet; how to manage information, avoiding plagiarism, referencing in text and creating a bibliography using the Harvard reference system. • **Communication:** theory – verbal and non-verbal communication; business communication; using I-language; intercultural communication; teamwork and conflict resolution in teams; CV and covering letter. • **Quantitative literacy:** numeracy: fractions, percentages, decimals, averages, rounding, ratios. • **Computers:** software use in: MS Office – MS Word, Excel and PowerPoint, email and Internet.
Assessment:	All assessments are compulsory. Assignments, Class tests, Tutorials, Final Summative Assessment, Practical tests.

ACADEMIC PRACTICE & COMMUNICATION 2

Pre-requisite:	Academic Practice and Communication 1
Mode of delivery:	Lectures and computer work
Subject outline:	This subject focuses on the following: ▪ **Academic Literacy:** Intermediate level academic writing, grammar and verbs, applying reading strategies to access, sift and organise information coherently. ▪ **Visual Literacy:** Be able to use digital Media in presenting information, ▪ **Communication theory:** Intermediate Level verbal and non-verbal communication; business correspondence; essay, report and article writing, effective meetings, letters and oral presentation ▪ **Computers:** software in use Ms Office-MS Excel, MS Access and MS Publisher
Assessment:	All assessments are compulsory. Assignments, Class tests, Tutorials, Final Summative Assessment, Practical tests.

APPLIED TEXTILES SCIENCE 1 (Divided into part A and B for the ECP programme)

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	This module focuses on the different aspects of natural, regenerated and synthetic fibres, as well as processes used to convert textile fibres into finished products – yarn and fabric construction, dyeing, printing and finishing processes – both in theory and practice. Students must demonstrate an understanding of fibre theory and how the external structure, chemical composition and internal structure of fibres impact on fabric properties and end products; demonstrate an understanding of the fibre properties by means of chemical and physical testing in the laboratory; demonstrate an understanding of the manufacturing processes, fibre properties, care instructions and end uses of different types of fibres, yarns and fabrics; demonstrate an understanding of different methods used in fibre identification; distinguish between different fibre, yarn and fabric types in term of their inherent characteristics and performance properties, as well as end uses; collate this information obtained from various textile sources into assignments/projects using the English language in an academically acceptable manner through written and visual communication.
Assessment:	All assessments are compulsory. Assignments, Class tests, Practical tests, Laboratory report portfolio, Laboratory work, Final Summative Assessment.

APPLIED TEXTILES SCIENCE 2

Pre-requisite:	Applied Textiles Science 1
Mode of delivery:	Lectures and practicals
Subject outline:	This module focuses on the processes used to convert textile fibres into finished products – yarn and fabric construction, dyeing, printing and finishing processes – both in theory and practice. Yarn spinning - students must demonstrate knowledge of the spinning techniques; demonstrate an understanding of the yarn properties by means of chemical and physical testing in the laboratory; know and identify different yarn types; Fabrication – student must demonstrate an understanding of the fabric formation by weaving and knitting technologies. Students must demonstrate an understanding of the fabric properties by means of chemical and physical testing in the laboratory; demonstrate an understanding of the manufacturing processes, care instructions and end uses of different types of fibres, yarns and fabrics; demonstrate an understanding of different methods yarn and fabric types in term of their inherent characteristics and performance properties, as well as end uses; collate this information obtained from various textile sources into assignments/projects using the English language in an academically acceptable manner through written and visual communication.
Assessment:	All assessments are compulsory. Assignments, Practical reports, Class tests, Quizzes, Projects, Class discussion/participation, Final Summative Assessment

APPLIED TEXTILES SCIENCE 3

Pre-requisite:	Pass all 2nd year subjects
Mode of delivery:	Lectures and practicals
Subject outline:	In this first module practice textile testing of different yarn types and fabric construction. This module focuses on different aspects of testing (fibres, yarns and fabrics), dry and wet tests, statistical analysis and interpretation of results from tests– students must demonstrate knowledge of yarn and fabric construction, dyeing, printing and finishing

	processes; show understanding of quantitative laboratory analytical methods; Apply the important foundation of this subject to explore other areas such as colour, production technology and quality aspects in subsequent years. In-depth demonstration and understanding of yarn theory and how the external structure, chemical composition and internal structure of fibres and yarns impact on fabric properties and end products; Demonstrate understanding of the manufacturing processes, fibre properties, care instructions and end uses of different types of fibres. Students should be able to design their own care label explain the rationale for such. Demonstrate understanding of different methods used in fibre composition of fabrics; collate this information obtained from various textile sources into assignments/projects using the English language in an academically acceptable manner through written and visual communication.
Assessment:	All assessments are compulsory. Assignments, Practical reports portfolio, Class tests, Quizzes, Projects, Class discussion/participation, Final Summative Assessment

BASIC INDUSTRIAL ENGINEERING 1

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	Provide the learner with the theoretical and practical background of basic industrial engineering techniques and processes; expose learners to work measurement and method study techniques; provide the learner with the necessary tools to analyse and solve problems relating to clothing and textile manufacturing processes to be able to conduct basic research to enhance quality, profitability and productivity in clothing and textile technology; maintain acceptable levels of productivity meeting standards; apply work measurement techniques to establish standard times; analyse processes and resources to produce and implement effective work methods; produce production plans to meet customer demand and suit workplace production systems; use clear and effective language confidently in written format and oral presentation, to report on products, processes and findings; use and construct numerical data and formulae in calculations and costings; access and process information through the use of relevant skills using a variety of media; show the relationship of the clothing industry structure to products, processes and customer needs; to acquire organisational and self-management skills.
Assessment:	All assessments are compulsory. Assignments, Class tests, Work measurement portfolio, Quizzes, Oral presentation, Final Summative Assessment.

CLOTHING & TEXTILES MANAGEMENT 1

Pre-requisite:	None
Mode of delivery:	Lectures incl. tutorial exercises
Subject outline:	The subject comprises Finance, Marketing and Economics and Management. Finance provides learners with understanding and an appreciation of financial principles and how these are applied in the business environment. The subject is presented on a theoretical base aimed at providing a foundation for practical application. It underpins the development of a key understanding of the financial process and the important role that this function plays in the world of work. Economics provides learners with an understanding of business in society and the workings of the economy. This gives the learner a theoretical and practical background to marketing and economics in business. In today’s dynamic environment, businesses and organisations face constant challenges to survive and remain competitive. The marketing element of the course deals with the basic principles of marketing. Business studies foster a better understanding of the factors that will influence the student’s working environment. Additionally in the management component the student is expected to understand the fundamentals of management and its application in the organisation; describe and define the nature of management; identify and explain the four basic management functions in organisations; describe different kinds of management found at different levels and in different areas of the organisation; discuss the science and the art of management inorganisations today.
Assessment:	All assessments are compulsory. Assignments, Class tests, Quizzes, Projects, Class discussion/participation, Final Summative Assessment

CLOTHING & TEXTILES MANAGEMENT 2

Pre-requisite:	Clothing and Textile Management 1
Mode of delivery:	Lectures, practical exercises and tutorial sessions

Subject outline:	The subject comprises Finance, Marketing and Economics and Management. Finance sets the foundation for cost and management accounting, by establishing the CIMA code of ethics for professional accountants; understanding of cost concepts, draw up sales budgets using, production budgets using different techniques) and cash budgets (using different techniques) also known as short-term budgeting; demonstrate an ability to prepare income statements using the direct and absorption methods, reconcile the income statements and calculate the ratios; and understanding cost behaviour and analyse the classification of costs. The primary objective of the course is to provide the learner with a framework for the development and evaluation of the human relation's function in the organisation. In order to achieve this, the learner will be introduced to the basic theory and research of human relations management. It will also be expected of the learner to become proficient in some of the actual procedures. Applied knowledge is a critical aspect of the course. An overview will also be provided on Corporate Social Responsibility and the application thereof. The aim of Clothing & Textiles Management – Economics & Marketing, is to provide the learner with a theoretical and practical background of the importance of economics and marketing in business.
Assessment:	All assessments are compulsory. Assignments, Class tests, Quizzes, Projects, Class discussion/participation, Final Summative Assessment

CLOTHING & TEXTILES MANAGEMENT 3

Pre-requisite:	Pass all 2nd year subjects
Mode of delivery:	Lectures and practical exercises
Subject outline:	The subject comprises Finance, Retailing, Management and Entrepreneurship. Finance sets the foundation for accounting and finance by creating an opportunity to provide evidence of understanding the role that long-term budgeting, strategic objectives and strategic plans; the nature of investment decisions; analysing and interpreting financial statements; investment appraisal and standard cost; and working capital in a manufacturing environment Retailing provides the student with the ability to explain the nature and scope of the retail environment, experience, a sector within the Clothing/Fashion industry. To describe the organizational classifications, operation and promotion of retail businesses and identify the importance of building effective relationships with customers. Management part is mostly Supply Chain Management which is in line with the higher NQF level subjects. The students are introduced to introductory level supply chain management concepts and theories. It covers the following areas: CSR, Supplier and purchasing management, Modes of transportation, etc. Entrepreneurship module focus on developing a business plan for small and medium enterprises by encouraging innovative thinking that would be useful in a business and stimulate business development. This module covers introduction to innovation, types of innovation, theories of innovation, feasibility studies, managing innovation, develop innovative business ideas, entrepreneurship and intrapreneurship, market analysis, marketing strategy and marketing mix, product strategy and development and preparing a full business plan.
Assessment:	All assessments are compulsory, Assignments, Class tests, Projects, Oral presentations and Final Summative Assessment.

CLOTHING & TEXTILES MANUFACTURE 1 (Divided into part A and B for the ECP programme)

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The subject consists of manufacturing technology and cutting room control. It aims to provide an introduction to the cutting room and its various processes, and provide an understanding of the integrated nature of the cutting room with other departments and their role-players. Introduction to cutting room – internal and external costs; identify different cutting processes; identify various areas interacting with the cutting room; identify and understand cutting room terminology; identify internal and external customers; understand the checking-in procedure of fabrics; understand the planning function; understand the functions of stockroom and laboratory; identify different types of paper. Introduction to procedure for producing a marker – identify different laying up techniques; identify cutting methods; identify ancillary equipment; understand bundling and sorting processes. The manufacturing technology component aims to make the student understand all sectors of the clothing and textile industry pipeline; identify workflow in a clothing and textile factory; identify the role of different personal and departments in a factory; identify a wide range of machinery used in the clothing and textile industry; identify and classify stitch types and seams types used in the clothing industry; identify and classify a wide variety of trims and other components used in the clothing industry; recommend correct procedures of application, uses or attachments of related equipment or machine parts for garment production; identify and complete basic technical reports.

Assessment:	All assessments are compulsory. Assignments, Class tests, Factory report, Oral presentations, Final Summative Assessment.

CLOTHING & TEXTILES MANUFACTURE 2

Pre-requisite:	Clothing and Textile Manufacture 1
Mode of delivery:	Lectures including tutorial exercises
Subject outline:	The manufacturing technology component is linked to a garment construction subject and aims to equip the students with a broader understanding of all sectors of the clothing and textile industry; learn the more advanced procedures involved in garment production; the step-by step approach of garment construction through the use of a garment construction breakdown/analysis and specification sheets; identify workflow in a clothing and textile factory; identify the role of different personnel and departments in a clothing factory; knowledge about the identification of a wide range of specialized machinery used in the clothing and textile industry; identify and classify more advanced stitch types and seams types used to produce garments in the clothing industry; identify and classify a wide variety of trims and other components used in the clothing industry; methods used to produce advanced engineered garments i.e. tailored jackets and 5-pocket-jeans. The subject also aims to provide an introduction to the cutting room and its various processes. Directed to provide an understanding of the integrated nature of cutting room with other departments and its role-players in the clothing manufacturing industry. Quality control and Assurance in all Cutting room processes is introduced at this level.
Assessment:	All assessments are compulsory. Assignments, Class tests, Quizzes, Projects, Class discussion/participation, Factory report, Oral presentations, Final Summative Assessment

CLOTHING & TEXTILES PROFESSIONAL PRACTICE

Pre-requisite:	Student need to pass all six 3rd year subjects.
Mode of delivery:	Placement in industry related workstation/experiential learning.
Subject outline:	The workplace-based learning component of this qualification will enable students to gain practical workplace-based knowledge and skills in addition to the disciplinary theoretical knowledge and practical laboratory skills. The workplace-based learning component will take under the supervision an institutionally approved mentor(s) or supervisor(s) in the workplace. Staff members visit students regularly while they are in the workplace to monitor progress and to provide feedback as part of formative assessment to ensure that the learning experience meets the educational requirements. Visitation forms are used for this purpose and follow-up action takes place if needed. Students are also required to keep a daily log sheet and these activities are closely monitored by the workplace mentor/supervisor and the staff members from the institution.
Assessment:	Students are also formally assessed by means of assignments, reports, oral presentations, log books, portfolios of evidence and other means of assessment (e.g. artefacts) to ensure close alignment between the expected learning outcomes, workplace-based learning experience and associated assessment strategy and criteria of the programme.

GARMENT CONSTRUCTION 1 (Divided into part A and B for the ECP programme)

Pre-requisite:	None
Mode of delivery:	Practicals in sewing room
Subject outline:	The following topics will be covered: Theory and practice of sewing; understanding machinery and types of seams used to construct garments; understanding garment construction; sewing techniques, stitch types, seam types; properties of a good seam; ability to create a construction breakdown; understanding figure analysis, body proportion and fit; understanding design details; developing observational and analytical skills to construct garments to a high degree of quality, using suitable tools and equipment for different garment types, styling and customer requirements.
Assessment:	All assessments are compulsory. Assignments, Practical tests, Class tests.

GARMENT CONSTRUCTION 2

Pre-requisite:	Garment Construction 1
Mode of delivery:	Practicals in sewing laboratory

Subject outline:	This subject encompasses all aspects of garment construction, styling, reading technical/ production drawings and developing new products. Persons achieving this qualification will be able to evaluate season's styles in terms of fabric, interpret technical drawings into garment construction following the different styling details, apply garment engineering techniques to the construction and finishing of the garment to specification, construction of prototypes in order to test patterns made. Students will also get an opportunity to construct garments for themselves and get an opportunity to experience different fabric types through the construction of different garment types.
Assessment:	All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment.

GARMENT CONSTRUCTION 3

Pre-requisite:	Pass all 2nd year subjects
Mode of delivery:	Practicals in sewing laboratory
Subject outline:	This subject encompasses all aspects of garment construction, styling, reading technical/ production drawings and developing new garment range. This includes the production of prototypes with an aim of testing patterns constructed in pattern construction. Fitting of production prototypes and/or accessories according to technical specifications and to make amendments if there is any non-compliance. Understanding design details; developing observational and analytical skills to construct garments to a high degree of quality, using suitable tools and equipment for different garment types with different styling details.
Assessment:	All assessments are compulsory. Practical tests, written report and Final Summative Assessment.

MATHEMATICS & STATISTICS 1

Pre-requisite:	None
Mode of delivery:	Lectures including tutorial exercises
Subject outline:	The aim of this subject is to cover basic statistical methods and calculation pertaining to their use in the clothing and textile industry both from the business and from the manufacturing perspective. General mathematical principles focusing on analysis of quantities, magnitudes, forms using symbolic language and logic. Mathematics and statistics are used regularly in many areas including clothing, textile and business fields. This course will develop an understanding of basic statistical methods and mathematical principles. Students will have a fundamental knowledge of its applications in clothing, textile and business areas and will be able to understand what is expected of them should they be employed at a supervisory or managerial level in an organization. The subject covers introduction to statistics, collection and organization of data, GDP calculation, presentation of statistical data, measure of data dispersion, basic textile and business calculations, introduction to probability, probability distribution, statistical estimation and hypothesis testing
Assessment:	All assessments are compulsory. Assignments, Class tests, Final Summative Assessment.

MATHEMATICS & STATISTICS 2

Pre-requisite:	Mathematics and Statistics 1
Mode of delivery:	Lectures including tutorial exercises
Subject outline:	This subject will further develop an understanding of basic statistical methods and mathematical principles. Significance testing of means- t-test, Significance testing of means for grouped data- t-test, The subject covers simple regression (linear regression), correlation analysis, control charts, chi-square distribution, textile and business calculations, analysis of variance (ANOVA)-One Way, ANOVA-Two way, transportation methods (North West Corner, Least Cost, Vogel's Approximation) and queuing theory.
Assessment:	All assessments are compulsory. Assignments, Class tests, Final Summative Assessment.

OPERATIONS MANAGEMENT 1

Pre-requisite:	Basic Industrial Engineering 1
Mode of delivery:	Lectures and practical exercises
Subject outline:	All areas involves the techniques used in a clothing and textile manufacturing environment - explore operations management; the use of different forecasting techniques in production; employment of various capacity planning

	techniques in a manufacturing plant; application of aggregate and master planning techniques; understand MRP and ERP and solve MRP mathematically; apply process selection and facilities layout processes to a manufacturing plant; understand and describe inventory and solve inventory management problems mathematically; use various work study and work sampling techniques; improve productivity using method study and work measurement techniques; do checks on work measurement; use various linear programming techniques and solve problems using various methods; understand value analysis and variety control in a company- establish whether to add or drop a line mathematically and do various costings applicable used to establish product costs to a manufacturing company.
Assessment:	All assessments are compulsory, Assignments, Class tests, Group Projects, Oral presentations and Final Summative Assessment.

OPERATIONS MANAGEMENT 2

Pre-requisite:	Pass all 2nd year subjects
Mode of delivery:	Lectures and practical exercises
Subject outline:	This subject is based specifically on what is applied in the clothing, textile and retail companies - Apply project management using CPM and PERT; explore incentives and performances, analyse predetermined motion time systems used in industry; plan and organise standard data; analyse the purchasing function in perspective; critically evaluate JIT/Lean operations and Japanese management verses Western management.
Assessment:	All assessments are compulsory, Assignments, Class tests, Projects, Oral presentations (if time permits) and Final Summative Assessment.

PATTERN CONSTRUCTION & CAD 1 (Divided into part A and B for the ECP programme)

Pre-requisite:	None
Mode of delivery:	Practical work in pattern laboratory and the CAD laboratory.
Subject outline:	To introduce students to basic pattern-making concepts; to impart knowledge of basic blocks and flat pattern techniques. Introduction to pattern making: terminology: notches, grain, grain line, construction lines, perforations, centre front line – front and back, bias, true bias, bust line, waistline, seat line, seam allowance, seams, darts, dart points, direction of dart excess, dart shape at pattern edge. Figure analysis: body ideals – body proportion, height and weight distribution, individual figure analysis; study of all body measurements for all age groups – infants, children, women and men – standards of body measurement, importance, standardisation and size charts; principles of pattern construction – drafting, draping and flat pattern-principles, advantages and disadvantages; methods and preparation of basic blocks – front, back, sleeve, skirt front and skirt back for infants, children, women, and men; flat pattern techniques – pivot and slash-spread methods, single dart series, double dart series, parallel darts, conversion of darts to tucks, pleats and gathers; Figure analysis – body, ideal proportion, height and weight distribution, individual figure analysis. Additionally students will be introduced to computer-aided pattern design.
Assessment:	All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment.

PATTERN CONSTRUCTION & CAD 2

Pre-requisite:	Pattern Construction and CAD 1
Mode of delivery:	Practical work in pattern laboratory and the CAD laboratory.
Subject outline:	To introduce students to more advanced pattern-making concepts; Figure analysis: body ideals – body proportion; study of all body measurements– children, women and men – standards of body measurement, importance, standardisation and size charts; principles of pattern construction drafting bespoke (made to fit) basic blocks and flat patterns. Drafting patterns in preparation for Prototypes, fit sessions. Additionally, students will be introduced to computer-aided pattern design in order to create technical drawings using a Kaledo Software in preparation for computerized patterns using a Gerber System to enable them to interpret Technical Drawings during the construction of manual and computerised patterns.
Assessment:	All assessments are compulsory. Assignments, Class tests, Practical tests, Final Summative Assessment.

PATTERN CONSTRUCTION & CAD 3

Pre-requisite:	Pass all 2nd year subjects
Mode of delivery:	Practical work in pattern laboratory and the CAD laboratory.
Subject outline:	Construction of Concept Boards according to the desired thoroughly researched themes based on forecasted trends and/or on researched target market. Creation of styling ideas in a form of computerized Technical Drawings. Construction of manual bespoke basic blocks. Interpretation of Technical Drawings through the construction of manual and computerised patterns. Create technical packages according to industry or organizational practices, policies and procedures.
Assessment:	All assessments are compulsory. Practical tests, written report and final Summative Assessment.

PROFESSIONAL PRACTICE & COMMUNICATION 3

Pre-requisite:	Pass all 2nd year subjects
Mode of delivery:	Lectures and Computer Work
Subject outline:	The aim of the subject includes communication principles suitable in the professional environment, this includes various employment procedures and acceptable behaviours. Also, the students are introduced to research tools with the expectation of being able to define, analyse and gather information and present it professionally.
Assessment:	All assessments are compulsory. Assignments, Class tests, Tutorials, Final Summative Assessment, Practical tests.

ADVANCED DIPLOMA SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

GREEN, SMART & SUSTAINABLE TEXTILE TECHNOLOGIES

Pre-requisite:	None
Mode of delivery:	Blended mode of lectures and practicals
Subject outline:	The subject provides a platform by moving a step further from the existing clothing and textiles, practices, concepts and theories by enhancing on in-depth knowledge about green and smart textiles and using the experience gained on studying this subject to create smart, sustainable and green products. The subjects covers green textiles involving the concept sustainability, green textiles approaches, key factors in green textiles, green raw materials and production processes, life cycle assessment (LCA), Higg index 3.0, circular economy, sustainable raw materials, sustainability in yarn manufacturing, sustainability in fabric manufacturing, sustainability in garment manufacturing, cleaner textile production technologies, smart textiles – passive, active and ultra-smart textiles and its applications, manufacturing approaches for smart textiles, various types of smart textile materials, washability and health concerns for smart textiles, regulation of textile hazardous substances and waste management.
Assessment:	All assessments are compulsory. Assignments, Project report, Oral presentations, Discussion forums, Final project report.

INNOVATIVE PRODUCTS & PROCESSES IN TEXTILES & CLOTHING

Pre-requisite:	None
Mode of delivery:	Blended mode of lectures and practicals
Subject outline:	The primary objective of the course is to acquaint the students with the latest innovative thinking in product and processes development related to the Textiles and Clothing sector. To stimulate and to assist the students to use various methods of innovations to research and develop new products or processes that meet market requirements. The student must understand the Product Development Process i.e. Concept development, System-level design, Detail design, Testing and refinement and Pilot production. Conduct research and solve problems related to product development and manufacturing and in related industries. Students must be able to report and present findings on research and analysis in terms of the Product Development Process. Identifying Customer Needs Concept Generation, Concept Selection, Concept Testing, Design for manufacturing and Design for the environment. The student will learn to account for the various dimensions of product development viz. Product quality, Product cost, Development time, Development cost and Development capability.
Assessment:	All assessments are compulsory. Assignments, Project report, Oral presentations, Discussion forums, Final project report.

PRODUCT PERFORMANCE & CONTROL IN TEXTILES & CLOTHING

Pre-requisite:	None
Mode of delivery:	Blended mode of lectures and practicals
Subject outline:	This subject aims to equip the students with detailed knowledge of product performance control of textiles and clothing with specific emphasis on quality assurance and quality control and evaluation of test data. Students must demonstrate an understanding of textile processes; Conduct research and solve problems in production, product development and manufacturing and in related industries. Students must be able to report and present findings on research and analysis in terms of: raw materials, manufacturing methods and material construction, determine and improve the functionality of different textile products. Students will learn about innovative and emerging technologies in clothing and textiles and related industries; the multi-disciplinary nature of textiles that requires expertise in engineering, chemistry, physics and electronics.; and be able to characterize different products, their performance and show understanding of control of quality in textiles and clothing
Assessment:	All assessments are compulsory. Project portfolio, presentations, practical report and assignments.

RESEARCH METHODOLOGY & PROJECTS

Pre-requisite:	None
Mode of delivery:	Blended mode of lectures
Subject outline:	This subject aims to establish a holistic approach to report/thesis writing for students. Inclusive of project/problem identification and selection, proposal writing, defining the research problem and its importance, literature review, experimental work along with results and discussion and ethics in research. Further, both theory and statistical calculations to establish a foundation in understanding, interpreting and evaluating relevant research data gathered. This work will culminate in written reports linked to the other subjects and is related to the latest innovations and innovative thinking in products and processes related to textiles and clothing manufacture.
Assessment:	All assessments are compulsory. Assignments, Project report, Oral presentations.

SUPPLY PROCESSES & SYSTEMS IN TEXTILES & CLOTHING

Pre-requisite:	None
Mode of delivery:	Blended mode of lectures
Subject outline:	The primary objective of the course is to provide the student with a framework for the development and evaluation of the supply chain function within the organisation. In order to achieve this, the student will be introduced to the basic theory and concepts in supply chain management processes and systems. It will also be expected of the learner to become proficient in some of the actual procedures like modes of transportation, supply chain partners, intermediaries, etc. Applied knowledge is a critical aspect of the course. An overview will also be provided on Corporate Social Responsibility, Sustainability and Global supply chain and the application thereof.
Assessment:	All assessments are compulsory. Assignments, Project report, Oral presentations, Discussion forums.

DEPARTMENT OFFICE-BEARERS

POSITION	NAME	TELEPHONE	E-MAIL
Head of Department	Ms Toni Stringer	021 959 6629	StringerT@cput.ac.za
Secretary	Ms C Daniels	021 959 6527 / 021 959 6631	DanielsCh@cput.ac.za
Admin Assistant	Ms B Mtuze	021 953 8696	MtuzeB@cput.ac.za
Dept. ECP Co-ordinator	Mr RA Fisher	021 953 8736	FisherR@cput.ac.za
Level / Class Co-ordinators			
Year Zero & 1	Mr RA Fisher	021 953 8736	FisherR@cput.ac.za
Year 2	Mr V Ngquba	021 959 6911	NgqubaV@cput.ac.za
Year 3	Mr DN Ramsay	021 959 6636	RamsayD@cput.ac.za
AdvDip Construction Management	Mr L Wentzel	021 959 6630	WentzelL@cput.ac.za
AdvDip Construction Health & Safety	Mr L Bikitsha	021 959 6419	BikitshaL@cput.ac.za
AdvDip Facility Management	Mr A Opperman	021 959 5870	OppermanAG@cput.ac.za
AdvDip Quantity Surveying	Mrs LF Pinfold	021 953 8402	PinfoldL@cput.ac.za
Postgraduate	Mr X Nghona	021 959 8623	NghonaX@cput.ac.za

DEPARTMENTAL STAFF

POSITION	NAME	QUALIFICATIONS
Head of Department	Ms Toni Stringer	MSc (Engineering), BSc (Civil), PGDip (Higher Education Studies)
Senior Lecturer	Dr J Fapohunda	MSc (Building), PhD
Senior Lecturer	Mr DN Ramsay	BSc (Quantity Surveying)
Lecturer	Mr IA Akinyede	ND (Building Technology), NHD (Building Technology), MTech (Construction Management), DEng (Civil Engineering).
Lecturer	Mr Y Bassadien	ND Building, BTech Quantity Surveying
Lecturer	Mr L Bikitsha	ND (Building), BTech (Quantity Surveying), MTech (Construction Management)
Lecturer	Mr MF Fakier	BSc (Civil Engineering), MEng (Civil Engineering).
Lecturer	Ms K Jaffer	BA, Higher Diploma in Education, BA (Honours), MPhil in Communication and Language Education.
Lecturer	Mr M Laatoe	NHD Post School Education, BSc (Quantity Surveying), MSc (Property Studies)
Lecturer	Mr E Marais	ND (Building), BTech (Construction Management), MSc in International Construction Management.
Lecturer	Mr X Nghona	ND (Building), MTech (Construction Management)
Lecturer	Mr M Ngqongisa	ND (Building), BTech (Construction Management), MTech (Construction Management).
Lecturer	Mr V Ngquba	ND (Building), BTech (Construction Management), BTech (Quantity Surveying), MTech Construction Management.
Lecturer	Mr SSS Nompunga	ND (Building), HD (Higher Education and Training), MTech (Construction Management)

POSITION	NAME	QUALIFICATIONS
Lecturer	Mr A Opperman	ND (Building), BTech (Quantity Surveying), MTech (Construction Management)
Lecturer	Mrs LF Pinfold	BTech (Survey), Post Grad Diploma in GIS, MTech (Construction Management)
Lecturer	Ms KL Rau	MTech (Language Practice)
Lecturer	Ms C Robbertse	BSc Honours, BSc (Quantity Surveying), Masters in Land and Property Development.
Lecturer	Mr L Wentzel	ND (Building), BTech (Quantity Surveying), MTech (Construction Management),
Junior Lecturer	Ms B Damba	ND (Building); HD Higher Education and Training, BTech (Quantity Surveying)
Junior Lecturer	Mr RA Fisher	NHD (Building Surveying), Master of Construction
Junior Lecturer	Ms A Mayeza	ND (Building), BTech (Quantity Surveying)
Junior Lecturer	Ms MA Thasi	ND (Building), BTech (Construction Management)
Junior Lecturer	Mr M Jobodwana	ND (Building), BTech (Quantity Surveying)
Co-op Co-ordinator	Mrs AI Fisher	NHD (Building Surveying)
IT Technician	Mr MG Quickfall	ND (Building), BTech (Construction Management)
Lab Technician	Mr D Appolis	ND (Building)
Lab Assistant	Mr Z Slamdien	ND (Building), BTech (Quantity Surveying)

QUALIFICATIONS OFFERED

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration	Work Integrated Learning
Diploma in Construction	D3CSTN	3 years	6 years	6 months
Diploma in Construction (Extended)	D3CSTX	4 years	8 years	6 months
Advanced Diploma in Construction Management	ADCNMT	1 year (full-time) 2 years (part-time)	2 years (full-time) 4 years (part-time)	--
Advanced Diploma in Construction Health & Safety	ADCNHS	1 year (full-time) 2 years (part-time)	2 years (full-time) 4 years (part-time)	--
Advanced Diploma in Facility Management	ADFCMT	1 year (full-time) 2 years (part-time)	2 years (full-time) 4 years (part-time)	--
Advanced Diploma in Quantity Surveying	ADQSUR	1 year (full-time) 2 years (part-time)	2 years (full-time) 4 years (part-time)	--
Master of Construction	MGCNSR	1 year (full-time) 2 years (part-time)	3 years (full-time) 4 years (part-time)	--

DIPLOMA IN CONSTRUCTION

COURSE AIM

The course is structured to provide a career-oriented technological education and to prepare students for supervisory level employment in the construction management, quantity surveying and allied industries in the built environment. The Diploma in Construction lays the foundation for further study towards the Advanced Diploma in Construction Management, the Advanced Diploma in Facility Management, the Advanced Diploma in Construction Management or BTech Quantity Surveying which are awarded after a further one year of study and allows for specialisation in these fields.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This is a broad-based qualification intended to prepare diplomates for supervisory and middle management level employment in the building industry and for technical and support level in the quantity surveying profession. Persons achieving this qualification will be competent to support supervisors, managers, building surveyors and quantity surveyors.

CAREER OPPORTUNITIES

Graduates practise as construction managers or quantity surveyors. Consultants, contractors or local authorities may employ the quantity surveyor or construction manager. Duties include taking off quantities, estimating and pricing for tendering purposes or the submission of payment certificates or managing the construction of buildings.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 25 using Method 1 (best 6 subjects excluding Life Orientation, divided by 10) E (First language) 4 (50%) M 4 (50%) or TM 5 (60%)	Recommended: Any of the following: ACC (3), BUS (3), ECON (3), CIVT (3), EGD (3), CAT (3), IT (3), PS (3), TS (3)	M (N4) 60%	E (5) (60%), M (5) (60%)

Legend:
E (English) M (Maths) TM (Technical Maths) PS (Physical Science) TS (Technical Science)

PROFESSIONAL REGISTRATION

Now that our old accredited National Diloma: Building and B Tech degrees are no longer being offered, the new Diploma in Construction as well as the new Advanced Diplomas in Quantity Surveying are due for accreditation this year by the South African Council for the Quantity Surveying Profession. All Diploma students will only be able to register with the council after successful completion of the Advanced Diploma in Quantity Surveying.

After completion of our Advanced Diplomas in Construction Management, Construction Health & Safety, and Facility Management students will be able to apply for professional registration with the South African Council for the Construction Management and Project Management professions.

DURATION

Full-time: Three years, including work-integrated learning. For further information regarding work integrated learning, please contact the Department of Construction Management and Quantity Surveying.

VENUE

Bellville

DIPLOMA IN CONSTRUCTION (D3CSTN)

Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1ST YEAR (all subjects compulsory)									
Computer Skills and Applications	CSA151S	01	Y	5	C	--	10	0.083	CE
Construction Management 1	CNM150S	01	Y	5	C	--	20	0.167	CE
Construction Mathematics	CMA150S	01	Y	5	C	--	10	0.083	CE
Construction Science 1	CNS150S	01	Y	5	C	--	10	0.083	CE
Construction Technology 1	CTY150S	01	Y	5	C	--	10	0.084	CE
Professional and Technical Communication 1	PTC152S	01	Y	5	C	--	10	0.083	CE
Quantity Surveying 1	QSU150S	01	Y	5	C	--	20	0.167	CE
Site Surveying	SSU150S	01	Y	5	C	--	20	0.167	CE
Technical Drafting	TCD150S	01	Y	5	C	--	10	0.083	CE
2nd Year (all subjects compulsory)									
Building Services	BDS260S	01	Y	6	C	CTY150S	10	0.083	CE
Construction Economics	CEC260S	01	Y	6	C	--	10	0.083	CE
Construction Health and Safety	CHS260S	01	Y	6	C	--	10	0.083	CE
Construction Management 2	CNM260S	01	Y	6	C	CNM150S	20	0.167	CE
Construction Science 2	CNS260S	01	Y	6	C	CNS150S	10	0.083	CE
Construction Technology 2	CTY260S	01	Y	6	C	CTY150S	20	0.167	CE
Integrated Construction Projects	ICP260S	01	Y	6	C	All first year subjects	10	0.084	CE
Professional and Technical Communication 2	PTC260S	01	Y	6	C	PTC152S	10	0.083	CE
Quantity Surveying 2	QSU260S	01	Y	6	C	QSU150S, CTY150S	20	0.167	CE
3RD Year (all subjects compulsory)									
Construction Entrepreneurship	CNE360S	01	S1	6	C	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.	10	0.083	CE
Construction Management 3	CNM360S	01	S1	6	C		20	0.167	CE
Construction Science 3	CNS360S	01	S1	6	C		10	0.083	CE
Construction Technology 3	CTM360S	01	S1	6	C		20	0.167	CE
Price Analysis and Estimating	PAE360S	01	S1	6	C		10	0.083	CE
Quantity Surveying 3	QSU360S	01	S1	6	C		20	0.167	CE
Construction Practice	BLP360S	01	S2	6	C		30	0.250	CE

DIPLOMA IN CONSTRUCTION (EXTENDED)

COURSE AIM

In the Extended Curriculum Programme, first-year subjects of the Diploma in Construction are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two-year Extended Curriculum Programme, students will integrate with the mainstream programme.

DURATION

Full-time: Four years, including work integrated learning. For more information regarding work integrated learning, please contact the Department of Construction Management and Quantity Surveying.

DIPLOMA IN CONSTRUCTION (EXTENDED) (D3CSTX)

Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
YEAR 0 (all subjects compulsory)									
Computer Skills & Applications	CSA151X	01	Y	5	C	--	10	0.083	CE
Construction Mathematics	CMA150X	01	Y	5	C	--	10	0.083	CE
Construction Science 1	CNS150X	01	Y	5	C	--	10	0.083	CE
Construction Technology 1	CTY150X	01	Y	5	C	--	10	0.084	CE
Professional & Technical Communication 1	PTC152X	01	Y	5	C	--	10	0.083	CE
Technical Drafting	TCD150X	01	Y	5	C	--	10	0.083	CE
1st Year (all subjects compulsory)									
Construction Management 1	CNM150X	01	Y	5	C	--	20	0.167	CE
Quantity Surveying 1	QSU150X	01	Y	5	C	--	20	0.167	CE
Site Surveying	SSU150X	01	Y	5	C	--	20	0.167	CE
2nd Year (all subjects compulsory)									
Building Services	BDS260S	01	Y	6	C	CTY150X	10	0.083	CE
Construction Economics	CEC260S	01	Y	6	C	--	10	0.083	CE
Construction Health & Safety	CHS260S	01	Y	6	C	--	10	0.083	CE
Construction Management 2	CNM260S	01	Y	6	C	CNM150X	10	0.167	CE
Construction Science 2	CNS260S	01	Y	6	C	CNS150X	10	0.083	CE

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Construction Technology 2	CTY260S	01	Y	6	C	CTY150SX	20	0.167	CE
Integrated Construction Projects	ICP260S	01	Y	6	C	All first year subjects	20	0.084	CE
Professional & Technical Communication 2	PTC260S	01	Y	6	C	PTC152X	10	0.083	CE
Quantity Surveying 2	QSU260S	01	Y	6	C	QSU150X, CTY150X	20	0.167	CE
3rd Year (all subjects compulsory)									
Construction Entrepreneurship	CNE360S	01	S1	6	C	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects	10	0.083	CE
Construction Management 3	CNM360S	01	S1	6	C		20	0.167	CE
Construction Science 3	CNS360S	01	S1	6	C		10	0.083	CE
Construction Technology 3	CTM360S	01	S1	6	C		20	0.167	CE
Price Analysis And Estimating	PAE360S	01	S1	6	C		10	0.083	CE
Quantity Surveying 3	QSU360S	01	S1	6	C		20	0.167	CE
Construction Practice	BLP360S	01	S2	6	C		30	0.250	CE

ADVANCED DIPLOMA IN CONSTRUCTION MANAGEMENT

COURSE AIM

The course focuses on the planning, execution and management of construction projects. The work of the construction manager mainly comprises the following:

- Pre-tender planning and programming of projects to determine the optimal use of resources.
- Post-tender refining and monitoring of construction programmes to ensure the smooth running and the completion of contracts on time.
- Quality control of labour and materials used in buildings.
- Controlling and managing sub-contractors, suppliers and the like.
- Co-ordinating the handing over of the completed projects.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for persons specialising in the field of construction management. Persons achieving this qualification will be competent to independently perform services relevant to contract planning management and property development.

CAREER OPPORTUNITIES

The main areas of employment are with building contractors and sub-contractors. Opportunities exist for self-employment, in property development, with mining houses, financial and insurance institutions, with state and semi-state departments, and in sales and marketing with retailers and manufacturers in the construction industry.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

- A 360 credit Diploma in Construction or an equivalent qualification at NQF L6.
- A National Diploma in Building or an equivalent qualification at NQF L6.
- Students should obtain an average pass mark of 60% pass in the exit level subjects of the Diploma/National Diploma.
- Students who do not obtain the 60% average, and with at least 1-year relevant industrial experience may be considered on merit.
- All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

Recognition for Prior Learning (RPL):

RPL will be considered in the context of the CPUT's commitment to alignment with the principles of the NQF and the National Plan for Higher Education in South Africa, with specific reference to:

- Broadening the social base of higher education
- Increasing access to higher education
- Increasing mobility of students across higher education institutions
- And other learning contexts
- Accelerating progress through learning programmes
- Increasing the number of graduates
- Developing staff

PROFESSIONAL REGISTRATION

Graduates are eligible for professional registration with the South African Council for Project and Construction Management Professions (SACPCMP) and the Chartered Institute of Building (CIOB Southern Africa) after the prescribed period of work. Professional registration enables them to practise as construction managers. In addition, graduates are eligible for particular categories of membership of the CIOB.

DURATION

Full-Time: One year
Part-Time: Minimum of two years

VENUE

Bellville

ADVANCED DIPLOMA IN CONSTRUCTION MANAGEMENT (ADCNMT)

Assessment Type: CE - Continuous evaluation / EX - Exam / PR - Project
Subject offering: Y - Year subject / S1 or S2 - Semester subject

Semester/ Year	Subject Name	Subject Code	Offering type	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
YEAR 4 (all subjects compulsory)									
Y	Advanced Construction Technology	ACT470S	01/02	7	C	--	10	0.083	CE
Y	Community Project Planning & Control	CPP470S	01/02	7	C	--	10	0.083	CE
Y	Construction Entrepreneurship	CNE470S	01/02	7	C	--	10	0.083	CE
Y	Construction Finance & Cost Control	CFC470S	01/02	7	C	--	10	0.083	CE
Y	Construction Law & Procedures	CLP470S	01/02	7	C	--	20	0.083	CE
Y	Construction Management	CNM470S	01/02	7	C	--	20	0.168	CE
Y	Construction Measurement	CME470S	01/02	7	C	--	10	0.168	CE
Y	Construction Project Management	CPM470S	01/02	7	C	--	10	0.083	CE
Y	Research Methodology	RME473S	01/02	7	C	--	10	0.083	CE
Y	Sustainability & Environmental Management	SEM470S	01/02	7	C	--	10	0.083	CE

ADVANCED DIPLOMA IN CONSTRUCTION HEALTH & SAFETY

COURSE AIM

This programme will provide crucial construction health and safety skills, and add value to existing construction enterprises, as well as new construction enterprises as required for practising as a construction health and safety officer and a construction health and safety manager.

PURPOSE AND RATIONALE OF THE QUALIFICATION

The study of construction health and safety management at this level aims to equip students with advanced knowledge in the discipline of construction health and safety management, and to apply that knowledge, skills, and values within a business or project environment.

CAREER OPPORTUNITIES

Given the prioritisation of improvements in construction health and safety worldwide and the dire shortage of qualified health and safety practitioners, this qualification equips students to render health and safety consulting seminars and be employed as health and safety specialists in construction.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

- A 360 credit Diploma in Construction or an equivalent qualification at NQF L6.
- A National Diploma in Building or an equivalent qualification at NQF L6.
- Students should obtain an average pass mark of 60% pass in the exit level subjects of the Diploma/National Diploma.
- Students who do not obtain the 60% average, and with at least 1-year relevant industrial experience may be considered on merit.
- All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

Recognition for Prior Learning (RPL):

RPL will be considered in the context of the CPUT’s commitment to alignment with the principles of the NQF and the National Plan for Higher Education in South Africa, with specific reference to:

- Broadening the social base of higher education
- Increasing access to higher education
- Increasing mobility of students across higher education institutions
- And other learning contexts
- Accelerating progress through learning programmes
- Increasing the number of graduates
- Developing staff

DURATION

Full-Time: One year
Part-Time: Minimum of two years

VENUE

Bellville

ADVANCED DIPLOMA IN CONSTRUCTION HEALTH & SAFETY (ADCNHS)

Assessment Type: CE - Continuous evaluation / EX - Exam / PR - Project
Subject offering: Y - Year subject / S1 or S2 - Semester subject

Semester/ Year	Subject Name	Subject Code	Offering type	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
YEAR 4 (all subjects compulsory)									
Y	Advanced Construction Technology	ACT470S	01/02	7	C	--	10	0.083	CE
Y	Construction Law & Procedures	CLP470S	01/02	7	C	--	20	0.167	CE
Y	Construction Occupation Health Management	COH470S	01/02	7	C	--	10	0.083	CE
Y	Construction Safety Management	CSM470S	01/02	7	C	--	20	0.167	CE
Y	Construction Site Management	CNS470S	01/02	7	C	--	20	0.167	CE
Y	Research Methodology	RME473S	01/02	7	C	--	10	0.083	CE
Y	Strategic Risk Management	SRM470S	01/02	7	C	--	20	0.167	CE
Y	Sustainability & Environmental Management	SEM470S	01/02	7	C	--	10	0.083	CE

ADVANCED DIPLOMA IN FACILITY MANAGEMENT

COURSE AIM

The course focuses on the planning, execution and management of facility management projects. The work of a facility manager mainly comprises the following:

- Ensuring management of facility-related services.
- Managing the maintenance of facilities.
- Assessment of properties and facilities.
- Planning and programming of projects relating to facilities.
- Controlling and managing contractors and service providers.

The ideal facility manager is a practical problem-solver and a self-motivated achiever who enjoys working in multidisciplinary teams. Applicants should be goal-orientated, enjoy working in a project environment, and have the ability to communicate with and motivate people at all levels. Good human relations, as well as the ability to think logically and report on situations in an orderly manner, are important as the facility manager needs to develop close relationships with a variety of stakeholders.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for persons specialising in the field of construction management. Persons achieving this qualification will be competent to independently perform services relevant to contract planning management and property development.

CAREER OPPORTUNITIES

The main areas of employment are with facility management companies, insurance institutions and state and semi-state departments. Opportunities exist for careers as consultants or self-employed service providers.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

- A 360 credit Diploma in Construction or an equivalent qualification at NQF L6.
- A National Diploma in Building or an equivalent qualification at NQF L6.
- Students should obtain an average pass mark of 60% pass in the exit level subjects of the Diploma/National Diploma.
- Students who do not obtain the 60% average, and with at least 1-year relevant industrial experience may be considered on merit.
- All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

Recognition for Prior Learning (RPL):

RPL will be considered in the context of the CPUT's commitment to alignment with the principles of the NQF and the National Plan for Higher Education in South Africa, with specific reference to:

- Broadening the social base of higher education
- Increasing access to higher education
- Increasing mobility of students across higher education institutions
- And other learning contexts
- Accelerating progress through learning programmes
- Increasing the number of graduates
- Developing staff

DURATION

Full-Time: One year / Part-Time: Minimum of two years

VENUE

Bellville

ADVANCED DIPLOMA IN FACILITY MANAGEMENT (ADFCMT)

Assessment Type: CE - Continuous evaluation / EX - Exam / PR - Project
Subject offering: Y - Year subject / S1 or S2 - Semester subject

Semester/ Year	Subject Name	Subject Code	Offering type	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
YEAR 4 (all subjects compulsory)									
Y	Advanced Construction Technology	ACT470S	01/02	7	C	--	10	0.083	CE
Y	Construction Project Management	CPM470S	01/02	7	C	--	10	0.083	CE
Y	Facility Management	FCM470S	01/02	7	C	--	20	0.168	CE
Y	Green Building Technology	GBT470S	01/02	7	C	--	10	0.083	CE
Y	Maintenance Management	MNM470S	01/02	7	C	--	10	0.083	CE
Y	Property Economics & Valuations	PEV470S	01/02	7	C	--	20	0.167	CE
Y	Property Law	PPL470S	01/02	7	C	--	20	0.167	CE
Y	Research Methodology	RME473S	01/02	7	C	--	10	0.083	CE
Y	Supply Chain Management	SCM470S	01/02	7	C	--	10	0.083	CE

ADVANCED DIPLOMA IN QUANTITY SURVEYING

COURSE AIM

The course prepares students for middle and top management employment in the construction, property development and allied industries, as well as financial institutions and government departments.

The quantity surveyor is the cost- and financial specialist of the construction industry. The work is varied, but mainly comprises the following:

- Estimating the cost of and assisting with determining the feasibility of projects.
- Preparing documentation for competitive tendering.
- Tendering and negotiating for contracts.
- Managing and exercising financial control over contracts to ensure cash flow and the profitability of projects.
- Controlling and managing sub-contractors and suppliers.
- Finalising financial aspects of contracts upon completion of projects.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for persons specialising in the field of quantity surveying, in the construction and property industries and the Quantity Surveying profession. Persons achieving this qualification will be competent to independently perform services relevant to contract procurement, financial and cost management and property development.

CAREER OPPORTUNITIES

Employment opportunities are many and varied: the main areas of employment are with building contractors and professional quantity surveyors. Opportunities also exist for self-employment, in property development, with mining houses, financial and insurance institutions, with state and semi-state departments and in marketing with retailers and manufacturers in the construction industry.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

- A 360 credit Diploma in Construction or related qualification at NQF L6.
- A National Diploma in Building.
- Students should obtain an average pass mark of 60% pass in the exit level subjects of the Diploma/National Diploma.
- Students who do not obtain the 60% average, and with at least 1-year relevant industrial experience may be considered on merit.
- All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

Recognition for Prior Learning (RPL):

RPL will be considered in the context of the CPUT's commitment to alignment with the principles of the NQF and the National Plan for Higher Education in South Africa, with specific reference to:

- Broadening the social base of higher education
- Increasing access to higher education
- Increasing mobility of students across higher education institutions
- And other learning contexts
- Accelerating progress through learning programmes
- Increasing the number of graduates
- Developing staff

PROFESSIONAL REGISTRATION

Graduates are eligible for particular categories of membership of the Association of South African Quantity Surveyors (SACQSP), the Chartered Institute of Building (CIOB Southern Africa) and registration with the South African Council for the Quantity Surveying Profession.

DURATION

Full-Time: One year
Part-Time: Minimum of two years

VENUE

Bellville

ADVANCED DIPLOMA IN QUANTITY SURVEYING (ADQSUR)

Assessment Type: CE - Continuous evaluation / EX - Exam / PR - Project
Subject offering: Y - Year subject / S1 or S2 - Semester subject

Semester/ Year	Subject Name	Subject Code	Offering type	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
YEAR 4 (all subjects compulsory)									
Y	Advanced Construction Technology	ACT470S	01/02	7	C	--	10	0.083	CE
Y	Building Descriptive Quantification	BDQ470S	01/02	7	C	--	10	0.083	CE
Y	Civil Descriptive Quantification	CDQ470S	01/02	7	C	--	10	0.083	CE
Y	Construction Economics	CEC470S	01/02	7	C	--	20	0.168	CE
Y	Construction Law & Procedures	CLP470S	01/02	7	C	--	20	0.167	CE
Y	Contract Planning & Cost Control Management	CPC470S	01/02	7	C	--	10	0.083	CE
Y	Property Economics & Valuations	PEV470S	01/02	7	C	--	20	0.167	CE
Y	Research Methodology	RME473S	01/02	7	C	--	10	0.083	CE
Y	Sustainability & Environmental Management	SEM470S	01/02	7	C	--	10	0.083	CE

MASTER OF CONSTRUCTION (MGCNSR)

COURSE AIM

The course produces experts with integrated technical knowledge and skills, as well as advanced analytical and problem-solving capabilities, in specialised fields of construction, financial control, and policy formulation. The research focus of the department is diverse, ranging from community-based research, health and safety, small and medium contractor's entrepreneurship, project management and leadership including advanced construction technologies among others.

RESEARCH-BASED DEGREE

Students conduct supervised research in a specialised area of construction management or quantity surveying and complete a dissertation.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended to enable graduates to apply integrated technical knowledge/ skills and advanced analysis and problem solving to a particular specialisation in construction management, quantity surveying, property development and other related fields, through involvement in an applied research project.

CAREER OPPORTUNITIES

Employment opportunities are many and varied. The main areas of employment are with building contractors and professional quantity surveyors. Opportunities also exist for self- employment, or employment in property development, with mining houses, financial and insurance institutions, with state and semi-state departments and in marketing with retailers and manufacturers in the construction industry.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

A level 8 qualification with a minimum aggregate of 60% in the following qualifications:

- A Postgraduate Diploma in Construction;
- A Bachelor of Construction Management (Honours); Construction Health and Safety (Honours); Facility Management (Honours) or Quantity Surveying (Honours);
- A Professional Bachelor of Construction; or any other related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

PROFESSIONAL REGISTRATION

Graduates may be eligible for particular categories of membership of:

- The Association of South African Quantity Surveyors;
- The South African Council for the Project and Construction Management Professions
- The Chartered Institute of Building (CIOB Southern Africa)
- The South African Council for the Quantity Surveying Profession.

DURATION

Full-time: Minimum 1 year Maximum 3 years
Part-time: Minimum 2 years Maximum 4 years

VENUE

Bellville

MASTER OF CONSTRUCTION (MGCNSR)

Subject Description	Subject Code	Offering type	Semester / year	NQF Exit Level	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit
Research project & dissertation	CNT690R	01 / 02	Y	9	--	180	1

PROGRESSION RULES AND CRITERIA

EXCLUSION

Extended Curriculum Programme

Students are excluded if they fail any or all subjects registered for in an academic year.

Mainstream

Students are excluded if they fail:

- 50% or more of the subjects registered for in any level of study.
- All the major subjects, namely Construction Management, Quantity Surveying and Construction Technology in any level of study.
- Any subject twice.

PROMOTION

To second year

Students may not progress to the next level of study if they fail 50% or more of the subjects of the first year.

Students may also not progress to the next level of study if they fail all the major subjects, namely Construction Management 1, Construction Technology 1 and Quantity Surveying 1.

To third year

Students must have successfully completed all their first- and second-year subjects for progression into the third year.

Re-admission

Any case may be appealed to the Head of Department. The student has recourse to submit in writing an appeal against exclusion or non-re-admission. If the student is not satisfied with the response from the Head of Department, submission for an appeal may be made to the Dean. Interventions during the year include a marks review and an “Early Warning System”, where students are advised of their poor performance. Individual lecturers do this on a subject-to-subject basis, with the Curriculum Officer.

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

ELECTIVE SUBJECT: This is a subject required for degree purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

DIPLOMA SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

BUILDING SERVICES

Pre-requisite:	Construction Technology 1
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Electrical, lighting, air conditioning, ventilation, plumbing, drainage, sprinkler systems, security and data.
Assessment:	All assessments are compulsory. Assignments, tests, presentations, and lab practicals.

COMPUTER SKILLS AND APPLICATIONS

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Computer basics, the Internet and the World Wide Web, introduction to presentations, introduction to word processing, file management, Microsoft Excel, databases.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION ECONOMICS

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Micro-economics, outline of economic theory to economic activities. Output and the effect on prices of construction work and re-work. Price and market mechanisms. The construction industry and its role in the South African economy. Sources of finance. The monetary system in South Africa. The element of public finance, International trade and economic order, Import and export trade financing in South Africa.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION ENTREPRENEURSHIP

Pre-requisite:	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.

Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Introduction to construction entrepreneurship, Market structure, Business Attributes, Business skills, Construction trades and specialisation, Setting out of construction firm, Constructional professional practices, Construction Business plan, Business forms and administration, Construction accounting systems, Accounting concepts, policies and generally accepted accounting practices in construction. Double entry principles, Trial balance, Financial statements.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION HEALTH & SAFETY

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The nature of construction health and safety, Occupational health and health promotion, Psychology of health and safety, Roles and responsibilities of industry participants and stakeholders, Occupational Health and Safety Act 85/1993, Hazard identification and managing risk, Health and safety management systems, Health and safety incentives, Communication and meetings, Theories of accident causation, investigations and reporting, International health and safety.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION MANAGEMENT 1

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Site Administration, Cost Control, Mechanical Plant and Equipment, Management Functions, Materials Management, Project Planning, Safety, Human Resources Management, Sub-Contractor Management.
Assessment:	All assessments are compulsory. Assignments, tests, presentations.

CONSTRUCTION MANAGEMENT 2

Pre-requisite:	Construction Management 1
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Communication In The Micro-Environment Of The Site, Management Of Mechanical Plant And Equipment, Materials Management, Human Resources Management, Contract Administration, Administer Construction Projects, Introduction To Construction Law, Introduction To Quality Management, Health And Safety Management, Introduction Into Environmental Management, Facilities Management.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION MANAGEMENT 3

Pre-requisite:	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Techniques of planning, Contract planning, Machinery and plant management, materials and logistics, Work studies, Office and site administration, Quality control, Contract Law, Human resource management, labour law, labour relations, health and safety, facilities management.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION MATHEMATICS

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Scientific Calculator, Basic Algebra, Indices and Logarithms, Significant Figures And Estimation, Transposition And Evaluation of Formulae, Fractions & Percentages, Graphs, Units And Conversions, Geometry, Areas, Volumes, Surface Areas, Frustum Of Cone/ Pyramid, Setting Out Mathematical Principles, Rates, Ratio's And Proportions, Sine Rule, Cosine Rule, Mid-Ordinate Rule, Trapezoidal Rule,Theorem of Pythagoras, Trigonometric Ratios for Right-angled Triangles,Simpson's Rule, Prismoidal Rule, Statistics. Mass, Volume and density (Solid , Bulk And Relative), Force and Gravity, Vectors and scalars, Vector components, Resultants, Force Triangles, Polygons.
Assessment:	All assessments are compulsory. Tests and tutorials.

CONSTRUCTION PRACTICE

Pre-requisite:	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Methods of programming, Levelling and setting out, Co-ordination of production activities on site, Pre- and post-contract administration, Liaison with payments to subcontractors, Liaison with professional team, Estimating and pricing, On-site measurement, Measurement of quantities from drawings, Compilation of labour costs for inclusion in monthly reports, Assist with compilation of monthly progress valuations and payments, Final accounts, Cost reports and projected cash-flows, Computer applications
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION SCIENCE 1

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Physical and chemical properties of materials, Force and stress, Fluids of materials, Water/Moisture ingress, Behaviour of fluids, Principles of thermal comfort, Thermal control by building design, Heat flow and thermal insulation, Solar energy: The beckoning opportunities, Light, colour, and vision, Daylight design principles, Artificial lighting, Nature of sound, Sustainable architecture concepts and principles, Applied Mechanics, Electricity.
Assessment:	All assessments are compulsory. Tests, Assignment, integrated project and tutorials.

CONSTRUCTION SCIENCE 2

Pre-requisite:	Construction Science 1
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Mechanics: Conversion of units, Vectors/Vector Components, Static equilibrium conditions. Force/Vector diagrams, Beam reactions, Stress & Strains, Structural Theory: Shear Force and Bending Moment diagrams, Bending and shear stresses, Deflection, Cross-sectional beam properties, Standard steel and timber sections,
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION SCIENCE 3

Pre-requisite:	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.

Subject outline:	Elementary Design: Columns, Beams, Formwork, Concrete pressures reinforcing steel and pre-stressed concrete. Concrete Technology: Aggregates, Binders, Extenders, Concrete Mix design, Batching, Quality control, Ready mix concrete, Pumped concrete, Self compacting concrete.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION TECHNOLOGY 1

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures and lab practicals
Subject outline:	Interpretation Of Drawings, Construction Methods, Construction Materials, Building Services, Workshop/Project, Site Visits.
Assessment:	All assessments are compulsory. Assignments, tests, tutorials, and projects and presentations.

CONSTRUCTION TECHNOLOGY 2

Pre-requisite:	Construction Technology 1
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Formwork materials and re-use factors, Pre-cast beams, concrete and floors, Metal doors and windows, timber doors and windows, characteristics of glass, prefabricated timber trusses, roof coverings, eaves, flashings and rainwater goods, Dormer windows and use of attic spaces, fireplaces, fixings fastenings and adhesives, floor, wall and ceiling finishes, drainage and plumbing details, paint to metal plaster and timber, industrial building systems
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

CONSTRUCTION TECHNOLOGY 3

Pre-requisite:	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures and lab practicals.
Subject outline:	Definition of multi-floor concepts, demolitions, protection of public and adjoining properties, soils and excavations, foundations and piles, basements and retaining walls, concrete structures, steel structures, cladding, finishes.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

INTEGRATED CONSTRUCTION PROJECTS

Pre-requisite:	All first year subjects
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Theory, Modelling, An assignment integrating knowledge from all subjects.
Assessment:	Submit one integrated assignment

PRICE ANALYSIS AND ESTIMATING

Pre-requisite:	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Specification of construction works, Estimating methods and programmes, Costing methods, Prime cost and provision of sums, Analysis of prices and unit rates, Pricing of preliminaries, alterations and rehabilitation work.

Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

PROFESSIONAL & TECHNICAL COMMUNICATION 1

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Critical Thinking. Visual Literacy. Written Communication. Spoken communication, Non-verbal Communication. Interviews, Meeting Procedures. Small Group Communication,
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

PROFESSIONAL & TECHNICAL COMMUNICATION 2

Pre-requisite:	Professional and Technical Communication 1
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Technical report writing, Professional communication,Construction Ethics, Meeting procedure, Interviewing, Work preparedness, Construction office practices and communication tools
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

QUANTITY SURVEYING 1

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Introduction to the Quantity Surveying Profession, The form of the “Bills of Quantities”, Items, Order and unit of Measurement, Dimension Preparation, Measuring and “Working Up” applicable to simple single-storey buildings, external finishes, schedules, bills of quantities preparation, abstracting and billing of a simple structure.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

QUANTITY SURVEYING 2

Pre-requisite:	Quantity Surveying 1, Construction Technology 1
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Foundations (stepped, raft, passings), roofs (hips and valleys, construction, covering, eaves and verges, rainwater disposal), finishes, windows and doors, bill production, preambles, preliminaries bill, valuation and construction work.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

QUANTITY SURVEYING 3

Pre-requisite:	ALL first and second year subjects MUST be passed before a student will be allowed to register for any third year subjects.
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	“Standard system of measuring building work”; interpret and apply the directives given to the measuring process; the order of trades, and items in the bills of quantities; critically evaluate the quality of information supplied on working drawings; accurately measure from drawings, and be able to “book” the dimensions in the correct format; apply the necessary mathematical formulas required to calculate areas and volumes; understand the“abstracting” and “billing” processes in compiling a “bills of quantities” for a simple structure.
Assessment:	All assessments are compulsory. Tests, projects, and tutorials.

SITE SURVEYING

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures and practicals
Subject outline:	Basic principles of surveying, linear surveying, levelling, theodolite, setting out, introduction to electronic survey equipment.
Assessment:	All assessments are compulsory. Practicals and tests.

TECHNICAL DRAFTING

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Interpretation of Drawings, lettering, isometric and oblique projection, first and third angle projection, 3D drawing, introduction to AutoCAD
Assessment:	Drawing Portfolio, integrated project, assignments, tutorials.

ADVANCED DIPLOMA SUBJECTS (All Qualifications)

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

ADVANCED CONSTRUCTION TECHNOLOGY

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of this subject is to equip the students with advanced knowledge, approaches, foresights, processes, materials and methods in the construction industry to meet the growing needs of urban developments and sustainable built environment. Advances in conceptual approaches to design and construction - Functions and performance of buildings, Visualization And Simulation Approaches In Construction, BIM, Green building, and Feasibility of new technologies in construction. Advances in foundations and substructure - Soil stabilizations, Advanced foundation engineering, Earthquake Resistant Design of Structures. Alternative Materials and Methods for Construction - Alternative materials for construction, Alternative methods for construction, Deterioration Process in Reinforced Concrete, Tilt up construction. Advanced technologies and materials - Lifts and escalators. Heating and cooling provision, Other building services (data connectivity, intelligent controls etc). Prefabricated construction - Prefabrication and construction techniques, Prefabrication and off-site production, Mass customization limitations in prefabrication, Guidelines in prefabricated construction, Prefabrication in Concrete Building Construction. Automated Construction - Construction Site Automation, Automated Horizontal Building Construction, and Automation in Concrete Building Construction.
Assessment:	Both summative and formative assessments

BUILDING DESCRIPTIVE QUANTIFICATION

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The purpose of this subject is to enable students to conduct measurement and compile Bills of Quantities for more specialized elements of building work. Measurement of More Specialized Elements of Building Work - Interpret architectural and corresponding structural engineering drawings. - Interpret the specification for the design shown on the drawings, Apply the Standard System of Measuring Building Work 1999 (6th Edition Rev), Produce quantities of building work for the more specialized elements of building work. Compile Bills of Quantities in Respect of more Specialized Elements of Building Work - Compile bills of quantities in accordance with the Model Bill of Quantities issued by the Association of South African Quantity Surveyors, Incorporate preambles in the bills of quantities, Apply the Standard System of Measuring Building Work 1999 (6th Edition Rev), Compile bills of quantities for multi-storey buildings using WinQS software. Measurement of – Shoring, Ground anchoring, Piling, Reinforced concrete coffered, troughed and composite slabs, Reinforced concrete retaining walls, Precast concrete beams, slabs and cladding, Alterations and demolitions. External works comprising: - Paths and paved areas, Tarmacadam and concrete roads, Fencing and gates, Grassing and stone pitching, Measurement of electrical work including a study of the necessary technology. Measurement of mechanical work including a study of the necessary technology.
Assessment:	Both summative and formative assessment

CIVIL DESCRIPTIVE QUANTIFICATION

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The purpose of this subject is to enable students to measure and compile Bills of Quantities for Civil Engineering work. Measurement of Civil Engineering Work - A study of the measurement and description of the civil engineering work and the content and arrangement of Civil Engineering Bills of Quantities, Site investigation work and site clearance, Excavation, earthwork and dredging, Concrete work, Brickwork, Piling, Timberwork in excavation timbering, wharfs, jetting, etc, Steelwork, Roads and paving, Sewers, drains and pipelines, Railway lines and sidings.
.Assessment:	Compulsory formative and summative assessments

COMMUNITY PROJECT PLANNING & CONTROL

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	To introduce students to the theory and practice of community projects including social housing. Elements of community development - Processes, methodologies and programs. Principles of community development - Ensuring participatory development, needs in community development. Local assets for community and economic development - Asset based community development approach, uncovering and mapping community assets. Harnessing and utilising local assets. Social networks and social capital - Building social capital through networks; social networks for development and job generation; interventions for families coping with the changing economy; job program/options for the handicapped. Community resilience and crisis management Building community resilience; coping with crises; effects of crises on individuals, families and communities;what to do for communities in emergencies; managing conflict in coalitions. Local Economic Development (LED); local assets for rural tourism development. Leadership, partnerships and participation in projects - Building and sustaining local coalitions of services; community business sector relations; working with local leadership; community participation in planning and developing projects; skills in negotiations; building communication and marketing skills for community projects. Community project management. Role of Government and Development Agencies - Funding options; accountability; quality control; reporting systems.
Assessment:	Compulsory formative and summative assessments

CONSTRUCTION ECONOMICS

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The purpose of this subject is to introduce the students to the basics of the Micro and Macroeconomics, with specific reference to its influence on property market in in the South African construction industry. The Theory and Application of Market Analysis to the Construction Industry - Introduction to Economics, Scarcity, choice and opportunity cost, Micro-economics vs. macro-economics. Construction Market Analysis - Analysing the Economic System, Defining a Market, identifying construction market, Analysing the Theory of Demand, Analysing the Theory of Supply, Theory of Elasticity: Practical implications in construction output & pricing decisions. The Theory and Application of Market Analysis to the Construction and Property Industry. The construction industry and the wider economy. Perfect Competition, Imperfect Competition And Monopoly etc. The South African Economy and Construction Activities - The National Income and Construction activities. The Nature and Behaviour of the Firm in the Construction Industry - Theory of the firm, Competition, Monopoly, Cost and Production, Diminishing Returns and Profit Maximization. The Labour Market. Unemployment and Inflation in the construction industry. Property Development, Finance and Investment - Introduction to commercial property finance, Property economics, Time value of money- simple interest and compound interest calculations, Feasibility Studies, Spread sheet calculations.
Assessment:	Compulsory summative and formative assessments

CONSTRUCTION ENTREPRENEURSHIP

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	To enable students to understand the business environment, financial aspects and different types of businesses for entrepreneurs within the construction industry. Fundamentals of Entrepreneurship - Concept of Business Opportunity and Entrepreneurship Motivation, Ethics in Organisations, Corporate Entrepreneurship and Entrepreneurship. Construction Industry and Business Environment - Innovation in the Construction Project, Innovation in the Construction Company, Financial Factors for Construction Entrepreneurs. Construction Business Planning - The Business Plan, Business Maturity and Performance Improvement, Entrepreneurship and Small Businesses in Construction Industry, Marketing Management Functions in Construction Firms, Organizational Development Systems – Best Practices. Challenges and Success factors in Developing and Managing Construction Firms - Challenges facing Small Medium Enterprises, (SMEs) in Construction Industry, Success Factors Responsible for the

	Growth of Construction Contractors, Successful Cases in South Africa. Diversification and Growth Strategies of Construction Companies - Strategic Management and Implementation in Construction Firms.
Assessment:	Compulsory summative and formative assessments. Tests (60%), tutorials (20%), and an assignment (20%)

CONSTRUCTION FINANCE & COST CONTROL

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	To equip the student with the knowledge of understand the business environment, financial aspects and different types of businesses for entrepreneurs within the construction industry. Financing the project - Financial and management accounting, Balance sheet, Profit measurement, Cash flow statements, Financial analysis, Budgeting, Working capital investment analysis, Understanding construction company accounts. Property and investment theory, Project finance. Cost Control - Pre-contract cost management, Contractor's estimating and tendering, Post-contract cost management. Contractors' cost-control and monitoring procedures - Change management, Valuing variations, Claims management, Procurement strategies, Payment systems and contract administration.
Assessment:	Both summative and formative assessments. All assessments are compulsory.

CONSTRUCTION LAW & PROCEDURES

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The subject is designed to equip students with the knowledge, theory and practice of Construction Law as it relates to the South African Construction Industry. Introduction - The nature of contracts, Essentials for the accrual of a valid contract, Contract applications, Termination of contracts. Building contracts - Common law provisions, Types of building contracts. Legislative environment - The constitution, The industry, Labour laws, Professional conduct, Occupational health and safety. Contract forms - New Engineering Contract, JBCC, FIDIC, GEC 1990.
Assessment:	Both summative and formative assessments. All assessments are compulsory.

CONSTRUCTION MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Apply current management concepts and strategies to all sectors of construction and property industry. Construction Project environment - Construction project cycle, Project resources, Project Stakeholders, Legislative environment of the industry, Project Performance improvement. Total Quality management - Lean Construction and Just in Time techniques, South African public sector procurement environment, Project procurement processes and implementation of diverse Project procurement approaches. Constructability in practice - Value management approach to projects, Internal and External benchmarking within the construction sector. Contract planning - Planning and programming construction projects including CCS software application, Monitoring and control of forecast against actual resources, time and cost. Construction Stakeholders Management and communications - Information flow in South Africa construction environment. Labour Relations and Management - Overcoming the barriers between construction professionals, establishing term collaborative relationships to encourage innovation and continuous improvement, Conflict resolution at the workforce level, Impact of the empowerment and development of the emerging sector nationally and internationally.
Assessment:	Compulsory summative and formative assessments. Tests (65%), tutorials (15%), and an assignment (20%)

CONSTRUCTION MEASUREMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.

Subject outline:	The course will enable the student to interpret drawings in respect of elements of building work, to take off builder's quantities, compile financial claims and tendering and estimating quantities. Tendering and estimating quantities - Payment claims, Construction innovation and the quantity surveyor. Measurement and quantities - Measurement guide, Changes in sequence of work, Variation submissions. Reimbursements - Client interim payments, Subcontractor payments, Material suppliers and hire company payments. Risk Management - Information flow in a construction environment, Health and safety with reference to conformance and non-conformance to regulations and the implementation of safety plans. Financial Claims - Project completion, Final accounts.
Assessment:	Compulsory summative and formative assessments

CONSTRUCTION OCCUPATION HEALTH MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of this subject to equip students with a knowledge and application of the methods, techniques and skills required to work proactively to promote a culture of healthy working environment within construction industry. Basic occupational health - The medical role in occupational health, Basic toxicology, Principles of occupational epidemiology, Psychosocial factors in the work environment. Risk assessment - Risk communication, Risk survey design for construction sites. Biological monitoring - General principles of biological monitoring, Biological monitoring and geno-toxicity. Current occupational health problems in construction - Sickness absence, Cancer in the workplace, Occupational skin diseases, The management of occupational asthma and hyper-reactive airways disease in the workplace, Male reproductive effects, Pregnancy and work, Substance abuse. Preventing occupational injury - First aid, Rehabilitation and prevention of work-related musculoskeletal disorders, Heat stress, Working positions, tools and equipment, Chemical substances, Chemicals and their risks, Hazardous substances on construction sites. Ergonomics - Fitting work to people, Strenuous and heavy physical work, Static loads, Sitting and standing working positions, Hand tools and equipment. Personal protective equipment (ppe) used on construction sites – Noise, Vibration, Dust. Welfare programmes and initiatives - Welfare facilities, Human resource control, HiV and Aids in the construction environment, Health Legislation.
Assessment:	Compulsory formative (60%) and summative (40%) assessments.

CONSTRUCTION PROJECT MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The subject is designed to equip students with advanced specialist knowledge of Construction Project Management tools and techniques applicable to complex construction projects. Introduction To Projects - Definitions, stakeholders, role of project manager and key concepts. Project Teams - Leadership, management types, human behavioural models, construction professionals and their specific disciplines, principal agency, organizational structure. Project Initiation And Conceptualization - Needs analysis, formulation of brief, design options and alternatives, feasibility studies, land issues and contractual arrangements project selection. Project Planning And Development - Development of tender documentation, funding considerations, appointment of the project team, tendering adjudication and award and site handover. Construction And Implementation - Execution of workplan, monitoring of processes, quality and time management, change control, adherence to plans and schedules, network analysis, work breakdown structure and project communication. Handover And Commissioning - Maintenance period, warranties, guarantees training options and building usage exercises, performance criteria and closeout reporting. Risk Management On Construction Sites - Understand, recognize, identify and assess the various risks encountered on a construction project. Apply risk management techniques. Match risk management techniques to projects. Recognize the involvement of people in construction project risk; Develop integrated risk and value management systems; Implement risk allocation throughout all phases of a construction project.
Assessment:	Compulsory formative (70%) and summative (30%) assessments.

CONSTRUCTION SAFETY MANAGEMENT

Pre-requisite:	None

Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of this subject is to equip students with advanced specialist knowledge of workplace safety: to research and apply theory and best practice with regard to effective safety management on construction sites. Science in construction safety - Structure of matter, Properties of chemicals, Mechanics, Strength of materials, Modes of failure, Testing, Hydraulics. General safety - History of Industrial Safety, Safety Legislation, Importance of Safety, Safety programs, Safety procedures, Environmental health, Equipment maintenance, Managing accidents, Disaster Management. Safety on construction sites - Construction accidents, Site hazards, Access. Equipment safety - Personal protective equipment, Guardrails, Ladders, Scaffolds, Elevating work platforms, Suspended access equipment, Rigging. Safe use of machinery - Strategy for selecting safeguards, Safeguarding techniques, Powered trucks, Lifting equipment, Pressure systems and gas containers. Hazards - Housekeeping, Electricity, Traffic control, Trenching, Confined spaces, Asbestos. Tools and techniques - Hand tools, Power tools, Welding and cutting, Formwork. Fire precautions - Basic combustion chemistry, The combustion process, Classification of fires, Ignition sources and their control, Protection against fire, Extinction, Firefighting, Fire risk, Means of escape in case of fire, Legal requirements, Liaison with the fire department. Risk management on construction sites - Understand, recognize, identify and assess the various risks encountered on a construction project. Apply risk management techniques. Match risk management techniques to projects. Develop integrated risk and value management systems; Implement risk allocation throughout all phases of a construction project.
Assessment:	Compulsory formative (60%) and summative (40%) assessments.

CONSTRUCTION SITE MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of this subject to equip the students with the skill and knowledge to manage the staff and activities on a construction site to a successful conclusion in accordance with time schedule, quality standards, and within budget. Assembling and developing the site team - Developing and maintaining good occupational working relationships, Establishing, implementing and maintaining systems for managing health, safety and welfare. Evaluating and selecting work methods to meet project or operational requirements, Monitoring construction-related project activities, Controlling project progress against agreed quality standards and programmes, Establishing, controlling and monitoring environmental factors and sustainability. Planning the preparation of the site for the project or operation, Ensuring that work activities and resources meet project work requirements, Identifying, allocating and planning the deployment and use of plant, equipment or machinery. Organising controlling and monitoring - Organising, controlling and monitoring supplies of materials, Establishing and monitoring communication systems and organisational procedures, Establishing project dimensional control criteria, Controlling project quantities and costs, Project conclusion and maintenance planning - Providing and monitoring construction-related customer service, Managing the handover of the construction project, Planning and scheduling the maintenance or remedial activities of property, systems or services, Planning historical conservation/restoration activities, Planning demolition activities.
Assessment:	Compulsory formative (60%) and summative (40%) assessments.

CONTRACT PLANNING & COST CONTROL MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The purpose of this subject is to equip the students with knowledge on the basics of the economy, with specific reference to its influence on property values, to familiarise them with the state of the property industry and to educate them in the principles and techniques of various valuation methods. Contract planning and control. The concept of planning: Bar charts, The critical path method, Resource management, Overlapping network models, Project control, Work study, Risk and scheduling, The program evaluation and review technique (pert), CCS, Pre-contract cost management, Contractor's estimating and tendering, Post-contract cost management, Contractors' cost-control and monitoring procedures. Change management – valuing variations. Claims management, Procurement strategies, Payment systems and contract administration. Key tools and techniques. Value management, Risk management (RM), Whole-life costing. Quantity Surveying Office practice. Construction Quantity Surveyor, Professional Quantity Surveyor – Consultancy.
Assessment:	Compulsory formative and summative assessments

FACILITY MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of the subject is to equip the students with specialised knowledge of facilities management processes and procedures to enable them to management various building facilities. Introduction to FM - Development of facility management globally, similarly for South Africa, and the current situation; the role and responsibilities of a facility manager, scope of FM (FM services). Leadership and management (professional practice) - Organisational structure of FM departments (organising the department), FM leadership, service delivery strategies for FM (planning, application and evaluation), service level agreement, strategic and tactical (operational) planning/management, space/workplace planning, allocation and management, change management. Overview of real estate management, process and financing, lease administration, disposing of property - both rented and owned, manage the real estate portfolio. Performance (building/facility) measurements and audits/survey techniques, best practice (benchmarking). Financial obligation and analysis, budget formulation and execution. Life cycle costing. Energy use and efficiency, green principles, sustainable (environmental) management and construction. Information technology system in FM - FM technology systems and technology trend (BMS, BIM), computer aided facility maintenance and operation systems. Human and environmental factors.
Assessment:	Compulsory formative and summative assessments

GREEN BUILDING TECHNOLOGY

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of the subject is to equip the students with advance knowledge and skills to apply the principles of green and sustainable technologies, renewable systems operations, planning for green building system. Principles of green and sustainable technologies - Basic principles of green building, clean and sustainable technology as they relate to the built environment; Working knowledge of the Leadership in Energy and Environmental Design (LEED) green building rating system; South African Green Building Council. Renewable systems operations. Planning for green building systems. Green plumbing systems. Renewable energy systems. Diverse methods of alternative electrical energy production. Energy management. Electrical systems - Commercial power, lighting distribution circuitry, HVAC controls and maintenance. Control circuitry utilized in HVAC equipment lighting systems and an overview of building automation systems and security systems utilized in many of today's facilities. Green HVAC & Plumbing - Concepts of water conservation methods
Assessment:	Compulsory formative (60%) and summative (40%) assessments.

MAINTENANCE MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of the subject is to equip the students with knowledge and skills in maintenance management in relation to the function of maintenance managers, the effect of design on building maintenance, categories of building maintenance, planning maintenance, financial maintenance, pricing of maintenance work, and supervision of maintenance works. Introduction to building maintenance - Function of the maintenance manager, review the development, necessity of maintenance management, cost saving effect of maintenance. The effect of design on building maintenance - The impact of design on the lifespan of the structure, its components, cost implications on future maintenance. Categories of building maintenance - Different categories of building maintenance, and their impact on maintenance planning. Planning maintenance - Lifecycles of the different components in a building, and the methods most suitable to execute that maintenance. Financing Maintenance - Budgetary methods commonly used for maintenance, the prioritization of maintenance work. Pricing of Maintenance Work - Importance of specifications and the drafting thereof, procurement methods, the impact of planning on the pricing of maintenance work. Execution and Supervision of Maintenance Work - Diversity of maintenance needs related to the functionality of buildings, and different methods of procurement, procurement choice (appraisal).

Assessment:	Both compulsory summative and formative assessments. An assignment in the form of a maintenance assessment report of an existing building.

PROPERTY ECONOMICS & VALUATIONS

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The purpose of this subject is to introduce the students to the basics of the economy, with specific reference to its influence on property values, to familiarise them with the state of the property industry and to educate them in the principles and techniques of various valuation methods. Introduction to economics studies. Macro and Micro Economics. Property economics. Real Estate Economics. The Property Industry. Property Rights Including Servitudes. Zoning and Town Planning Concepts. Potential and its Influence on Value. Highest and Best Use of a Property. Different Methods of Property Valuation to Best Suit a Particular Property Type. Market research to identify comparable sales for a residential valuation as per the Comparable Sales Method. Preparation and writing of a comprehensive valuation report with applicable annexure. The Residual Method for township development. The valuation of income-producing properties by means of the Income-capitalization Method. Lease agreements and its influence on property value. Capitalization rates and its relationship to risk and value. Replacement Cost Method. Valuation for insurance purposes - different types of replacement costs. Depreciated Replacement Cost – valuation of specialized properties. Writing of a comprehensive valuation report.
Assessment:	Both compulsory summative and formative assessments

PROPERTY LAW

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The course aims to develop an understanding of property law and procedures which are applicable for facility managers within construction industry. History of the South African Law. The meaning and function of law and legal rules; the main divisions of the law; the structure of the courts, officers of the courts and different court procedures; sources of South African law; basic concepts of Private Law; South Africa's Constitution; the Bill of Rights and Land Use. General principles of the law of contract; specific or applied contracts: sale and lease; forms of security: contractual and property rights; insolvency, lease agreements, statutory control, sectional title, share block, housing development. Valuation of land and buildings. Malafides of valuation court; what constitutes immovable property; method of valuation; separate valuations of land and buildings; valuation of an interest in land; restrictive conditions effect on value. Immovable property. The meaning of immovable property, interest in immovable property, the capacity to acquire rights over land in South Africa, forms of land tenure, joint ownership, servitudes, real security, survey of land, commercial associations. Environmental legislation. The Expropriation Act; the impact of the environmental clause and environmental legislation on land use; sectional title and share block schemes.
Assessment:	Both compulsory summative and formative assessments

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	This aim of this subject will provide the knowledge needed to understand and apply the process of research to construction related problems or questions. Define a research problem within the Built Environment field. Develop hypotheses which can be tested within a research project. Formulate Objectives to their research which are achievable within a given time period. Develop background literature to the identified research problem sourced from academic resources. Accurately reference work using the Harvard method in the literature review. Understand diverse methodological approaches to a research problem. Motivate the approach selected for a research study. Develop a research instrument based on methodology. Identify the most suitable means to collect data and sampling for a study. Use statistical means to analyse data collected. Draw inferences from data analysed and make conclusions in relation to background literature collected. Present a Research Thesis in the correct format and at an acceptable academic

	level. Verbally motivate selection of problem area, survey methods and data collection as well as justify inferences and conclusions made.
Assessment:	Oral presentation of the Research Outcome.

STRATEGIC RISK MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of this subject to equip students with knowledge of the concepts, methods, techniques and skills required to systematically manage risks in the project. An introduction to the concept of risk from construction, key issues and why risk needs to be managed - A systematic approach to risk management, Source of risk, Identification of risk, Risk assessment, The measurement of risk, Hazard and risk. Opportunities, risk and value, Ownership of risk, True cost of risk. The many positive effects on both the project and the business, extending beyond cost and finance. An introduction to the basic techniques of risk management. Tools for the identification of risks in a systematic risk management process. Options in responding to risk. An overview of the skills and qualities that make an effective risk management team, and the key role of an impartial facilitator.
Assessment:	Both formative (60%) and summative (40%) assessments. Tests assignments, and tutorials. All assessments are compulsory.

SUPPLY CHAIN MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	The aim of the subject is to equip the advanced diploma graduate with knowledge and skills to understand the key issues in supply chain disciplines, supply chain strategies, green supply chain and creating a framework to assist with future conceptual strategic thinking. Introduction to supply chain management. Holistic view of supply chain, key supply chain disciplines in detail, supply chain in context. Production planning and control. Supply chain strategies, strategic management of construction procurement, planning, Sourcing and order management, and innovation in construction supply chain management. IT applications in supply chain. Overview of supply chain and information technology in construction, benefits of using E-markets place in construction. Risk management. Conceptual strategic thinking, green supply chain.
Assessment:	Both formative (60%) and summative (40%) assessments. All assessments are compulsory.

SUSTAINABILITY & ENVIRONMENTAL MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Multi-modal method of curriculum delivery involving online and face to face lectures.
Subject outline:	Sustainable development approaches; Sustainability design and innovation; Technology for sustainable development; Sustainable construction site; Project conclusion and maintenance planning. The environment - issues, international law and management; Environmental management systems; Environmental Management Programs; Operational Control.
Assessment:	Compulsory formative (60%) and summative (40%) assessments.

DEPARTMENT OFFICE-BEARERS

POSITION	NAME	TELEPHONE	E-MAIL
Head of Department	Dr ML Adonis, DTech (Electrical)	021 959 6859	AdonisMA@cput.ac.za
Secretary	Ms J Rogers	021 959 4370	RogersJ@cput.ac.za
Administration	Ms D de Jongh	021 959 6246	deJonghD@cput.ac.za
	Ms Z Tom	021 959 6859	TomZ@cput.ac.za
	Ms K Soyizwaphi	021 959 6859	SoyizwaphiK@cput.ac.za
Head of Programme: Undergraduate	Dr ZT Nkosi	021 959 6859	NkoziZ@cput.ac.za
Head of Programme: Postgraduate	Dr A Raji	021 959 6246	RajiA@cput.ac.za
ECP Co-ordinator	Ms N Tshemese-Mvandaba	021 959 4360	TshemeseN@cput.ac.za

DEPARTMENTAL STAFF

POSITION	NAME	QUALIFICATIONS
Professor	Prof MTE Kahn	BSc (Electrical), DTech (Electrical)
Associate Professor	AProf WLO Fritz	DTech (Eng), PrEng
Associate Professor	AProf RR van Zyl	PhD (Electronic Engineering)
Adjunct Professor	Prof PA Apostolov	PhD (Electrical)
Adjunct Professor	Prof S Bernard	DPhil
Adjunct Professor	Prof PJ Cilliers	PhD (Electrical)
Adjunct Professor	Prof PA Petev	PhD (Electrical)
Senior Lecturer	Dr KM Aboalez	PhD (Electrical)
Senior Lecturer	Dr V Balyan	PhD (Electronics & Communication)
Senior Lecturer	Mr S Behardien	BSc (Eng)
Senior Lecturer	Dr K Govender	MSc (Eng), PhD (Physics)
Senior Lecturer	Mr DC Kallis	NHD (Light Current)
Senior Lecturer	Dr C Kriger	DEng (Electrical)
Senior Lecturer	Dr S Krishnamurthy	MEng (Power Systems), DTech (Electrical), PrEng
Senior Lecturer	Dr WC Kukard	BEng (Electrical), MEng (Electrical), PhD
Senior Lecturer	Dr P Lazanas	PhD (Electrical), PrTechEng
Senior Lecturer	Dr L Mwansa	PhD (Computer Science & Engineering), PMSA
Senior Lecturer	Dr ZT Nkosi	PhD (Engineering Mathematics), HDE, FSAMS
Senior Lecturer	Dr AK Raji	BSc (Electrical), DTech (Electrical)
Senior Lecturer	Mr M Sitshinga	MBA, MTech (Entrepreneurship), MDipTech, PrTechEng
Senior Lecturer	Dr PG Wiid	PhD (Electronic Engineering)
Lecturer	Mr LG Abrahams	MDipTech (Electrical)

POSITION	NAME	QUALIFICATIONS
Lecturer	Dr AMA Almaktoof	DTech (Electrical)
Lecturer	Dr QJ Bart	MTech (Electrical), DEng (Electrical)
Lecturer	Dr AD Brandt	MSc (Electrical), PhD (Computers)
Lecturer	Mrs L Boshoff	MSc (Applied Mathematics)
Lecturer	Mr AJ Bredekamp	MTech (Electrical), MCSE
Lecturer	Mr T du Bruyn	NHD, Diploma in Education, MTech (Electrical)
Lecturer	Mr DJ Callaghan	MTech (Electrical)
Lecturer	Dr C Ekron	PhD, M Drama, BDram, BMus (Ediocationis)
Lecturer	Mr A Fish	Higher Diploma in Education, Teachers Higher Bilingual Cert, BSc (Electrical)
Lecturer	Dr MS Jacobs	PhD (Mathematics Education)
Lecturer	Dr AI Mabuda	PhD (Physics)
Lecturer	Mr AHM Meru	HED, MTech (Electrical)
Lecturer	Dr MES Mnguni	MTech (Electrical), DEng (Electrical)
Lecturer	Mr PF Mostert	MDipTech (Electrical)
Lecturer	Mr V Moyo	BSc (Hons) (Computer Science), MBA, MSc (Electrical)
Lecturer	Mr RA Pentz	MTech (Electrical)
Lecturer	Mr M Ratshitanga	MEng (Electrical), PrTechEng
Lecturer	Mr I Robertson	BTech (Electrical)
Lecturer	Ms N Tshemese-Mvandaba	MTech (Electrical)
Lecturer	Mr J Wheeler	MSc (Engineering)
Junior Lecturer	Mr L Khetla	ND (Electrical), BTech (Electrical), HDHET
Junior Lecturer	Mr PR Tjale	NHD (Electrical), BCom

F'SATI: Satellite Systems Engineering staff		
Chief Engineer	Mr DF Visser	MSc (Electronic Engineering)
Senior Engineer	Mr CR Jooste	MTech, MSc (Electrical)
Senior Engineer	Mr N Royi	MTech (Electrical), MSc (Electrical)
Senior Engineer	Mr LD Steenkamp	MTech, MSc (Electrical)
Mission Engineer	Mr S Magina	MEng (Electrical)
Mission Engineer	Mr K Mtshemla	MEng (Electrical)
Mission Engineer	Mr M Roman	MTech, MSc (Electrical)
Development Engineer	Mr C Cogan	MTech (Electrical)
Development Engineer	Mr S Cupido	MTech (Electrical)
Development Engineer	Mr EW Louw	MTech (Electrical)
AIT Support	Ms L Leopold	BTech (Electrical)
Engineer-in-Training	Mr S Martin	BTech (Mechanical)

POSITION	NAME	QUALIFICATIONS
DEECE: Technical Support Staff		
Senior Technician	Mr K Mohamed	ND (Electrical)
Senior Technician	Mr G Rose	BTech (Electrical), MTech (Electrical)
Senior Technician	Mr C Wills	BTech (Electrical)
Technician	Mr K Jooste	BTech (Electrical), MEng (Electrical)
Technician	Mr L Mkosana	BTech (Electrical)
Technician	Mr P Msiza	BTech (Electrical)
Technician	Mr M E Sulaiman	ND (Electrical)
Technician	Mr B H Weimann	BTech (Electrical)
Technician	Mr BC Williams	BTech (Electrical)
Research Administrative Staff	Ms PF Panda	BTech (Quality)
Research Administrative Staff	Mr WA van Zyl	BA, HonsBMus, MMus

QUALIFICATIONS OFFERED

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration
Diploma in Engineering Technology in Electrical Engineering	D2ETEE	2 years	4 years
Diploma in Engineering Technology in Electrical Engineering (Extended)	D2ETEX	4 years	6 years
Diploma in Engineering Technology in Computer Engineering	D2ENCE	2 years	4 years
Bachelor of Engineering Technology in Electrical Engineering	BPETEE	3 years	6 years
Bachelor of Engineering Technology in Computer Engineering	BPETCP	3 years	6 years
Master of Engineering in Electrical Engineering (Full Thesis)	MGELER	1 Year full-time 2 Years part-time	3 Years full-time 4 Years part-time
Master of Engineering in Electrical Engineering in Smart Grid (Coursework)	MGESGC	1 Year full-time 2 Years part-time	3 Years full-time 4 Years part-time
Master of Engineering in Energy (Coursework)	MGENRC	1 Year full-time 2 Years part-time	3 Years full-time 4 Years part-time
Master of Engineering in Satellite Systems & Applications (Coursework)	MGENSC	1 Year full-time 2 Years part-time	3 Years full-time 4 Years part-time
Doctor of Engineering in Electrical Engineering	DGELER	2 Years full-time 4 Years part-time	4 Years full-time 6 Years part-time

DIPLOMA IN ENGINEERING TECHNOLOGY IN ELECTRICAL ENGINEERING (D2ETEE)

COURSE AIM

This qualification has been designed in accordance with the revised HEQSF (2013), the Engineering Council of South Africa's requirements, and the current Electrical Engineering industry requirements. Completion of the Diploma in Engineering Technology (280 credits) will allow a learner to register as a candidate or professional Technician with the Engineering Council of South Africa. The qualification also serves to provide students with the knowledge, cognitive and conceptual tools and practical skills for further higher education in Electrical Engineering. The qualification title of Diploma in Engineering Technology in Electrical Engineering is aligned to the nomenclature approved by ECSA for 280 credit diploma qualifications.

The engineering industry contributes to the technical, social, economic and environmental infrastructure of the country, leading to socio-economic growth. These qualifications are intended for technician and technologist level employment in industry. The framework of engineering qualifications develops the human resources essential for sustaining this profession.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Professional Electrical Engineering Technicians are characterized by the ability to apply proven, commonly understood techniques, procedures, practices and codes to solve *well-defined electrical* engineering problems. They manage and supervise electrical engineering operations, construction and activities. They work independently and responsibly within an allocated area or under guidance.

Professional Electrical Engineering Technicians must therefore have a working understanding of engineering sciences underlying the techniques used, together with financial, commercial, legal, socio-economic, health, safety and environmental methodologies, procedures and best practices.

The process of professional development of a Professional Electrical Engineering Technician starts with the attainment of an accredited RSA qualification or combination of substantially equivalent qualification (s) that meets this standard. After graduation a programme of training and experience is completed to attain the competencies for registration in the category Professional Engineering Technician. **ECSA Qualification Standard for Diploma in Engineering Technology E-08-PN Rev 1 (Published 14 March 2013)**

CAREER OPPORTUNITIES

This qualification is designed to build the necessary knowledge, understanding, abilities and skills required to become a competent practicing Electrical Engineering Technician. This qualification provides:

1. Preparation for careers in electrical engineering by achieving technical proficiency which will make a contribution to the economy and national development;
2. The educational base required for registration as a Professional Engineering Technician with ECSA.
3. Entry to NQF level 7 programmes e.g. Bachelor of Engineering Technology in Electrical Engineering.

Electrical engineering students completing this qualification will have demonstrated competence in all the exit level outcomes at HEQSF level 6 contained in the ECSA E-08-PN standard for solving well defined electrical engineering problems:

- Problem Solving
- Application of Scientific and Engineering Knowledge
- Engineering Design
- Investigation
- Use of engineering methods and tools
- Professional and Technical Communication
- Impact of Engineering Activity
- Individual and Teamwork
- Independent Learning
- Engineering Professionalism

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or ELECT 4 (50%) or TS 5 (60%)	Recommended: One of the following: CAT (4), IT (4), ELECT (4)	M (N4) 60% ES (N4) 60% Electrotechnics (N4) 60% Digital Electronics (N4) 60%	E (5) (60%), M (5) (60%) At least 3 of the following: ES (3) with 60%, Electrical Principles and Practice (3) with 60%, Electronic Control and Digital Electronics (3) with 60%, Electrical Workmanship (3) with 60%

Legend:

M (Maths)
ML (Mathematical Literacy)
TM (Technical Maths)
ES (Engineering Science)
PS (Physical Science)
TS (Technical Science)
ELECT (Electrical Technology)

PROFESSIONAL REGISTRATION

The Diploma in Engineering Technology in Electrical Engineering is registered with the South African Qualifications Authority (Registration No: 111392) and accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.

EXPERIENTIAL LEARNING

This qualification does not include experiential learning or work placement. All practical work is included in each engineering subject and forms a compulsory and integral part of the subject.

DURATION

Full time: 2 years

VENUE

Bellville

DIPLOMA IN ENGINEERING TECHNOLOGY IN ELECTRICAL ENGINEERING (D2ETEE)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (All subjects compulsory)									
Electrical Engineering 1	ELE152S	01	Y	5	C	--	28	0.200	CE
Electronics 1	ELC152S	01	Y	5	C	--	28	0.200	CE
Engineering Communication 1	COM155S	01	Y	5	C	--	14	0.100	CE
Engineering Mathematics 1	EMA155S	01	Y	5	C	--	28	0.200	CE
Engineering Physics 1	EPH151S	01	Y	5	C	--	28	0.200	CE
Engineering Skills 1	EES150S	01	Y	5	C	--	14	0.100	CE
2nd Year. (All subjects compulsory) **Students must pass ALL 1ST year subjects before being allowed to register for 2nd year subjects**									
Communication Systems 2	COM261S	01	Y	6	C	EMA155S	28	0.200	CE
Engineering Design 2	EDE260S	01	Y	6	C	EES150S, (Co-PSC261S, POS260S)	14	0.100	PR
Engineering Mathematics 2	EMA263S	01	Y	6	C	EMA155S	14	0.100	CE
Microprocessors 2	MCP261S	01	Y	6	C	ELC152S	14	0.100	CE
Power Systems 2	POS260S	01	Y	6	C	ELE152S, EPH151S	28	0.200	CE
Process Control 2	PSC261S	01	Y	6	C	ELT152S, ELE152S	28	0.200	CE
Software Development 2	SFD261S	01	Y	6	C	--	14	0.100	CE

DIPLOMA IN ENGINEERING TECHNOLOGY IN ELECTRICAL ENGINEERING (EXTENDED) (D2ETEX)

COURSE AIM

In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two-year Foundational Programme, students will integrate with the normal programme.

DURATION

Full time: 3 years

DIPLOMA IN ENGINEERING TECHNOLOGY IN ELECTRICAL ENGINEERING (EXTENDED) (D2ETEE)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Year 0 (All subjects compulsory)									
Engineering Communication 1	COM155X	01	Y	5	C	--	14	0.100	CE
Engineering Mathematics 1	EMA154X	01	Y	5	C	--	28	0.200	CE
Engineering Physics 1	EPH151X	01	Y	5	C	--	28	0.200	CE

Year 1 will only be offered from 2022

DIPLOMA IN ENGINEERING TECHNOLOGY IN COMPUTER ENGINEERING (D2ENCE)

COURSE AIM

This qualification has been designed in accordance with the revised HEQSF (2013), the Engineering Council of South Africa's requirements, and the current Electrical Engineering industry requirements. Completion of the Diploma in Engineering Technology (280 credits) will allow a learner to register as a candidate or professional Technician with the Engineering Council of South Africa. The qualification also serves to provide students with the knowledge, cognitive and conceptual tools and practical skills for further higher education in Electrical Engineering. The qualification title of Diploma in Engineering Technology in Electrical Engineering is aligned to the nomenclature approved by ECSA for 280 credit diploma qualifications.

The engineering industry contributes to the technical, social, economic and environmental infrastructure of the country, leading to socio-economic growth. These qualifications are intended for technician and technologist level employment in industry. The framework of engineering qualifications develops the human resources essential for sustaining this profession.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Professional Electrical Engineering Technicians are characterized by the ability to apply proven, commonly understood techniques, procedures, practices and codes to solve *well-defined electrical* engineering problems. They manage and supervise electrical engineering operations, construction and activities. They work independently and responsibly within an allocated area or under guidance.

Professional Electrical Engineering Technicians must therefore have a working understanding of engineering sciences underlying the techniques used, together with financial, commercial, legal, socio-economic, health, safety and environmental methodologies, procedures and best practices.

The process of professional development of a Professional Electrical Engineering Technician starts with the attainment of an accredited RSA qualification or combination of substantially equivalent qualification(s) that meets this standard. After graduation a programme of training and experience is completed to attain the competencies for registration in the category Professional Engineering Technician. **ECSA Qualification Standard for Diploma in Engineering Technology E-08-PN Rev 1 (Published 14 March 2013)**

CAREER OPPORTUNITIES

This qualification is designed to build the necessary knowledge, understanding, abilities and skills required to become a competent practicing Computer Engineering Technician. This qualification provides:

1. Preparation for careers in computer engineering by achieving technical proficiency which will make a contribution to the economy and national development;
2. The educational base required for registration as a Professional Engineering Technician with ECSA.
3. Entry to NQF level 7 programmes e.g. Bachelor of Engineering Technology in Computer Engineering.

Computer engineering students completing this qualification will have demonstrated competence in all the exit level outcomes at HEQSF level 6 contained in the ECSA E-08-PN standard for solving well defined computer engineering problems:

- Problem Solving
- Application of Scientific and Engineering Knowledge
- Engineering Design
- Investigation
- Use of engineering methods and tools
- Professional and Technical Communication
- Impact of Engineering Activity
- Individual and Teamwork
- Independent Learning
- Engineering Professionalism

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or ELECT 4 (50%) or TS 5 (60%)	Recommended: One of the following: CAT (4), IT (4), ELECT (4)	M (N4) 60% ES (N4) 60% Electrotechnics (N4) 60% Digital Electronics (N4) 60%	E (5) (60%), M (5) (60%) At least 3 of the following: ES (3) with 60%, Electrical Principles and Practice (3) with 60%, Electronic Control and Digital Electronics (3) with 60%, Electrical Workmanship (3) with 60%

Legend:

M (Maths)	ES (Engineering Science)	ELECT (Electrical Technology)
ML (Mathematical Literacy)	PS (Physical Science)	
TM (Technical Maths)	TS (Technical Science)	

PROFESSIONAL REGISTRATION

The Diploma in Engineering Technology in Computer Engineering is registered with the South African Qualifications Authority (Registration No: 101914) and accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.

EXPERIENTIAL LEARNING

This qualification does not include experiential learning or work placement. All practical work is included in each engineering subject and forms a compulsory and integral part of the subject.

DURATION

Full time: 2 years

VENUE

Bellville

DIPLOMA IN ENGINEERING TECHNOLOGY IN COMPUTER ENGINEERING (D2ENCE)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (All subjects compulsory)									
Computer Engineering Skills 1	CES150S	01	Y	5	C	--	14	0.100	CE
Electrical Engineering Principles 1	ELE150S	01	Y	5	C	--	28	0.200	CE
Electronics 1	ELC150S	01	Y	5	C	--	28	0.200	CE
Engineering Communication 1	COM152S	01	Y	5	C	--	14	0.100	CE
Engineering Mathematics 1	EMA151S	01	Y	5	C	--	28	0.200	CE
Engineering Physics 1	EPH150S	01	S1	5	C	--	14	0.100	CE
Software Development 1	SFD150S	01	S2	5	C	--	14	0.100	CE
2nd Year. (All subjects compulsory) **Students must pass ALL 1ST year subjects before being allowed to register for 2nd year subjects**									
Digital Communication 2	COM260S	01	Y	6	C	--	28	0.200	CE
Engineering Mathematics 2	EMA260S	01	Y	6	C	EMA151S	14	0.100	CE
Engineering Physics 2	EPH260S	01	Y	6	C	EPH150S	14	0.100	CE
Microprocessors 2	MCP260S	01	Y	6	C	ELC150S	14	0.100	CE
Process Control 2	PSC260S	01	Y	6	C	ELC150S, EMA151S	28	0.200	CE
Software Development 2	SFD260S	01	Y	6	C	SFD150S	28	0.200	CE
Systems Analysis 2	SSA260S	01	Y	6	C	COM152S	14	0.100	CE

BACHELOR OF ENGINEERING TECHNOLOGY IN ELECTRICAL ENGINEERING (BPETEE)

COURSE AIM

The aim of this course is to prepare candidates in electrical engineering for careers in engineering itself and areas that potentially benefit from engineering skills, for achieving technological proficiency and to make a contribution to the economy and national development.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is primarily industry oriented. The knowledge emphasises general principles and application or technology transfer. The qualification provides students with a sound knowledge base in a particular field or discipline and the ability to apply their knowledge and skills to particular career or professional contexts, while equipping them to undertake more specialised and intensive learning. Programmes leading to this qualification tend to have a strong professional or career focus and holders of this qualification are normally prepared to enter a specific niche in the labour market.

CAREER OPPORTUNITIES

This qualification provides:

1. Preparation for careers in engineering itself and areas that potentially benefit from engineering skills, for achieving technological proficiency and to contribute to the economy and national development;
2. The educational base required for registration as a Professional Engineering Technologist and/or Certificated Engineer with ECSA. (refer to qualification rules)
3. Entry to NQF level 8 programmes e.g., Honours, Post Graduate Diploma and BEng Programmes and then to proceed to Masters Programmes.
4. For certificated engineers, this provides the education base for achieving proficiency in mining / factory plant and marine operations and occupational health and safety.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 36 using Method 2 E (First language) 5 (60%) M 5 (60%) or TM 5 (60%) PS 5 (60%) or ELECT 5 (60%) or TS 5 (60%)	Recommended: One of the following: CAT (5), IT (5), ELECT (5)	M (N4) 60% ES (N4) 60% Electrotechnics (N4) 60% Digital Electronics (N4) 60%	E (5) (60%), M (5) (60%) At least 3 of the following: ES (3) with 60%, Electrical Principles and Practice (3) with 60%, Electronic Control and Digital Electronics (3) with 60%, Electrical Workmanship (3) with 60%

Legend:

M (Maths)
ML (Mathematical Literacy)
TM (Technical Maths)
ES (Engineering Science)
PS (Physical Science)
TS (Technical Science)
ELECT (Electrical Technology

PROFESSIONAL REGISTRATION

Candidates who successfully complete this qualification are eligible to apply to ECSA to register as a candidate Professional engineering technologist and on completion of the practical requirements can apply for registration as a Professional Engineering Technologist.

Policy on Registration in Professional Categories R-01-POL-PC REVISION No. 3: 20 August 2020

EXPERIENTIAL LEARNING

This qualification does not include experiential learning or work placement. All practical work is included in each engineering subject and forms a compulsory and integral part of the subject.

DURATION

Full time: 3 years

VENUE

Bellville

BACHELOR OF ENGINEERING TECHNOLOGY IN ELECTRICAL ENGINEERING (BPETEE)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (All subjects compulsory)									
Electrical Engineering 1	ELE151S	01	Y	5	C	--	28	0.200	CE
Electronics 1	ELC151S	01	Y	5	C	--	28	0.200	CE
Engineering Mathematics 1	EMA157S	01	Y	5	C	--	28	0.200	CE
Engineering Skills 1	ESK150S	01	Y	5	C	--	28	0.200	CE
Physics 1	PHY156S	01	Y	5	C	--	28	0.200	CE
2nd Year. (All subjects compulsory) **Students must pass ALL 1st year subjects before being allowed to register for 2nd year subjects**									
Digital Systems 2	DIG260S	01	Y	6	C	--	28	0.200	CE
Software Engineering 2	SEG260S	01	Y	6	C	ELE151S	28	0.200	CE
Data Networks 2	DNT260S	01	S1	6	C	EMA157S	14	0.100	CE
Engineering Communication 1	COM250S	01	S1	5	C	--	14	0.100	CE
Engineering Mathematics 2	EMA261S	01	S1	6	C	EMA157S	14	0.100	CE
Engineering Ethics 1	EET250S	01	S2	5	C	--	14	0.100	CE
Power Electronics 2	POW260S	01	S2	6	C	ELC151S	14	0.100	CE
Signal Processing 2	SIP260S	01	S2	6	C	EMA157S	14	0.100	CE
3rd Year. (All subjects compulsory) **Students must pass ALL 2nd year subjects before being allowed to register for 3rd year subjects**									
Control Systems 3	CSS370S	01	Y	7	C	EMA261S	28	0.200	CE
Electrical Machines 3	ELM370S	01	Y	7	C	PHY156S	28	0.200	CE
Electronic Communications 3	COM371S	01	Y	7	C	EMA261S, SIP260S	28	0.200	CE
Industrial Design Project 3	DES370S	01	Y	7	C	COM250S, EKS150S	28	0.200	CE
Power Systems 3	POW370S	01	Y	7	C	PHY156S, ELE151S	28	0.200	CE

BACHELOR OF ENGINEERING TECHNOLOGY IN COMPUTER ENGINEERING (BPETCP)

COURSE AIM

The aim of this course is to prepare candidates in computer engineering for careers in computer engineering itself and areas that potentially benefit from computer engineering skills, for achieving technological proficiency and to make a contribution to the economy and national development.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is primarily industry oriented. The knowledge emphasises general principles and application or technology transfer. The qualification provides students with a sound knowledge base in a particular field or discipline and the ability to apply their knowledge and skills to particular career or professional contexts, while equipping them to undertake more specialised and intensive learning. Programmes leading to this qualification tend to have a strong professional or career focus and holders of this qualification are normally prepared to enter a specific niche in the labour market.

CAREER OPPORTUNITIES

This qualification provides:

1. Preparation for careers in engineering itself and areas that potentially benefit from engineering skills, for achieving technological proficiency and to contribute to the economy and national development;
2. The educational base required for registration as a Professional Engineering Technologist and/or Certificated Engineer with ECSA. (refer to qualification rules)
3. Entry to NQF level 8 programmes e.g., Honours, Post Graduate Diploma and BEng Programmes and then to proceed to Masters Programmes.
4. For certificated engineers, this provides the education base for achieving proficiency in mining / factory plant and marine operations and occupational health and safety.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 36 using Method 2 E (First language) 5 (60%) M 5 (60%) or TM 5 (60%) PS 5 (60%) or ELECT 5 (60%) or TS 5 (60%)	Recommended: One of the following: CAT (5), IT (5), ELECT (5)	M (N4) 60% ES (N4) 60% Electrotechnics (N4) 60% Digital Electronics (N4) 60%	E (5) (60%), M (5) (60%) At least 3 of the following: ES (3) with 60%, Electrical Principles and Practice (3) with 60%, Electronic Control and Digital Electronics (3) with 60%, Electrical Workmanship (3) with 60%

Legend:

M (Maths)
ML (Mathematical Literacy)
TM (Technical Maths)
ES (Engineering Science)
PS (Physical Science)
TS (Technical Science)
ELECT (Electrical Technology)

PROFESSIONAL REGISTRATION

Candidates who successfully complete this qualification are eligible to apply to ECSA to register as a candidate Professional engineering technologist and on completion of the practical requirements can apply for registration as a Professional Engineering Technologist.

Policy on Registration in Professional Categories R-01-POL-PC REVISION No. 3: 20 August 2020

EXPERIENTIAL LEARNING

This qualification does not include experiential learning or work placement. All practical work is included in each engineering subject and forms a compulsory and integral part of the subject.

DURATION

Full time: 3 years

VENUE

Bellville

BACHELOR OF ENGINEERING TECHNOLOGY IN COMPUTER ENGINEERING (BPETCP)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (All subjects compulsory)									
Computer Architecture 1	CAR150S	01	S2	5	C	--	14	0.100	CE
Electrical Engineering Principles 1	EEP150S	01	S1	5	C	--	14	0.100	CE
Electronics 1	ELC153S	01	Y	5	C	--	28	0.200	CE
Engineering Mathematics 1	EMA156S	01	Y	5	C	--	28	0.200	CE
Physics 1	PHY157S	01	Y	5	C	--	28	0.200	CE
Software Design 1	SDN150S	01	Y	5	C	--	28	0.200	CE
2nd Year. (All subjects compulsory)									
Computer Graphics 2	CGD260S	01	S1	6	C	CAR150S	14	0.100	CE
Digital Systems 2	DIG261S	01	Y	6	C	--	28	0.200	CE
Engineering Communication 1	COM251S	01	S1	5	C	--	14	0.100	CE
Engineering Ethics 1	EET251S	01	S2	5	C	--	14	0.100	CE
Engineering Mathematics 2	EMA265S	01	S1	6	C	EMA156S	14	0.100	CE
Operating Systems 2	OPS260S	01	Y	6	C	CAR150S	28	0.200	CE
Signal Processing 2	SIP261S	01	S2	6	C	EMA156S	14	0.100	CE
Software Design 2	SDN260S	01	S2	6	C	SDN150S	14	0.100	CE
3rd Year. (All subjects compulsory)									
Database Systems 3	DSS370S	01	Y	7	C	SDN260S	28	0.200	CE
Electronic Communications 3	COM372S	01	Y	7	C	EMA265S, SIP261S	28	0.200	CE
Embedded Systems 3	ESS370S	01	Y	7	C	COM251S, DIG261S, SDN150S, OPS260S	28	0.200	CE
Industrial Computing Design Project 3	DES371S	01	Y	7	C	(Co-DSS370S, ESS370S, NSS370S)	28	0.200	CE
Network Systems 3	NSS370S	01	Y	7	C	OPS260S	28	0.200	CE

MASTER OF ENGINEERING IN ELECTRICAL ENGINEERING (MGELER)

COURSE AIM

The course equips students with the necessary knowledge and skills to conduct independent research in (Electrical) and to contribute to knowledge production through the understanding, application and evaluation of existing and new knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

A qualifying learner will conduct independent research, under minimum guidance, in a chosen field of (Electrical), and contribute to knowledge production in that field. The research problem, its justification, process and outcome is reported in a dissertation that complies with the generally accepted norms for research at that level.

CAREER OPPORTUNITIES

Graduates may follow a career in research and development in industry, or may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: https://www.cput.ac.za/study/postgraduate-applications

A level 8 qualification with a minimum aggregate of 60% in the following qualifications:

- Postgraduate Diploma in Electrical Engineering;
- Bachelor of Engineering Technology (Honours) in Electrical Engineering
- Professional Bachelor of Engineering in Electrical Engineering; or related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

DURATION

Full-time: Minimum of 1 year / Maximum of 3 years
Part-time: Minimum of 2 years / Maximum of 4 years

VENUE

Bellville

For any queries contact Dr A Raji
Telephone: +27 21 959 6246 / Email: RajiA@cput.ac.za

MASTER OF ENGINEERING IN ELECTRICAL ENGINEERING (MGELER)

Period of Study	Year/Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
6	Y	ELE690R	Research Project and Dissertation	C	--	9	180	1	Full Thesis

MASTER OF ENGINEERING IN ELECTRICAL ENGINEERING IN SMART GRID (MGESGC)

COURSE AIM

This unique Masters in Smart Grid program was developed to address the many challenges facing the legacy and evolving Power System by building systems. This course equips students with the necessary knowledge and skills to conduct independent research in electrical engineering and to contribute to knowledge production through the understanding, application and evaluation of existing and new knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

A qualifying learner will conduct independent research, under minimum guidance, in a chosen field of Electrical Engineering, and contribute to knowledge production in that field. The research problem, its justification, process and outcome are reported in a dissertation, which complies with the generally accepted norms for research at that level.

This qualification is built on the application of the IEC61850 standard in Substation Automation and Smart Grids, which makes CPUT the first institution in the world to offer such specialisation. The qualification programme is unique because it teaches integrated knowledge for IEC61850 standard-based technologies for monitoring, protection, optimisation and control necessary for the building of Smart Grids. The subjects have a strong practical component requiring the real-time implementation of the solutions developed by the students in the research laboratory

The specialist in Smart Grids has to have knowledge of the power systems, control systems, computers systems and communication systems to be capable to work on and lead projects incorporating smart meters, smart appliances, variable renewable energy resources, intelligent power substations, IEC61850 standard-based communication and digital information and control systems.

CAREER OPPORTUNITIES

This will include working at Municipalities, the National power provider, and consulting companies for the efficient, stable and secure operation of the power grid. They could also be the driving force for new technology uptake, application and development, which will create needs and conditions for investments from within South Africa and/or abroad. The postgraduate students from other African countries, whom have graduated, could transfer the technology to their own countries, thus extending the technology uptake, and its application. This will create conditions for South African investments in these countries.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

Admission criteria pertaining to HEQSF qualification types at NQF level 8: Qualifications:

- Bachelor of Science (Honours);
- Bachelor of Engineering (4 year professional degree at NQF level 8);
- Bachelor of Engineering Technology (Honours) at NQF level 8;
- Postgraduate Diploma in a relevant field of Electrical Engineering, Information Technology, and Computer Engineering

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

PROFESSIONAL REGISTRATION

Candidates who successfully complete this qualification are eligible to apply to ECSA to register as a candidate Professional engineering technologist and on completion of the practical requirements can apply for registration as a Professional Engineering Technologist. Policy on Registration in Professional Categories R-01-POL-PC REVISION No. 3: 20 August 2020.

DURATION

Full Time: 1 year / Part Time: 2 years

VENUE

Bellville

For any queries contact Dr Carl Kriger
Telephone: +27 21 959 6246
Email: KrigerC@cput.ac.za

MASTER OF ENGINEERING IN ELECTRICAL ENGINEERING IN SMART GRID (MGESGC)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	SAQA Credits	HEMIS Credit	Assessment Type
6th Year								
Research Project & Report	ESG690C	01/02	Y	9	C	90	0.500	PR
IEC61850 Standard & Cyber Security in Grids	SCG690S	01/02	S1	9	C	15	0.084	CE
Smart Grid & Distributed Energy Resources	SGD690S	01/02	S1	9	C	15	0.084	CE
Research Methodology	RME691S	01/02	S1	9	C	15	0.083	CE
Power Electronics & Control in Smart Grids	PEC690S	01/02	S2	9	C	15	0.083	CE
Smart Grid Protection Automation & Control	SGP690S	01/02	S2	9	C	15	0.083	CE
Choose 1 Elective:								
Control Design & Optimisation in Smart Grids	CDO690S	01/02	S2	9	E	15	0.083	CE
Embedded Systems for Signal Processing	ESS690S	01/02	S2	9	E	15	0.083	CE
Electricity Market in Deregulated Power Grids	EMD690S	01/02	S2	9	E	15	0.083	CE

MASTER OF ENGINEERING IN ENERGY (MGENRC)

COURSE AIM

The Master of Engineering in Energy (MEng. Energy) is an interdisciplinary qualification. The programme incorporates coursework and electives applicable to a wide range of disciplines. This includes Electrical, Electronic and Computer Engineering, Chemical Engineering, Mechanical Engineering and the Built Environment.

The new qualification ensures that the curriculum offered at CPUT can be directly compared to that of other institutions; not only nationally, but also internationally through the benchmarking process that took place during the development of this new qualification.

Graduates develop the knowledge and skills required to conduct independent research in many energy related aspects of engineering and environmental challenges, and to contribute significantly to knowledge production through the understanding, application and evaluation of existing and new knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for engineers that intend working in the broader energy field. Graduates achieving this qualification have the competence to conduct independent research in energy engineering, and contribute significantly to knowledge production through the understanding, application and evaluation of existing knowledge. The research problem, its justification, process and outcome is reported in a thesis, which complies with the generally accepted norms at that level.

For Africa, the transition towards a knowledge economy provides significant opportunities for higher education. Higher education should therefore focus on market-driven demands. Education in engineering will play a key role in building Africa's future technological innovation. This transition, also driven by globalisation, industry and employability, calls for matters such as developing an interdisciplinary approach and the ability to combine theory and practice. As global energy resources come under pressure, engineers are needed that have a broad and expansive awareness of energy related issues such as energy efficiency, energy management, energy policy, energy access, etc. This qualification will aim to address the current shortfall in this arena.

The purpose of this professional Master's Degree in Energy is to educate and train researchers who can contribute to the development of knowledge in Energy Engineering at an advanced level. This qualification is intended to enable graduates to apply integrated technical knowledge; advanced skills and advanced analysis and problem solving to a particular specialisation in the field of Energy, through involvement in an applied research project. The graduates will develop the capacity to conduct research, be able to reflect critically on theory and its application. The qualification provides for the ability to deal with complex issues both systematically and creatively. The graduates will be able to critically appraise research and make sound judgments based on data and available information, and to make their conclusions on their findings. The graduate will be able to continue advancing their knowledge and skills within the profession.

CAREER OPPORTUNITIES

Engineering researchers play an important role in the development of new products, new applications for existing products or raw materials, or cheaper ways of making existing products.

The high-level skills obtained by the graduates of the programme will be directly marketable to the energy industry as well as improving their individual competitiveness. The benefits derived from this qualification are directly applicable to the South African economy and the continent through the energy sector. The energy sector in South Africa and the continent is experiencing a growth phase in many areas. These developments are evident from examples such as the renewable energy sector in the Renewable Energy Independent Power Producer Procurement Programme (REIPPP), to the boom and rapid expansion in the natural gas industry and the planned expansion of the nuclear energy capability. These indicators show the need for suitably qualified personnel in energy related fields. The graduates of this programme will be able to contribute and serve this growing energy sector.

Graduates are employed in research and development in industry, as well as in teaching positions at Higher Education institutions.

PROFESSIONAL REGISTRATION

On completion of the coursework masters, graduates have the opportunity to register with the Engineering Council of South Africa (ECSA).

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

BTech (Level 7) qualification admission requirements	HEQSF qualifications (Level 8) admissions
Qualification with a minimum aggregate of 60% : a) A BTech in Electrical Engineering; b) A BTech in Mechanical Engineering; c) A BTech in Chemical Engineering; d) A BTech in Civil Engineering; e) A BTech in Construction Management; f) A BTech in Quantity Surveying; g) Any related discipline, subject to approval by the department Research Committee.	Qualification with a minimum aggregate of 60% : a) A Bachelor of Engineering Technology (Honours); b) A Bachelor of Engineering (Honours); c) A Bachelor of Science (Honours) in Engineering or Built Environment related discipline; d) A Postgraduate Diploma in Engineering or Built Environment related discipline; e) Any related discipline, subject to approval by the department Research Committee.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

DURATION

Full Time: 2 years: 1st year coursework, 2nd year completion of thesis. Maximum time 3 years.

VENUE

Bellville

For more information on Staff and Research Areas, go to the following pages:

Centre for Distributed Power & Electronic Systems (CDPES):

https://www.cput.ac.za/academic/faculties/engineering/research/centre-for-distributed-power-and-electronic-systems-cdpes

CPUT Focus area 3: Smart Energy:

https://www.cput.ac.za/research-technology-and-innovation/research-focus-areas/research-focus-area-no-3-smart-energy

For any queries get in touch with:

Contact: Dr Marco Adonis

Telephone: +27 21 959 6246

Email: AdonisMA@cput.ac.za

MASTER OF ENGINEERING IN ENERGY (MGENRC)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	SAQA Credits	HEMIS Credit	Assessment Type
6th Year								
Dissertation (Mini-Thesis)	ENR690C	01/02	Y	9	C	90	0.500	PR
Energy Access in Africa & Developing Countries	EAA690S	01/02	S1	9	C	15	0.083	CE
Energy Efficiency in Industry/Residential	EEI690S	01/02	S1	9	C	15	0.083	CE
Research Methodology 5	RSM690S	01/02	S1	9	C	15	0.085	CE
Alternative & Sustainable Energy Technologies	ASE690S	01/02	S2	9	C	15	0.083	CE
Choose 2 Electives from the disciplines below:								
Electrical & Computer Engineering:								
Energy Auditing	ENA690S	01/02	S2	9	E	15	0.083	CE
Energy Modelling	ENM690S	01/02	S2	9	E	15	0.083	CE
Generation, Transmission & Distribution of Energy	GTD690S	01/02	S2	9	E	15	0.083	CE
Chemical Engineering:								
Bio-Energy Technology	BET690S	01/02	S2	9	E	15	0.083	CE
Process Energy Analysis & Integration	PEA690S	01/02	S2	9	E	15	0.083	CE
Built Environment:								
Green Building Economics & Valuation	GBE690S	01/02	S2	9	E	15	0.083	CE
Sustainable Building Services & Energy Efficiency	SBS690S	01/02	S2	9	E	15	0.083	CE
Mechanical Engineering:								
Solar Thermal Systems	STS690S	01/02	S2	9	E	15	0.083	CE
Wind Energy - Advanced	AWE690S	01/02	S2	9	E	15	0.083	CE

MASTER OF ENGINEERING IN SATELLITE SYSTEMS & APPLICATIONS (MGENSC)

COURSE AIM

The Programme will provide access to a highly developed pool of knowledge, promote knowledge sharing and knowledge transfer in support of the National Space Landscape. The research and innovation will contribute to the Satellite Systems development base. The programme will involve leading space experts from around the world. Participants will benefit from global exposure and will provide an interdisciplinary qualification that exposes participants to all key aspects of space engineering, technology and applications.

The MEng in Satellite Systems and Applications will focus on Technology and Applications based on nano-satellite technologies.

The following key areas will be addressed by the program:

- Product development
- Complete mission development
- Research and Innovation
- Professional development
- Space-based services and applications

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

The primary purpose of the qualification is to educate and train engineers, technologists and researchers who can effectively contribute to the development of knowledge at an advanced level, as required for the space industry. This qualification is intended to enable graduates to apply integrated technical knowledge, advanced skills, analysis and problem-solving techniques to particular specialisations in the field of Space Engineering and Applications.

Students are immersed in a state-of-the-art environment and provided with advanced nanosatellite technology platforms that facilitate cutting-edge research in several niche areas in the broader discipline of satellite systems and applications, including, technology development at the subsystem and fully integrated satellite levels, space-based services and applications. Furthermore, the participation of leading space experts will ensure that students benefit from global exposure and will provide an interdisciplinary qualification that exposes participants to all key aspects of space engineering, technology and applications.

The collective purpose of the Programme is to produce graduates that have a deep theoretical understanding of engineering and applications in the space environment, with the ability to apply this knowledge in a vibrant research and innovation ecosystem with actual satellite hardware, and to synthesise space-based engineering solutions in a multi-disciplinary environment to support the national and regional space industries.

Rationale:

As a prominent University of Technology firmly rooted within the South African landscape, CPUT must remain responsive to the economic and societal needs of the country and the continent. It aligns its research activities strategically with the national needs and the continuing imperative for social and economic transformation. From this background stems the Institution's vision "To be at the heart of technology education and innovation in Africa".

The nation has become increasingly dependent on space-based applications to manage its national resources and to support its safety and security objectives. Our focus on nano-satellites enables us to bridge the innovation chasm that implicitly exists due to the inhibitive high technology and resources threshold of bigger satellites. The discipline covers a range of cognate engineering fields, namely Electrical, Mechanical, Industrial, and Mechatronics Engineering

CAREER OPPORTUNITIES

On completion of the programme, graduates would have developed a high level of intellectual independence through their engagement with theoretical coursework and project-based applied research in the areas of Satellite Systems and Applications. These attributes are developed through a range of modules dealing with complex issues in the satellite systems space, where solutions are driven by both systematic and creative design. The course outcomes are driven by carefully selected overarching coursework material. A successful dissertation further emphasises the graduate's ability to critically appraise information from a range of sources, make judgements through the application of sound theory and communicate their conclusions to specialist and non-specialist audiences.

Graduates can be employed in several satellite engineering phases, including (1) design and development of subsystems, systems and full satellite missions, (2) assembly, integration and environmental testing of satellites, (3) operating satellite missions, (4) development of applications and services based on satellite data, (5) project management of satellite missions development, and (6) management of the respective phases (1 – 4).

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

Admission to the Master of Engineering in Satellite Systems and Applications are open to any Engineering degree, the details of which are described below.

The minimum admission requirement in a relevant qualification at NQF Level 8:

- Bachelor of Engineering
- Bachelor of Engineering Technology (Honours)
- Post Graduate Diploma.
- Bachelor of Science in Engineering

All in a relevant cognate field including:

- Electrical Engineering,
- Electrical & Computer Engineering
- Mechanical Engineering,
- Electro-Mechanical Engineering
- Industrial Engineering;
- Chemical Engineering
- Mechatronics Engineering
- Aerospace Engineering

Applicants with a relevant qualification as stipulated above must have obtained an average of 60% overall in the exit level subjects. Alternatively, access to the qualification can be gained through Recognition of Prior Learning (RPL) in terms of the Institutional RPL policies.

International students:

If the applicant has a qualification from abroad, that qualification must be evaluated by the SAQA (South African Qualifications Authority) unit for the Evaluation of Foreign Qualifications before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the entry requirements of the programme the applicant could apply through the normal application process

PROFESSIONAL REGISTRATION

Candidates who successfully complete this qualification are eligible to apply to ECSA to register as a candidate Professional engineering technologist and on completion of the practical requirements can apply for registration as a Professional Engineering Technologist.

EXPERIENTIAL LEARNING

The qualification does not have an experiential learning component. However, Thesis projects are, in most cases, selected in line with the needs of the space program, allowing the students to solve real-world problems.

DURATION

Full-time: 2 years
Part-time: 4 years

VENUE

Bellville

MASTER OF ENGINEERING IN SATELLITE SYSTEMS & APPLICATIONS (MGENSC)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	SAQA Credits	HEMIS Credit	Assessment Type
6th Year								
Mini Thesis	ENS690C	01/02	Y	9	C	75	0.417	PR
Engineering for Space Environment	ESE690S	01/02	S1/S2	9	C	21	0.116	CE
Research Methodology	RME690S	01/02	S1/S2	9	C	15	0.083	CE
Satellite Applications	SAP690S	01/02	S1/S2	9	C	18	0.100	CE
Satellite Mission Analysis & Design	SMA690S	01/02	S1/S2	9	C	18	0.100	CE
Satellite Subsystems	SSS690S	01/02	S1/S2	9	C	18	0.100	CE
Choose Between Elective Group 1 or Elective Group 2:								
Group 1								
General History of Africa	GHA690S	01/02	S1/S2	9	E	7.5	0.042	CE
Gender & Human Rights	GHR690S	01/02	S1/S2	9	E	7.5	0.042	CE
Group 2								
Management of Space Technology	MSP690S	01/02	S1/S2	9	E	15	0.084	CE

DOCTOR OF ENGINEERING IN ELECTRICAL ENGINEERING (DGELER)

COURSE AIM

Graduates develop the competence to conduct independent research in the field of (Electrical) and contribute significantly to the body of knowledge through the understanding, application and evaluation of existing knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

A qualifying learner will conduct independent research, under minimum guidance, in a chosen field of (Electrical), and contribute to knowledge production in that field. The research problem, its justification, process and outcome is reported in a dissertation that complies with the generally accepted norms for research at that level.

CAREER OPPORTUNITIES

Graduates follow a career in research and development in industry, and are employed at research institutes. They may also find employment in research positions at higher education institutions.

ADMISSION REQUIREMENTS:

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

- A level 9 Masters qualification in Electrical Engineering or related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

DURATION

Full-time: Minimum 2 years / Maximum 4 years
Part-time: Minimum 4 years / Maximum 6 years

VENUE

Bellville

DOCTOR OF ENGINEERING IN ELECTRICAL ENGINEERING (DGELER)

Period of Study	Year/Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
7	Y	ELE710R	Research Project and Dissertation	C	--	10	360	2	Full Thesis

PROMOTION CRITERIA: ELECTRICAL ENGINEERING

Academic Exclusion Rules and Appeal

A candidate shall not be permitted to renew his or her registration except by permission of the Head of Department or the Dean, if the candidate fails to complete the subjects as prescribed below:

Semester Subjects:

a) For first-semester subjects within one year [two semesters] after his/her first registration for the qualification;
b) For second-semester subjects within two years [four semesters] after his/her first registration for the qualification;
c) Referring to sections a and b, it is a requirement that a candidate complete all first- and second-semester subjects before enrolling for the third semester;
d) For third semester subjects within three years after his/her first registration for the qualification;
e) For fourth semester subjects within four years after his/her first registration for the qualification;

Year subjects:

f) The same rules apply as for semester subjects.

Maximum time to complete any qualification in the department:

Each candidate is afforded the opportunity to repeat a subject once only.

f) Full Time enrolled students:

Example:

Normal duration of registered qualification = 2 years. Students are afforded double the normal duration of the qualification, i.e normal time = 2 x 2 = 4 years.

Appeals

a) Notwithstanding the above, the department has an appeals process, which affords excluded candidates an opportunity to appeal such an exclusion and present mitigating factors.
b) Departments formally present such an excluded candidate to the Dean at the earliest occasion subsequent to the exclusion.

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For Example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for qualification purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

DIPLOMA SUBJECTS (All qualifications)

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

COMMUNICATION SYSTEMS 2

Pre-requisite:	Electronics 1, Electrical Engineering 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	The purpose of communication system is to transmit information bearing signals from a source located at one point to a user destination located at another point some distance away. Communication is simply the process of conveying message at a distance or communication is the basic process of exchanging information. Various pieces of electronic equipment are used for to assemble a communication system. Examples of communication systems are line telephony and line telegraphy, radio telephony and radio telegraphy, radio broadcasting, point-to-point communication and mobile communication, computer communication, radar communication, television broadcasting, radio aids to navigation, radio aids to aircraft landing etc. In electrical engineering it is essential that future engineer have a good grasp of the various components that constitute a communication system. To achieve this the course is structured to include the following content: • Introduction to electronic communication systems. • Matching attenuation and insertion loss. • Series and parallel resonance. • Passive filters. • Amplitude modulation. • Frequency modulation. • Transmission lines. • EM waves and propagation. • Antennas. • Baseband PCM and data communication systems. • Component behaviour at high frequency. • The Smith chart. • Digital modulation schemes. • GSM system.
Assessment:	Class test 1 (5%), Class test 2 (10%), Practical assessments (30%), Assignments (5%), FISA (50%)

COMPUTER ENGINEERING SKILLS 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures and practical laboratory classes. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually as well as in teams. A number of self-paced practical exercises have been developed to assist the student in assimilating the subject material. The development of self-study skills is encouraged through a self-study industry relevant assignment.
Subject outline:	Computer Engineering Skills 1 is designed to introduce learners to the basics of Computer Systems and computer operating systems. The students will be provided with the necessary theoretical principles and skills to pursue application for the international Comp TIA A+ Certification, assemble desktop and personal computers and installation of relevant operating systems. The course is developed to cover the following: • Introduction to the Personal Computer. • Safe Lab Procedures and Tool Use. • Computer Assembly – Step by Step. • Basics of Preventive Maintenance and Trouble shooting.

- Fundamental Operating Systems.
- Fundamental Laptops and Portable Devices.
- Fundamental Printers and Scanners.
- Fundamental Networks.
- Fundamental Security.
- Communication Skills.
- Document and communicate faults and safety procedures.
- Assembling and disassembling of PC's.
- Installations.
- Trouble-shooting

Assessment: Class test 1 (15%), Class test 2 (20%), Online assessments (10%), Practical assessments (50%), Assignment (5%)

DIGITAL COMMUNICATION 2

Pre-requisite: Electronics 1, Electrical Engineering 1

Mode of delivery: The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually.

A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors.

The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.

Subject outline: Digital Communications is the transfer of data (a digital bitstream or a digitized analogue signal) over a point-to-point or point-to-multipoint communication channel. Data transmitted may be digital messages originating from a data source, for example a computer or a keyboard. To grasp the basic principles of data transmission which also includes computer networking applications and networking protocols, for example routing, switching and inter-process communication it is important that students are exposed to the various elements and components of digital communications. This includes transmission Control Protocols (TCP) as applicable to the transmission of data.

To achieve this the courses is structured to include the following basic principles:

- Ethernet and the telephone system.
- Data transmission media. Optic fibre; Radio waves; Microwaves; Infrared and Laser; Coaxial cables (thin and thick) and twisted pair cables such as CAT1, CAT2, CAT3, CAT4, CAT5 and CAT6.
- Partitioning the problem. Abstraction, service versus implementation; layering as a restricted form of abstraction.
- Transmission fundamentals. Physical channel; limitations: noise, attenuation. Channel capacity (bandwidth). Modulation techniques for digital systems.
- Coding. Modulation as a form of coding, A/D, D/A, error correcting and detecting codes.
- Multiplexing. FDM, synchronous and asynchronous TDM. Circuit switching, packet switching, ATM.
- Switching and routing. Repeaters, bridges, routers and switches.
- LAN, MAN and WAN. LAN topologies and technologies.
- Protocols and state. ARQ and X.25 as examples.
- Naming, addressing and routing.
- The Internet architecture, TCP, IP, UDP, ARP, ICMP, IGMP, OSPF, IPv4 and IPv6.
- Communication and networking: ISO 7-layer reference model, TCP/IP.
- Network management: security, firewalls and quality of service.
- Wireless and mobile computing. GSM, cell layout, frequency planning, mobile station, base station systems, switching sub systems.
- Mobility Management, Signalling protocols, MS-PSTN call, PSTN-MS call, MS- MS call, call handover.
- Functioning and types of PSTN networks, encryption, Characteristics of SIM, equipment identification.
- SS7 versus SS7 over IP, Physical layer, data link layer, MAP Protocols.

Assessment: Class test 1 (5%), Class test 2 (10%), Practical assessments (30%), Assignment (5%), FISA (50%)

ELECTRICAL ENGINEERING 1 / ELECTRICAL ENGINEERING PRINCIPLES 1

Pre-requisite: None

Mode of delivery: The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually.

	A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	This is a major subject which will provide the student the underpinning knowledge to identify and demonstrate a working knowledge of DC, AC and 3-phase theory and the associated equipment, systems and measurements. In addition, the student will be able to perform system design, analysis and testing in the laboratory with the appropriate test equipment and software. To achieve this the students will be exposed to the following major concepts: **DC Theory** • Voltage, current, resistivity, conductivity and conductor standards, • Ohm's law, Kirchoff's laws and Network theorems, • Parallel, series and combined circuits • Inductance and Capacitance in a DC circuit application • Magnetic circuit applications • Materials used in the Electrical Industry • Battery applications **AC Theory** • AC generation • AC Current, Voltage, phasor diagrams and complex power • AC Network Theorems • Resistance, inductance, capacitance and impendence • Series, parallel and combined circuits • Resonance circuits • Maximum power transfer • Harmonics and Power Factor correction **3-Phase Theory** • Three phase symmetrical and asymmetrical systems • Star and Delta circuits • Three phase Power factor correction • Symmetrical Components • The per unit system • Three phase Power and Reactive Power measurement
Assessment:	Class test 1 (5%), Class test 2 (10%), Class test 3 (10%), Practical assessments & written report (25%), FISA (50%)

ELECTRONICS 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	This is another major subject for electrical/electronic engineers and it is hence essential that students are able to identify and demonstrate a working knowledge of all electronic components such as diodes, transistors, op-amplifiers as used in circuits for signal amplification, filters, oscillators, multi-vibrators, power supplies, and basic digital concepts and circuits. In addition to a well-grounded knowledge of all electronic components the student will also be taught to perform system design, analysis and testing in the laboratory with the appropriate test equipment and software. To achieve this the student will be exposed and given a solid foundation of the following concepts: • Diodes, Bipolar junction transistors, BJT Amplifiers, Field Effect Transistors, Operational Amplifiers, Amplifier Frequency response, Power Amplifiers and their applications. • Active Filters • Oscillators • Voltage Regulators

- Digital and analogue quantities. Logic levels and logic operations.
- Number systems and digital codes.
- Logic gates, combinational logic circuits and truth tables
- Boolean algebra and logic minimization.

Assessment:	Class test 1 (5%), Class test 2 (10%), Class test 3 (10%), Practical assessments & written report (25%), FISA (50%)

ENGINEERING COMMUNICATION 1

Pre-requisite:	None
Mode of delivery:	The subject will be presented as a series of lectures integrated with information literacy sessions from the library staff. The emphasis will be on understanding, both spoken and written. Teaching strategies would include: Group/ team work in scenario and project (e.g., digital story). Writing short texts to contribute to longer texts e.g., an essay. Individual power point presentation and open class discussions on relevant topics such as load shedding, domestic use of energy, women in engineering, etc. Tutors will be available to assist especially with digital story preparation. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	The development of effective English communication skills is a key contributor to our students' success in the academic environment of higher education and future workplace as employees, where they will interact with colleagues, managers, clients and customers in the Electrical, Electronic and Computer Engineering industries. These communication skills are, however, embedded in theory; therefore, our students are not only trained in vital communication skills, but also thoroughly guided through the theoretical understanding of these respective skills. The course is designed to cover communication theory, academic literacy, Organisational communication, report writing and oral presentations. This subject forms a major part of the technical and business acumen required to identify and solve problems in which responses display that responsible decisions using critical and creative thinking and work effectively with others as a member of a team or group. The course is designed to cover the following: • PowerPoint presentation • Reading Skills: types of reading. Scan, skim, etc. • Summarizing & paraphrasing information • Referencing IEEE standards • Plagiarism in detail • Research essay: how & why format; the "three-part-essay" • Investigative and technical report writing
Assessment:	Class test (10%), Written & group assignments (20%), PowerPoint presentation (30%), Written assignment (40%)

ENGINEERING DESIGN 2

Pre-requisite:	Electronics 1, Electrical Engineering 1, Engineering Communication 1, Engineering Skills 1
Mode of delivery:	This is a capstone final year project module. The students will be provided with a variety of opportunities to apply the theory they have mastered in other subjects. The students will be expected to gain competence in many of the outcomes through self-study. An Industry relevant project will be undertaken by the students in order to gain real life experience in topics relevant to their chosen field of specialization. During the course of the year, they will work individually and in groups. The students will have opportunities for consultation with subject experts in order to achieve their objectives.
Subject outline:	The content of this module will depend on the choice of project that each student will make. A suitable range of project options will be provided in order to accommodate all the students' choices
Assessment:	Project presentation (20%), Portfolio of evidence (30%), Final written project report (50%)

ENGINEERING MATHEMATICS 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures and tutorial classes.

	The student is expected to gain competence in many of the outcomes through self-study. A number of self-paced tutorials have been developed to assist the student in this regard. Group work is encouraged. These are completed under the supervision of tutors on a weekly basis. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	This subject underpins all engineering principles and provides the students with the fundamental theoretical knowledge and practical perspectives of the importance of mathematics. In this first-year, NQF level 5 subject, the content includes a range of contemporary principles and perspectives which will strengthen the following: • Calculator computations and graph sketching, • Complex numbers, • Application of De Moivre's theorem and Euler's formula in the manipulation of complex numbers, • Trigonometric equations and the sine function, • Radian measure, • Manipulations of formulae, • Pascal's triangle, the Binomial theorem and limits of functions, • Use tables and rules to calculate derivatives of functions. • Apply differentiation in graph sketching, optimization and velocity and acceleration problems • Use tables and standard integration techniques to integrate functions.
Assessment:	Class test 1 (10%), Class test 2 (15%), Tutorials (20%), Written assignment report (5%), FISA (50%)

ENGINEERING MATHEMATICS 2

Pre-requisite:	Engineering Mathematics 1
Mode of delivery:	The subject is presented as a series of lectures and tutorial classes. The student is expected to gain competence in many of the outcomes through self-study. A number of self-paced tutorials have been developed to assist the student in this regard. Group work is encouraged. These are completed under the supervision of tutors on a weekly basis. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	This subject further underpins all engineering principles and provides the students with a scaffold to higher level fundamental theoretical knowledge and practical perspectives of the importance of the mathematics which was covered the first-year of this qualification. The subject content includes a range of higher level contemporary principles and perspectives which will strengthen the following: • Ordinary differential equations I • Ordinary differential equations II • The Laplace transform • Difference equations and the z-transform • Fourier series • Fourier transform • Functions of several variables • Vector Calculus • Line integrals and multiple integrals
Assessment:	Class test 1 (10%), Class test 2 (15%), Tutorials (20%), Written assignment report (5%), FISA (50%)

ENGINEERING PHYSICS 1 (ELECTRICAL ENGINEERING DIPLOMA ONLY)

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors.

	The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	This subject underpins all engineering principles and provides the students with the fundamental theoretical knowledge and practical perspectives of the importance of physics in engineering. In this first-year, NQF level 5 subject, the content includes a range of contemporary principles and perspectives which will strengthen the student's understanding of electrical and electronics in thefollowing areas" • Circuit Theory • Magnetism and Electromagnetism • Optics • Motion and the Wave Equations • Energy Studies
Assessment:	Class test 1 (5%), Class test 2 (10%), Class test 3 (10%), Practical assessments & written report (25%), FISA (50%)

ENGINEERING PHYSICS 1 (COMPUTER ENGINEERING DIPLOMA ONLY)

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	This subject underpins all engineering principles and provides the students with the fundamental theoretical knowledge and practical perspectives of the importance of physics in engineering. In this first-year, NQF level 5 subject, the content includes a range of contemporary principles and perspectives which will strengthen the student's understanding of electrical and electronics in thefollowing areas: • **Introduction to materials:** A qualitative and semi-quantitative description of: Bohr model of the hydrogen atom, atomic energy level structures, bonding in materials and some electrical and mechanical properties of materials. More in-depth discussion will be covered under various items below. • **Mechanics:** units, vectors, Newton's laws of motion, equilibrium, work and energy principles, rigid body motion. • **Oscillations and Waves** • **Electricity and Magnetism:** Coulomb's law and Gauss' law, electric fields, electric potential, electric current, capacitance and dielectrics, DC circuits and batteries; magnetic fields and forces, Biot-Savart law, Ampere's law and Faraday's Law of induction, inductance and basic AC circuits; Electrical and magnetic properties of common materials.
Assessment:	Class test 1 (10%), Class test 2 (15%), Practical assessments (20%), Written assignment report (5%), FISA (50%)

ENGINEERING PHYSICS 2

Pre-requisite:	Engineering Physics 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	The study of Engineering Physics emphasizes the application of basic scientific principles to the design of equipment, which includes electronic and electro- mechanical systems, for use in measurements, communications, and data acquisition. This subject complements and further underpins the 1st level physics and engineering principles, providing computer engineering students with more in- depth theoretical knowledge and practical perspectives of the importance of physics in engineering in computer engineering. To achieve this the courses is structured to include the following principles:

- **Introduction to Thermodynamics:** Heat, temperature, and the First and Second law of thermodynamics. Thermal properties of materials and gases.
- **Basic Fluid mechanics:** Hydrostatic pressure, buoyancy, pressure measurements, and fluid dynamics, Bernoulli's equation.
- **Light and Optics:** Geometric optics including mirrors, lenses and prisms; physical optics including wave nature of light, electromagnetic spectrum, interference and diffraction; Basic concepts in illumination; Optical properties of materials.
- **Modern Physics:** Wave particle duality, atomic (Bohr model, atomic energy levels) and introductory nuclear physics.

Assessment: Class test 1 (5%), Class test 2 (10%), Practical assessments (30%), Written assignment report (5%), FISA (50%)

ENGINEERING SKILLS 1

Pre-requisite: None

Mode of delivery: The subject is presented as a series of lectures and practical laboratory classes. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually as well as in teams.

A number of self-paced practical exercises have been developed to assist the student in assimilating the subject material.

The development of self-study skills is encouraged through a self-study industry relevant assignment.

Subject outline: Engineering Skills 1 is designed to introduce learners to have an understanding of the role of workplace safety systems and the responsibility of the employer / employee in the context of workplace safety. Understand data relating to common electrical / electronic components to be able to identity a range of common electronic / electrical components to construct simple electrical/electronic circuits to perform a variety of functions and in doing so develop and show competence in both the use of soldering and de-soldering tools as well as competence in the use of light engineering hand tools. This knowledge, competencies and skills will enable the students to use acquired skills to work as a team member and perform specific tasks dedicated to him/her to support to collective idea of the team.

The significance of this programme ensures that students can transfer the knowledge and skills across all diploma levels hence the course is developed to cover the following:

- General workplace safety and hand tools
- Basic electronic/electrical components use, specifications and electronic symbols
- Circuit construction techniques: proto-typing, soldering and de-soldering, bread-boarding, vero-board and printed circuit board, etc.
- Circuit testing and fault-finding
- Principles of measurement and sensors
- Modular assembly project.

Assessment: Class test 1 (15%), Class test 2 (20%), Written assignment report (5%), Practical assessments (60%)

MICROPROCESSORS 2

Pre-requisite: Electronics 1

Mode of delivery: The subject is presented as a series of lectures, tutorials and practical laboratory classes. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually.

Several self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors.

The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.

Subject outline: Microprocessors have revolutionised the field of digital electronics and are one of the most exciting technological innovations in electronics. It is, therefore, imperative for every engineer, especially electronics engineers, to have detail knowledge about microprocessors. This course prepares students to become designers of electronic products hence they need to learn how to use microprocessors. The subject of microprocessors is overviewed here with the objective that a beginner gets to know what a microprocessor, the architecture and operation of typical microprocessor systems.

To achieve this the courses is structured to include the following basic principles:

- Digital integrated circuit technologies. TTL, CMOS etc. Noise margins, fan-out, pull-up and pull down resistors.
- DSP basics. DACs and ADCs. Sampling and PWM techniques.

- Digital memory and storage devices. RAM, ROM and Flash memory. Magnetic and optical storage devices.
- Computer interfacing.
- Microprocessor architecture.
- Programming microprocessors.
- Input and output. Peripheral devices.
- Serial communication and busses.
- Microprocessor systems circuit design.
- Microprocessor system construction, programming, testing and debugging.

Assessment: Class test 1 (20%), Class test 2 (30%), Written assignment report (5%), Practical assessments (45%)

POWER SYSTEMS 2

Pre-requisite: Electrical Engineering 1, Engineering Physics 1

Mode of delivery: The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually.

Several self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors.

The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.

Subject outline: A power system is a network of components that is well designed and structured to efficiently transmit and distribute electrical energy produced by generators to locations where they are utilized. Generators, motors and other utility loads are connected by a power system. In electrical engineering it is essential that engineers have a good grounding of the components of a power system. To achieve this the course is structured to include the following content:

- National grid Generation, Transmission, Distribution and Tariffs
- Distributors
- Substations
- Overhead Lines
- Cables and insulators
- Transformers
- Electrical protection elements
- Protection schemes (IDMT, etc.)
- AC and DC machines

Assessment: Class test 1 (5%), Class test 2 (10%), Practical assessments (30%), Written assignment report (5%), FISA (50%)

PROCESS CONTROL 2

Pre-requisite: Electronics 1, Electrical Engineering 1

Mode of delivery: The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually.

A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors.

The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.

Subject outline: Process control is used in continuous production – in manufacturing and in other fields and industries where some kind of material is produced without any kind of interruption – as well as in “batch processing.” It’s used to automatically control the conditions in which a product is made – ensuring better quality and efficiency. Without adequate and reliable process controls, an unexpected process occurrence cannot be monitored, controlled, and eliminated. Process controls can range from simple manual actions to computer logic controllers, remote from the required action point, with supplemental instrumentation feedback systems. These systems should be designed such as to minimize the need to activate secondary safety devices. The objective of process control is to keep key process-operating parameters within narrow bounds of the reference value or set point.

To achieve this the courses is structured to include the following principles:

	Introduction to control systems, System Modelling/Transfer Function; Laplace Transformation; Block Diagram Models; System Response; Introduction to Feedback Control; System stability; Steady state error as a performance criterion; Controller design; Root Locus techniques; Frequency response of systems; Sequential Logic- Latches, Timing circuits and Flip-flops. Asynchronous, Synchronous and Truncated counters; Shift registers and applications; Measurement and control in industrial processes; Pressure, flow, level and temperature measurement; Basic concepts in automatic control; Control valves and valve positioners; Plant floor communication in an industrial environment; Control loop characteristics; Program and interface a Siemens S7 300 PLC to automate a control process.
Assessment:	Class test 1 (5%), Class test 2 (10%), Practical assessments (30%), Written assignment report (5%), FISA (50%)

SOFTWARE DEVELOPMENT 1 (DIPLOMA IN COMPUTER ENGINEERING) /
SOFTWARE DEVELOPMENT 2 (DIPLOMA IN ELECTRICAL ENGINEERING)

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, tutorials and practical laboratory classes. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. Several self-paced tutorials and practical exercises have been developed to assist the student in assimilating the subject material. Group work is encouraged. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	In computer engineering the ability to integrate software and hardware is critical hence software development is an integral part of most modern day computer and electrical engineering processes. Software development is the process of conceiving, specifying, designing, programming, documenting, testing, and bug fixing involved in creating and maintaining applications, frameworks, or other software components. Software development is a process of writing and maintaining the source code, but in a broader sense, it includes all that is involved between the conception of the desired software through to the final manifestation of the software, sometimes in a planned and structured process. To answer the requirements of software development this course is designed to incorporate the following topics: • Introduction to Computers, the Internet and the Web • Algorithms • Structured Program Development • Program Control • Functions • Arrays • Pointers • Characters and Strings • Formatted input and output • C Structures, Unions, Bit Manipulations and Enumerations • File processing • Data structures and Algorithms • Pre-processors • Other topics in C
Assessment:	Class test 1 (20%), Class test 2 (30%), Written assignment report (5%), Practical assessments (45%)

SOFTWARE DEVELOPMENT 2 (COMPUTER ENGINEERING)

Pre-requisite:	Electronics 1, Computer Engineering Skills 1, Engineering Communication 1, Software Development 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. Several self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. This is also a capstone final year project subject. An Industry relevant project will be undertaken by the students in order to gain real life experience in topics relevant to their chosen field of specialization. The students will have opportunities for consultation with subject experts in order to achieve their objectives.

Subject outline:	In computer engineering the ability to integrate software and hardware is critical hence software development is an integral part of most modern day computer and electrical engineering processes. Software development is the process of conceiving, specifying, designing, programming, documenting, testing, and bug fixing involved in creating and maintaining applications, frameworks, or other software components. Software development is a process of writing and maintaining the source code, but in a broader sense, it includes all that is involved between the conception of the desired software through to the final manifestation of the software, sometimes in a planned and structured process. To answer the requirements of software development this course is designed to incorporate the following: • Object-Oriented programming: classes, objects, inheritance and polymorphism • Control Statements, Arrays • Exception Handling: A Deeper Look • Object-Oriented Design with the UML • GUI Components, Graphics and Java 2D • Strings, Characters and Regular Expressions • Files, Streams and Object Serialization • Recursion • Searching, Sorting and Big O • Generic Collections, classes and methods • Custom Generic Data Structures • Applets and Java Web Start • Multimedia: Applets and Applications • Multithreading • Networking • Accessing Databases with JDBC • JavaServer™ Faces Web Applications • Ajax-Enabled JavaServer™ Faces Web Applications • Web Services
Assessment:	Class test 1 (10%), Class test 2 (20%), Project presentation (10%), Practical assessments (25%), Written project report (40%)

SYSTEMS ANALYSIS 2

Pre-requisite:	Engineering Communication 1
Mode of delivery:	The subject is presented as a series of lectures and tutorials. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose. Analysis specifies what the system should do. A system is therefore “an orderly grouping of interdependent components linked together according to a plan to achieve a specific goal.” A system must have three basic constraints: • A system must have some structure and behaviour which is designed to achieve a predefined objective. • Interconnectivity and interdependence must exist among the system components. • The objectives of the organization have a higher priority than the objectives of its subsystems. The analysis of a system is thus a combination of the Processor and the Control element. Finally, the behaviour of a Computer System is controlled by the Operating System and Software. In order to keep system in balance, what and how much input is needed is determined by Output Specifications. The subject “Systems Analysis” combines most of the subjects listed in this course and to interface all these concepts and to be able to analyse a system an understanding of the following content us required: • Structured analysis, object-oriented analysis and agile methods. • SWOT analysis, system feasibility study and preliminary system investigation. • Scheduling tools, including Gantt charts and PERT/CPM charts.

- Task dependencies, durations, start and end dates.
- Functional decomposition diagram (FDD), Unified Modelling Language (UML) symbols, fact-finding techniques and total cost of ownership.
- Data and process modelling concepts and tools. Object modelling terms and concepts.
- When to use the various outsourcing options. Interface design. Generating user reports.
- Entity relationship diagrams, normalization, topologies and architectures.
- Software quality assurance and software engineering.
- Risk management concepts. Backup and disaster recovery systems.
- Financial, commercial, legal and socio-economic impact of a system.

Assessment:	Class test 1 (10%), Class test 2 (20%), Tutorial assessments (15%), Written assignment report (5%), FISA (50%)

BACHELORS SUBJECTS (All qualifications)

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

COMPUTER ARCHITECTURE 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. Several self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	On successful completion of this subject the student will be able to: Identify and describe the architectural features of computer systems; Describe and compare the performance of different computer architectures; Perform system design, analysis and testing in the laboratory with the appropriate test equipment and software. Subject content: • Data representation. Numbers systems binary arithmetic and binary codes. • Basic computer architecture. • Memory systems. • I/O interfacing and communications. • Instruction decoding and execution. • Program flow control. • Multiprocessor, multicore and distributed computing architectures. • Embedded systems architectures.
Assessment:	Two written class tests, evenly spaced over the duration of the course will be conducted under examination conditions. At the end of the course, a final written integrated summative assessment (FISA) will be conducted under examination conditions. The purpose of these assessments is to ascertain whether the student has achieved the specific outcomes as listed above. Practical assessments, evenly spaced over the duration of the course, will be conducted. The practical assessments are conducted in the laboratory and will assess whether the student can apply in practice what they have learnt in both the theoretical and practical components of the course. A written report on an industry and subject relevant self-study assignment is required. **Assessment weights:** Class test 1 (10%), Class test 2 (15%), Practical assessments (20%), Written assignment report (5%), FISA (50%)

COMPUTER GRAPHICS 2

Pre-requisite:	Computer Architecture 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	On successful completion of this subject the student will be able to: Describe and explain the basic principles, techniques and algorithms of computer graphics; Implement some basic graphics techniques using a graphics system; Implement a practical animation and multimedia project in a team.

	Subject content: • Introduction to computer graphics, image processing and computer vision. • 2D graphics, clipping and transformations. • 3D graphics, clipping and transformations. • Image processing. • Graphics systems. • Graphics techniques and algorithms. • Aspects of human-computer interaction. • Computer animation and multimedia techniques.
Assessment:	Two written class tests, evenly spaced over the duration of the course will be conducted under examination conditions. At the end of the course, a final written integrated summative assessment (FISA) will be conducted under examination conditions. The purpose of these assessments is to ascertain whether the student has achieved the specific outcomes as listed above. Practical assessments, evenly spaced over the duration of the course, will be conducted. The practical assessments are conducted in the laboratory and will assess whether the student can apply in practice what they have learnt in both the theoretical and practical components of the course. A written report on an industry and subject relevant self-study assignment is required. **Assessment weights:** Class test 1 (10%), Class test 2 (15%), Practical assessments (20%), Written assignment report (5%), FISA (50%)

CONTROL SYSTEMS 3

Pre-requisite:	Engineering Communication 1, Engineering Mathematics 2, Software Engineering 2, Digital Systems 2
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	Fundamental concepts of Classical control: • Introduction to Control Systems • System Mathematical Modelling • Laplace Transformation • Transfer Functions • Block Diagram Models • System Response • Introduction to Feedback Control • Controller design: • Analyse steady-state error as a performance criterion • P, PI, PD, and PID controller configurations and tuning – Ziegler-Nichols and heuristic tuning. • Analyse system stability – Routh-Hurwitz • Understand root-locus techniques • Understand the concept of frequency response of systems – Phase-lag, phase-lead and lag-lead controllers, Nyquist plots, Bode plots, and zero-pole plots. • Understand the concept of state-space representation of systems – Canonical forms.
Assessment:	Class test 1 (5%), Class test 2 (10%), Class test 3 (10%), Practical assessments & written assignments (25%), FISA (50%)

DATA NETWORKS 2

Pre-requisite:	Electronics 1, Engineering Mathematics 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	The following learning areas will be addressed: • Data networks • The data link layer: Framing, Error Detection and ARQ • Introduction to queuing theory • Packet multiple access: The Aloha Protocol • Local area networks • Fast packet switching • Routing • Flow and congestion control • Higher layer protocols: TCP/IP and ATM • Evolution of mobile communication systems. • Frequency reuse and channel assignment strategies.
Assessment:	Class test 1 (10%), Class test 2 (15%), Practical assessments (20%), Written assignment report (5%), FISA (50%)

DATABASE SYSTEMS 3

Pre-requisite:	Engineering Communication 1, Software Design 2
Mode of delivery:	In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry.
Subject outline:	On successful completion of this module the student will be able to: Demonstrate advanced knowledge of the structure, functions and processes of modern database systems; Write SQL code to store and retrieve data; Measure and analyse the performance of a database system. **Subject content:** • Information models and systems. Capture and representation, Storage and retrieval. • Database systems. Architecture, management, indexing, search and linking. • Files, records and fields. • Data models. Hierarchical, Network, Relational, Object, Logical, Semantic, Dimensional. • Database management systems. • Database query languages. • Physical database design.
Assessment:	Three written class tests, evenly spaced over the duration of the course will be conducted under examination conditions. At the end of the course, a final written integrated summative assessment (FISA) will be conducted under examination conditions. The purpose of these assessments is to ascertain whether the student has achieved the specific outcomes as listed above. Practical assessments, evenly spaced over the duration of the course, will be conducted. The practical assessments are conducted in the laboratory and will assess whether the student can apply in practice what they have learnt in both the theoretical and practical components of the course. A written report on an industry and subject relevant self-study assignment is required. **Assessment weights:** Class test 1 (15%), Class test 2 (10%), Class test 3 (10%), Practical assessments & written assignments (25%), FISA (50%)

DIGITAL SYSTEMS 2

Pre-requisite:	Physics 1, Electronics 1, Electrical Engineering 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study Industry-relevant assignment.
Subject outline:	On successful completion of this subject the student will be able to: Explain and apply fundamental digital principles, technologies and standards; Design, construct, test and fault find digital circuits and systems; Design, program, and interface FPGAs. **Subject content:** • Combinational logic circuits. Adders, Code converters, encoders, decoders, multiplexers and demultiplexers. • Sequential Logic circuits. Latches, timers and Flip-flops. Asynchronous and synchronous counters. Shift registers and applications. • Mass storage devices, magnetic and optical. Memory storage and circuit design. • Digital integrated circuit technologies. • Analog to digital and digital to analog converters. • Serial communication protocols. Copper, RF and fibre optic digital communication media. • Computer architecture and interfacing. • Digital signal processing, Sampling theorem, anti-aliasing and reconstruction filters, FIR and IIR digital filters. • Field Programmable Gate Arrays: architecture, programming, interfacing and applications.
Assessment:	Class test 1 (5%), Class test 2 (10%), Class test 3 (10%), Practical assessments and written assignment report (25%), FISA (50%)

ELECTRICAL ENGINEERING 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	**The following learning areas will be addressed:** • DC Theory • Voltage, current, resistivity, conductivity and conductor standards • Ohm's law, Kirchoff's laws and Network theorems • Parallel, series and combined circuits • Inductance and Capacitance in a DC circuit application • Magnetic circuit applications • Materials used in the Electrical Industry • Battery applications • AC Theory • AC generation • AC Current, Voltage, phasor diagrams and complex power • AC Network Theorems • Resistance, inductance, capacitance and impedance

	• Series, parallel and combined circuits • Resonance circuits • Maximum power transfer • Harmonics and Power Factor correction • 3 Phase Theory • Three phase symmetrical and asymmetrical systems • Star and Delta circuits • Three phase Power factor correction • Symmetrical Components • The per unit system • Three phase Power and Reactive Power measurement
Assessment:	Class test 1 (5%), Class test 2 (10%), Class test 3 (10%), Practical assessments and written assignment report (25%), FISA (50%)

ELECTRICAL ENGINEERING PRINCIPLES 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	On successful completion of this subject the student will be able to: Identify and demonstrate a working knowledge of DC and AC theory and the associated equipment, systems and measurements; Perform system analysis and testing in the laboratory with the appropriate test equipment and software. **Subject content:** • The following learning areas will be addressed: • DC Theory • Voltage, current, resistivity, conductivity and conductor standards • Ohm's law, Kirchoff's laws and Network theorems • Parallel, series and combined circuits • Inductance and Capacitance in DC circuit applications • Magnetic circuit applications • Materials used in the Electrical Industry • Battery applications • AC Theory • AC generation • AC Current, Voltage, phasor diagrams and complex power • AC Network Theorems • Resistance, inductance, capacitance and impedance • Series, parallel and combined circuits • Resonance circuits • Maximum power transfer • Harmonics and Power Factor correction
Assessment:	Two written class tests, evenly spaced over the duration of the course will be conducted under examination conditions. At the end of the course, a final written integrated summative assessment (FISA) will be conducted under examination conditions. The purpose of these assessments is to ascertain whether the student has achieved the specific outcomes as listed above. Practical assessments, evenly spaced over the duration of the course, will be conducted. The practical assessments are conducted in the laboratory and will assess whether the student can apply in practice what they have learnt in both the theoretical and practical components of the course. A written report on an industry and subject relevant self-study assignment is required. **Assessment weights:** Class test 1 (5%), Class test 2 (10%), Practical assessments (20%), Written assignment report (5%), FISA (50%)

ELECTRICAL MACHINES 3

Pre-requisite:	Engineering Communication 1, Electrical Engineering 1, Physics 1, Engineering Mathematics 2
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	**The following learning areas will be addressed:** • Basics of Electrical Machines • Transformers (Single phase, three phase) • Switched-reluctance machines • DC machines • AC machines (Induction, Synchronous) • Brushless DC motors
Assessment:	Class test 1 (5%); Class test 2 (10%); Class test 3 (10%); Practical assessments & written report/assignment (25%); FISA 50%

ELECTRONIC COMMUNICATIONS 3

Pre-requisite:	Engineering Communication 1, Mathematics 2, Signal Processing 2, Digital Systems 2
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment
Subject outline:	**The following learning areas will be addressed:** • Introduction to electronic communication systems including the decibel and its uses. • Matching attenuation and insertion loss. • Series and parallel resonance. • Passive filters. • Amplitude and Frequency modulation. • Transmission lines. • EM waves, propagation and antennas. • Baseband PCM and data communication systems. • Component behaviour at high frequency. • The Smith chart and applications. • Digital modulation schemes. • Mobile telephone system.
Assessment:	Class test 1 (5%); Class test 2 (10%); Class test 3 (10%); Practical assessments & written report/assignment (25%); FISA 50%

ELECTRONICS 1

Pre-requisite:	None

Mode of delivery: The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually.

A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors.

The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment

Subject outline: **The following learning areas will be addressed:**

- Diodes and their applications
- Bipolar junction transistors
- BJT Amplifiers
- Field Effect Transistors
- Operational Amplifiers
- Amplifier Frequency response
- Power Amplifiers
- Active Filters
- Oscillators
- Voltage Regulators
- Digital and analogue quantities. Logic levels and logic operations.
- Number systems and digital codes.
- Logic gates, combinational logic circuits and truth tables.
- Boolean algebra and logic minimization.

Assessment: Class test 1 (5%); Class test 2 (10%); Class test 3 (10%); Practical assessments & written report/assignment (25%); FISA 50%

EMBEDDED SYSTEMS 3

Pre-requisite: Engineering Communication 1, Digital Systems 2, Software Design 1, Operating Systems 2

Mode of delivery: The subject is presented as a series of lectures, practical laboratory sessions and an advanced embedded system development project. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry.

The development of self-study skills is encouraged through an advanced embedded system development project and a self-study industry relevant assignment.

Subject outline: On successful completion of this subject the student will be able to: Describe and explain the basic components and features of embedded systems; Identify, describe and apply advanced embedded software development techniques; Complete an advanced practical embedded system design project. Design, testing and debugging.

Subject content:

- Basics of embedded systems.
- Real-time system requirements. Hardware/software co-development.
- System architecture and software patterns.
- Hardware interfacing. Events and triggers.
- Embedded operating systems.
- Software reuse techniques.
- Embedded system optimization. Performance, memory, power.
- Development tools and testing techniques.
- Multicore embedded systems.
- Safety critical techniques.
- Embedded system project management.
- Application specific features. I/O, storage, Networking, Automotive, Satellite, Telecoms.

Assessment:	Three written class tests, evenly spaced over the duration of the course will be conducted under examination conditions. At the end of the course, each student must demonstrate their working practical project and submit a comprehensive project report. The purpose of these assessments is to ascertain whether the student has achieved the specific outcomes as listed above. Practical assessments, evenly spaced over the duration of the course, will be conducted. The practical assessments are conducted in the laboratory and will assess whether the student can apply in practice what they have learnt in both the theoretical and practical components of the course. A written report on an industry and subject relevant self-study assignment is required. Class test 1 (5%); Class test 2 (10%); Class test 3 (10%); Practical assessments & written report/assignment (25%); FISA 50%

ENGINEERING COMMUNICATION 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment
Subject outline:	**The following learning areas will be addressed:** • PowerPoint presentation • Reading Skills: types of reading. Scan, skim, etc. • Summarising & paraphrasing information • Referencing IEEE standards • Plagiarism in detail • Research essay: how & why format; the “three-part- essay” • Investigative and technical report writing
Assessment:	Class test (10%); Written and group assignments (20%); PowerPoint presentation (30%); Written assignment reports 40%

ENGINEERING ETHICS 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures and tutorials sessions and a number of case studies will be analysed. The student is expected to gain competence in many of the outcomes through self-study. A number of self-paced tutorials have been developed to assist the student in this regard.
Subject outline:	**The following learning areas will be addressed:** • Ethics and professionalism • Code of Ethics • Safety • Workplace responsibilities and rights • Environmental Ethics • Engineering Management Principles • Environment impact of Engineering Activity
Assessment:	Class test (10%); Written and group assignments (20%); PowerPoint presentation (30%); Written assignment reports (40%)

ENGINEERING MATHEMATICS 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures and tutorial classes. The student is expected to gain competence in many of the outcomes through self-study. A number of self-paced tutorials have been developed to assist the student in this regard. Group work is encouraged. These are completed under the supervision of tutors on a weekly basis. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment
Subject outline:	**The following learning areas will be addressed:** • Review of algebraic techniques • Engineering functions, trigonometric functions • Coordinate systems • Discrete mathematics • Sequences and series • Vectors • Matrix algebra • Complex numbers • Differentiation • Techniques of differentiation • Applications of differentiation • Integration • Techniques of integration • Applications of integration • Further topics in integration • Numerical integration • Taylor and Maclaurin series • Probability • Statistics and probability distributions
Assessment:	Class test 1 (10%); Class test 2 (15%); Tutorials (20%); Written assignment report (5%); FISA 50%

ENGINEERING MATHEMATICS 2

Pre-requisite:	Engineering Mathematics 1
Mode of delivery:	The subject is presented as a series of lectures and tutorial classes. The student is expected to gain competence in many of the outcomes through self-study. A number of self-paced tutorials have been developed to assist the student in this regard. Group work is encouraged. These are completed under the supervision of tutors on a weekly basis. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	On successful completion of this subject the student will be able to: Identify and explain relevant mathematical theory and methods; Apply mathematical theory and methods to the solution of mathematical problems; Apply mathematical theory and methods to the solution of real engineering problems. **The following learning areas will be addressed:** • Ordinary differential equations I • Ordinary differential equations II • The Laplace transform • Difference equations and the z-transform • Fourier series • Fourier transform

- Functions of several variables
- Vector Calculus
- Line integrals and multiple integrals

Assessment:	Class test 1 (10%); Class test 2 (15%); Tutorials (20%); Written assignment report (5%); FISA (50%

ENGINEERING SKILLS 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures and practical laboratory classes. In the practical lab sessions the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually as well as in teams. A number of self-paced practical exercises have been developed to assist the student in assimilating the subject material. The development of self-study skills is encouraged through a self-study industry relevant assignment.
Subject outline:	**The following learning areas will be addressed:** • General workplace safety and hand tools • Basic electronic/electrical components use, specifications and electronic symbols • Circuit construction techniques: proto-typing, soldering and de-soldering, bread-boarding, vero-board and printed circuit board, etc. • Circuit design techniques: theoretical principles (incl. interfacing & loading effects, etc.) • CAD package for circuit simulation and analysis techniques & Printed Circuit Board design • Circuit testing and fault-finding • Data sheet analysis • Manage/implement an electronic/electrical project according to given specifications • Technical report writing skills • Project management and teamwork skills. • Principles of measurement and sensors • Modular assembly project.
Assessment:	Class test 1 (15%); Class test 2 (20%); Practical assessments (60%); Written assignment report (5%)

INDUSTRIAL COMPUTING DESIGN PROJECT 3

Pre-requisite:	Engineering Communication 1, Engineering Ethics 1, Digital Systems 2, Software Design 2
Mode of delivery:	This is a capstone final year project module. The students will be provided with a variety of opportunities to apply the theory they have learnt in other subjects. The students will be expected to gain competence in the outcomes through guided self-study. An Industry relevant project will be undertaken by the students in order to gain real life experience in their chosen field of specialization. During the course of the year the students will work individually and in groups. The students will have opportunities for consultation with subject experts in order to achieve their objectives.
Subject outline:	**The following learning areas will be addressed:** • Integrate and apply knowledge learnt in other subjects to solve computer engineering problems. • Design computer engineering solutions to broadly defined problems. • Plan, execute and effectively manage a broadly defined computer engineering project. • Communicate engineering information and report on work done, both orally and in writing The content of this module will depend on the choice of project that each student will make. The student is expected to define his or her own project on consultation with relevant industry and the project supervisor. The project should fall within the field of study of one or more of the major subjects listed as co-requisites.
Assessment:	Project presentation (20%); Portfolio of Evidence (30%); Final written project report (50%)

INDUSTRIAL DESIGN PROJECT 3

Pre-requisite:	Engineering Skills 1, Engineering Communication 1, Engineering Ethics 1, Digital Systems 2, Software Engineering 2
Mode of delivery:	This is a capstone final year project module. The students will be provided with a variety of opportunities to apply the theory they have learnt in other subjects. The students will be expected to gain competence in the exit level outcomes through guided self-study. An Industry relevant project will be undertaken by the students in order to gain real life experience in their chosen field of specialization. During the course of the year the students will work individually and in groups. The students will have opportunities for consultation with subject experts in order to achieve their objectives.
Subject outline:	**The following learning areas will be addressed:** • Integrate and apply knowledge learnt in other subjects to solve electrical engineering problems. • Design electrical engineering solutions to broadly defined problems. • Plan, execute and effectively manage a broadly defined electrical engineering project. • Communicate engineering information and report on work done, both orally and in writing The content of this module will depend on the choice of project that each student will make. The student is expected to define his or her own project on consultation with relevant industry and the project supervisor. The project should fall within the field of study of one or more of the major subjects listed as co-requisites.
Assessment:	Project presentation (20%); Portfolio of Evidence (30%); Final written project report (50%)

NETWORK SYSTEMS 3

Pre-requisite:	Engineering Communication 1, Digital Systems 2, Operating Systems 2
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually.
Subject outline:	On successful completion of this subject the student will be able to: Demonstrate a working knowledge of the structure, functions and processes of modern network systems; Define and compare performance metrics for different network system configurations; Perform network system configuration and performance testing exercises in the laboratory. The following learning areas will be addressed: Introduction to control systems, System Modelling/Transfer Function; Laplace Transformation; Block Diagram Models; System Response; Introduction to Feedback Control; System stability; Steady state error as a performance criterion; Controller design; Root Locus techniques; Frequency response of systems; Sequential Logic- Latches, Timing circuits and Flip-flops. Asynchronous, Synchronous and Truncated counters; Shift registers and applications; Measurement and control in industrial processes; Pressure, flow, level and temperature measurement; Basic concepts in automatic control; Control valves and valve positioners; Plant floor communication in an industrial environment; Control loop characteristics; Program and interface a Siemens S7 300 PLC to automate a control process.
Assessment:	Class test 1 (5%); Class test 2 (10%); Class test 3 (10%); Practical assessments and written assignment/report (25%); FISA (50%)

OPERATING SYSTEMS 2

Pre-requisite:	Computer Architecture 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	On successful completion of this subject the student will be able to: Demonstrate a working knowledge of the structure, functions and processes of modern computer operating systems; Define and compare performance metrics for different operating systems and with different system configurations; Perform operating system configuration and performance testing exercises in the laboratory. **Content:** • Introduction to OS: History, role, purpose and functionality.

- OS principles: Structuring methods, abstractions, processes and resources.
- Concurrency and synchronization principles and techniques.
- Scheduling and dispatch. Processes and threads.
- Memory management techniques.
- I/O subsystem. Polling and interrupts.
- File management subsystem. Directories, file names and meta-data, access control.
- OS abstraction. Kernels and micro-kernels.
- OS case studies.

Assessment:	Class test 1 (5%); Class test 2 (10%); Class test 2 (10%); Practical assessments and written assignment/report (25%); FISA (50%)

PHYSICS 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	**Content:**

- Introduction to materials (A qualitative and semi-quantitative description of: Bohr model of the hydrogen atom, atomic energy level structures, bonding in materials and some electrical and mechanical properties of materials. More in-depth discussion will be covered under various items below.)
- Mechanics (units, vectors, Newton's laws of motion, equilibrium, work and energy principles, rigid body motion.)
- Oscillations and Waves
- Electricity and Magnetism (Coulomb's law and Gauss' law, electric fields, electric potential, electric current, capacitance and dielectrics, DC circuits and batteries; magnetic fields and forces, Biot-Savart law, Ampere's law and Faraday's Law of induction, inductance and basic AC circuits; Electrical and magnetic properties of common materials.)
- Introduction to Thermodynamics (Heat, temperature, and the First and Second law of thermodynamics. Thermal properties of materials and gases.)
- Basic Fluid mechanics (Hydrostatic pressure, buoyancy, pressure measurements, and fluid dynamics, Bernoulli's equation.)
- Light and Optics (Geometric optics including mirrors, lenses and prisms; physical optics including wave nature of light, electromagnetic spectrum, interference and diffraction; Basic concepts in illumination; Optical properties of materials.)
- Modern Physics (Wave particle duality, atomic (Bohr model, atomic energy levels) and introductory nuclear physics.)

Assessment:	Class test 1 (10%); Class test 2 (15%); Practical assessments (20%); Written assignment report (5%); FISA (50%)

POWER ELECTRONICS 2

Pre-requisite:	Electronics 1, Electrical Engineering 1, Physics 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.

Subject outline:	**Content:** • Power Electronics: An Enabling Technology • Design of Switching Power-Poles • Switch-Mode DC-DC Converter (SMPS) • Designing Feedback controllers in SMPS • Diode and PWM Rectifiers • Thyristor Converters • Synthesis of DC and Low-Frequency Sinusoidal AC Voltages • Power-Factor-Correction Active Circuits • Switch-Mode DC Power Supplies • Applications of Switch Mode Power Electronics in Motor Drives and UPS • Utility Applications of Power Electronics
Assessment:	Class test 1 (10%); Class test 2 (15%); Practical assessments (20%); Written assignment report (5%); FISA (50%)

POWER SYSTEMS 3

Pre-requisite:	Engineering Communication 1, Electrical Engineering 1, Physics 1, Engineering Mathematics 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	The following areas of learning will be addressed: • National grid Generation, Transmission, Distribution and Tariffs • Power System Load • Planning Principles and Planning Criteria • Economic Consideration and Loss Evaluation • Topologies of Electrical Power Systems • Arrangement in Grid stations and Substations • Transformers • Cable Systems • Overhead Lines • Flexible AC Transmission Systems (FACTS) • Load-Flow and Short-Circuit Current Calculation • Connection of "Green-Energy" Generation to Power Systems • Protection of Equipment and Power System Installations • Overvoltage’s and Insulation Coordination • Influence of Neutral Earthing on Single-Phase Short-Circuit Currents
Assessment:	Class test 1 (5%); Class test 2 (10%); Class test 3 (10%); Practical assessments & written report/assignment (25%); FISA 50%

SIGNAL PROCESSING 2

Pre-requisite:	Mathematics 1, Electronics 1
Mode of delivery:	The subject is presented as a series of lectures, practical laboratory sessions and tutorials. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually.

	A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	The following areas of learning will be addressed: • Introduction to signal processing. • Time reversal, compression, decompression, shifting in the time domain. • Periodic signals in continuous and discrete time. • Power and Energy signals. • Sampling. • Properties of systems. • Linear time invariant systems in discrete and continuous time. • Analysis of LTI systems using Fourier series and Fourier transforms. • Analysis of LTI systems using Laplace transforms.
Assessment:	Class test 1 (10%); Class test 2 (15%); Practical assessments (20%); Written assignment report (5%); FISA (50%)

SOFTWARE DESIGN 1

Pre-requisite:	None
Mode of delivery:	The subject is presented as a series of lectures and practical laboratory classes. In the practical lab sessions the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually as well as in teams. A number of self-paced practical exercises have been developed to assist the student in assimilating the subject material. The development of self-study skills is encouraged through a self-study industry relevant assignment.
Subject outline:	On successful completion of this subject the student will be able to: Identify and describe the basic features of structured programming and object orientated programming; Write well-structured programs in C and Java; Complete a basic practical software design project in a team. Design, testing and debugging. The following areas of learning will be addressed: Introduction to Computers, the Internet and the Web; Algorithms and Structured Program Development; Program Control – Functions, Arrays and Pointers, Characters and Strings, Formatted input and output ,C Structures, Unions, Bit Manipulations and Enumerations; File processing; Data structures and Algorithms; Pre-processors. Introduction to Classes, Objects Methods and Strings Voltage, Control Statements, Arrays and Array lists; Classes and Objects; Object-Oriented Programming: Inheritance & Polymorphism; Exception Handling; Object-Oriented Design with the UML; GUI Components
Assessment:	Three written class tests, evenly spaced over the duration of the course will be conducted under examination conditions. The purpose of these assessments is to ascertain whether the student has achieved the specific outcomes as listed above. Practical assessments, evenly spaced over the duration of the course, will be conducted. The practical assessments are conducted in the laboratory and will assess whether the student can apply in practice what they have learnt in both the theoretical and practical components of the course. A written report on an industry and subject relevant self-study assignment is required. **Assessment weights:** Class test 1 (5%); Class test 2 (10%); Class test 3 (10%); Practical assessments & written report/assignment (25%); FISA 50%

SOFTWARE DESIGN 2

Pre-requisite:	Software Design 1
Mode of delivery:	The subject is presented as a series of lectures, tutorials and practical laboratory classes. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors.

	The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	On successful completion of this subject the student will be able to: Identify and describe advanced features of structured programming; Identify and describe advanced features of object orientated programming; Write well-structured advanced programs in Java; Complete an advanced practical software design project. Design, testing and debugging. **Subject content:** • Strings, Characters and Regular Expressions • Files, Streams and Object Serialization • Recursion • Searching, Sorting and Big O • Generic Collections • Generic Classes and Methods • Custom Generic Data Structures • Applets and Java Web Start • Multimedia: Applets and Applications • Multithreading • Networking • Accessing Databases with JDBC • JavaServer™ Faces Web Applications • Ajax-Enabled JavaServer™ Faces Web Applications • Web Services
Assessment:	Two written class tests, evenly spaced over the duration of the course will be conducted under examination conditions. At the end of the course, a final written integrated summative assessment (FISA) will be conducted under examination conditions. The purpose of these assessments is to ascertain whether the student has achieved the specific outcomes as listed above. Practical assessments, evenly spaced over the duration of the course, will be conducted. The practical assessments are conducted in the laboratory and will assess whether the student can apply in practice what they have learnt in both the theoretical and practical components of the course. A written report on an industry and subject relevant self-study assignment is required. **Assessment weights:** Class test 1 (10%); Class test 2 (15%); Practical assessments (20%); Written assignment report (5%), FISA 50%

SOFTWARE ENGINEERING 2

Pre-requisite:	Electronics 1, Electrical Engineering 1
Mode of delivery:	The subject is presented as a series of lectures, tutorials and practical laboratory classes. In the practical lab sessions, the student will work on measuring and test equipment similar to that used in industry. In these sessions the student is expected to work individually. A number of self-paced tutorials have been developed to assist the student in assimilating the subject material. Group work is encouraged. These are completed under the supervision of tutors. The development of self-study skills is encouraged through self-paced tutorial work and a self-study industry relevant assignment.
Subject outline:	**The following areas of learning will be addressed:** **Structured Programming:** Introduction to Structured C Programming; Input /Output Data concepts – Unformatted and formatted I/O; Data types & Variables; Logic Flow Constructs & Operators – Arithmetic, Relational, Logical and Bitwise; Algorithm development – Pseudo code and flowcharts; Multi-Function programs; Program structures – decisions and looping; Arrays and strings; File handling. **Microcontrollers:** Introduction to microcontrollers; Microcontroller and microprocessor differences; Microcontroller internal Architecture; Bus Structures and memory; Software implementation; Microcontroller integrated peripheral hardware devices; ADC's,

DAC's, UART, CAPTURE COMPARE UNIT, PWM; Interrupts and Timer applications; RS232, SPI and IIC serial communications; Interfacing in embedded systems.

Programmable Logic Controllers (PLC's):

Introduction to PLC programming; Flow diagrams; Timers, counters and flags; I/O modules; Organizational, functional, programming and data blocks; Arithmetic and comparison instructions; Integrated mathematical function blocks; Analog functions; PID control loops and control strategies

Assessment:	Class test 1 (5%), Class test 2 (10%), Class test 3 (10%), Practical assessments & written report (25%), FISA (50%)

COURSEWORK MASTERS SUBJECTS (SMART GRID)

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

CONTROL DESIGN & OPTIMISATION IN SMART GRIDS

Pre-requisite:	None
Mode of delivery:	The teaching strategy includes formal lectures with presentations, tutorials, practical assignments and use of digital media to support formative and summative assessment methods.
Subject outline:	The subject is theoretical in nature and provides relevant knowledge that the students is capable of understanding the complex nature of the closed loop control and Energy Management Problems that are an integral part of the problems to be solved in order to design, develop, and implement the Smart grids. The theory and practice of important methods for control design and optimization are taught during the course. Theoretical knowledge is further extended by practical implementation of the considered methods to some industrial case studies. The subject is an elective and is presented during the second semester of the first year of the programme. It is narrowly focussed and supports all compulsory subjects as it reflects the interconnections between the elements of the Smart Grid and the multidisciplinary nature of these elements and their operation.
Assessment:	All assessments are compulsory and include tutorials, assignments and final summative assessments.

ELECTRICITY MARKET IN DEREGULATED POWER GRIDS

Pre-requisite:	None
Mode of delivery:	The teaching strategy includes formal lectures with presentations, tutorials, practical assignments and use of digital media to support formative and summative assessment methods.
Subject outline:	The subject has a theoretical nature necessary to provide relevant knowledge that students are capable of understanding the Smart Grid electricity markets of the deregulated power systems which includes the bilateral contracts and pricing bids of the renewable energy resources. The theory and practice of electricity markets which include methods such as nodal pricing and zonal congestion are taught during the course. Theoretical knowledge is further extended by practical implementation of the considered methods to some industrial case studies. The subject is an elective and is presented during the second semester of the first year of the programme. It is narrowly focussed and supports all compulsory subjects as it reflects the interconnections between the elements of the Smart Grid and the multidisciplinary nature of these elements and their operation.
Assessment:	All assessments are compulsory and include tutorials, assignments and final summative assessments.

EMBEDDED SYSTEMS FOR SIGNAL PROCESSING

Pre-requisite:	None
Mode of delivery:	The teaching strategy includes formal lectures with presentations, tutorials, practical assignments and use of digital media to support formative and summative assessment methods.
Subject outline:	The subject is designed to impart knowledge that is relevant to understanding the importance of processing the power system signals that occur within the power system grid of which the Smart grid is inclusive. Students will learn about the fundamental concepts related to digital signal processing such as analogue-to-digital conversion (ADC), digital-to-analogue conversion (DAC), sampling techniques, digital filter design and transform techniques such as the discrete Fourier transforms. The theoretical component will be supplemented with practical exercises where the various theoretical concepts will be utilized to implement simple digital processing systems for the conditioning and analysis of power system signals under various power system conditions, particularly those conditions under which faults occur. Here various case studies will be utilized to assist with the practical component of the course. The subject is an elective and is presented during the second semester of the first year of the programme. This subject supports the theoretical content offered in the compulsory subjects as it provides a mechanism to practically implement techniques and methods within power system monitoring, protection and control which is a necessary requirement for optimal operation of power systems and the Smart Grid.
Assessment:	All assessments are compulsory and include tutorials, practical assignments and final practical assessment.

IEC61850 STANDARD & CYBER SECURITY IN GRIDS

Pre-requisite:	None
Mode of delivery:	The teaching strategy includes formal lectures with presentations, tutorials, practical assignments and use of digital media to support formative and summative assessment methods.
Subject outline:	This subject is designed to provide relevant knowledge on smart grid communication and cyber security. Students learn about emerging technologies in Smart Grid communication, cryptography, communication network architecture, network security, cyber security threats and countermeasures, and cyber-physical systems. The course encompasses theoretical and practical aspects. The theoretical aspect is complemented by the practical aspect as the theoretical methods and principles taught are tested and validated using practical examples and case studies. The topics complement the other subjects by discussing the communication network framework and security required in Smart Grids.
Assessment:	All assessments are compulsory and include tutorials, practical assignments and final summative assessments.

POWER ELECTRONICS & CONTROL IN SMART GRIDS

Pre-requisite:	None
Mode of delivery:	The teaching strategy includes formal lectures with presentations, tutorials, practical assignments and use of digital media to support formative and summative assessment methods.
Subject outline:	The subject provides a detailed theoretical background needed to understand power electronics as an enabling technology for Smart Grids. Various aspects encompassing power electronic devices and power electronic systems, including the control of power electronic circuits, are covered in sufficient detail to provide the platform for treating the wide range of applications of power electronics in the Smart Grid. This subject establishes an in-depth theoretical understanding of the core aspects of power electronics technologies, and the many tools provided for meeting the needs of Smart power systems. The theory covered in the subject is reinforced by means of considering relevant industry-related problems of a practical nature, through a number of tutorials, assignments and laboratory experiments. This subject is a core (i.e. compulsory) module and is presented in the second semester of the first year of the program. It is closely tied to the other modules of the program, in as far as it covers many important methods, tools and concepts needed for a variety of Smart Grid applications.
Assessment:	All assessments are compulsory and include tutorials, assignments and final summative assessments.

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	The teaching strategy includes formal lectures with presentations, tutorials, practical assignments and use of digital media to support formative and summative assessment methods.
Subject outline:	The subject is more theoretical in nature and provides relevant knowledge that the students is capable of understanding the research process which includes different components such as literature review, formulation of the research question, objectives, aims and hypothesis of the research, scope and delimitation of the project, and research methods. The student is able to conduct experiments to prove the research hypothesis and present the research findings and recommendations. The subject also provides the student with the practical aspects by introducing software tools for plagiarism checking and includes introducing students to the online digital platform for submission of relevant documents in their research project study. The subject is compulsory and is presented during the first semester of the first year of the programme.
Assessment:	All assessments are compulsory and include tutorials, assignments and a draft proposal assessment.

RESEARCH PROJECT & REPORT

Pre-requisite:	None
Mode of delivery:	The student in consultation with the supervisor meet regularly to determine project focus and direction.
Subject outline:	This subject provides the students with theoretical and practical research work under the guidance of a supervisor that equips them to learn how to develop and implement an electrical engineering project for solving problems in building the elements of Smart Grids. The field of the research work depends on the choice of project that each student has to develop. The students are guided to understand and perform the various stages of project development such as: planning and managing, conducting literature review, analysis and system simulation, application and development of

	new design methods, testing of the obtained solutions by building test beds and investigation of various case studies, data collection and analysis, conclusion, deliverables formulation, and future application, and research report writing. The subject is compulsory and is performed during the second year of the programme. It is narrowly focussed and supported by all Compulsory and Elective courses as it reflects the interconnections between the elements of the Smart Grid and the multidisciplinary nature of these elements and their operation.
Assessment:	A mini-thesis document including all aspects of the research project is produced, which is externally examined and evaluated.

SMART GRID & DISTRIBUTED ENERGY RESOURCES

Pre-requisite:	None
Mode of delivery:	The teaching strategy includes formal lectures with presentations, tutorials, practical assignments and use of digital media to support formative and summative assessment methods.
Subject outline:	The subject provides a sufficiently comprehensive overview of the Smart Grid, outlining its various components and the differentiating factors in comparison with the traditional electric power system, as well a detailed theoretical treatment of the core aspects of Distributed Energy Resource (DER) technologies, emphasizing their key role in the realization of the Smart grid. Various aspects encompassing types and characteristics of the main distributed energy resources, conversion technologies, control mechanisms and grid integration strategies, are covered in sufficient detail to enable the student credited with this course to effectively plan, develop and design DER systems, both for stand-alone operation as well as in the context of the Smart grid. The intention with the subject is to establish an in-depth theoretical understanding of the core aspects of DER technologies, underscoring their relevance and significance to the building of a Smart Power system that caters to the present and future needs of a secure, reliable and efficient electric power supply system. The theory covered in the module is reinforced by means of considering relevant industry-related problems of a practical nature, through a number of tutorials, assignments and laboratory experiments. SDR500S is a core (i.e. compulsory) module and is presented in the first semester of the first year of the program. It is closely tied to the other subjects of the program, as far as it provides a concise yet sufficiently detailed introduction to the Smart grid, as well as covering the important topic of DER systems and their integration into the Smart Grid.
Assessment:	All assessments are compulsory and include tutorials, assignments and final summative assessments.

SMART GRID PROTECTION AUTOMATION & CONTROL

Pre-requisite:	None
Mode of delivery:	The teaching strategy includes formal lectures with presentations, tutorials, practical assignments and use of digital media to support formative and summative assessment methods.
Subject outline:	This subject is designed to provide relevant knowledge on the theoretical principles required in the modelling of synchronous and induction machines, power system stability, wide area monitoring, protection, automation, and control. The students are informed about emerging technologies, new techniques and methods of solution that is applied for wide area monitoring, protection, and control. The course encompasses theoretical and practical aspects. The theoretical aspect is complemented by the practical aspect as the theoretical methods and principles taught are tested and validated using practical examples and case studies. The subject is compulsory and is presented during the second semester of the first year of the programme. The topics complement the other compulsory subjects by discussing power system modelling, power system stability, and protection, automation, and control systems required in Smart Grids.
Assessment:	All assessments are compulsory and include tutorials, assignments and final summative assessments.

COURSEWORK MASTERS SUBJECTS (ENERGY)

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

ALTERNATIVE & SUSTAINABLE ENERGY TECHNOLOGIES

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	Alternative and Sustainable Energy Technologies exposes the student to an overview of the most common renewable energy sources and their typical applications. These renewable sources include solar, wind, bioenergy, hydropower, geothermal power and waste-to-energy systems. Energy storage technologies are also included in this study since renewable technologies, due to their intermittency of supply to an electrical system, need to have the capability to compensate for this unforeseen fluctuation in supply. These energy storage technologies include batteries, compressed air energy storage, flywheel systems and pumped storage hydropower. Fuel cells are included as an energy storage facility together with an integration of the hydrogen economy. As engineers and researchers, exposure to these renewable technologies will allow the design of applications for efficacy.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

BIO-ENERGY TECHNOLOGY

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	To present core topics and key concepts surrounding bioenergy generation and environmental sustainability. To provide students with a comprehensive knowledge and understanding of biochemistry and microbiology as they relate to bioprocess technology. To gain an in-depth understanding of the applied technologies used in production, harvesting, and handling of biomass and its various energy products.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

DISSERTATION (MINI-THESIS)

Pre-requisite:	None
Mode of delivery:	In consultation with research supervisor
Subject outline:	Apply key aspects of research design such as exploration, description and explanation and the research process in order to plan and execute an engineering research project and present the artefact as a cohesive document that meets institutional guidelines.
Assessment:	External examination by two examiners

ENERGY ACCESS IN AFRICA & DEVELOPING COUNTRIES

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	Currently sub-Saharan Africa faces an energy poverty challenge in the provision of modern energy. The subject will analyse the definition of energy access. It will consider the challenges of providing access to modern energy. The subject deliberates Energy access assessment, Energy Access enabling policies, Energy diversity & security, Energy user profiles. It also investigates Energy utilisation, Energy Poverty Index, The Multidimensional Energy Poverty Index (MEPI) approach and Total energy access minimum standards.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

ENERGY AUDITING

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	To provide participants with a profound knowledge of the ISO 50001:2011 standard for Energy Management Systems. An overview of understanding of ISO 50001:2011 and its requirements as well as understand their roles in maintaining and meeting the requirements of the code of practice within organisations. Energy Management System Implementation, Assessment and Certification. Basic Components of an Energy Audit. Introduction to Energy Services companies, Guidelines for preparation of Energy Audit Reports and the Structure of the Energy Audit Reports. Introduction to Load profiles, Different Tariff definitions and Analysis of Energy Bills. Energy Rand savings.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

ENERGY EFFICIENCY IN INDUSTRY/RESIDENTIAL

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	The objective of this course is to provide an investigation of the field of energy efficiency and energy management in both electrical and thermal utilities encountered in residential and industry applications. Energy efficiency is categorized into four categories: technology, equipment, operation and performance. Performance efficiency being is the efficiency of energy, which is externally determined from the energy system and can be classified by deterministic indicators such as technical indicators, environmental impact, cost, production, energy security, and energy sources. The evaluation of a system wide measurement approach is the operation efficiency and is the coordination of variable components within a system.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

ENERGY MODELLING

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	The subject includes application and in-depth knowledge on electricity system planning and economics. Analyse the nature of planning in electricity sector and the hierarchy of electricity planning models. Illustrate electricity demand forecasting and review the load forecasting techniques and guidelines for selection. Describe the economic operation of power system and employ the planning methods properly. Explain the economics of power system reliability by identifying the key indicators, performing calculations and dealing with uncertainties in capacity. Expansion planning. Explore various electricity pricing approaches, modelling approaches and using Monte Carlo techniques. Determine the value-based transmission expansion by quantifying the value of transmission. Formulate power-flow problems covering techniques for power-flow studies
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

GENERATION, TRANSMISSION & DISTRIBUTION OF ENERGY

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	The electrical power system is a complex network consisting of generators, loads, transmission lines, transformers, buses, circuit breakers, etc. For the analysis of a power system in operation, a suitable model is needed. This model basically depends upon the type of problem on hand. Accordingly, it may be algebraic equations, differential equations, transfer functions, etc. The power system is never in steady state as the loads keep changing continuously. The modern electrical power system is made up, not only of AC elements, but of DC elements too. Thus, many connections are now made, not with AC overhead lines or cables, but by HVDC links. We could say that we have a kind of hybrid AC and DC system. We no longer have a purely AC system. One of the consequences of this situation is that the traditional providers of system inertia that we have relied on in the past are being replaced by providers that do not possess inertia in the conventional meaning of the word.

Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

GREEN BUILDING ECONOMICS & VALUATION

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	Green Building Economics and Valuation exposes the student to an overview of the demand and supply of green building which are designed to be energy and water efficient. The subject includes; effective use of scarce resources; markets for green buildings and infrastructure; environmental economics; impacts of sustainable development on stakeholders; optimisation of green building performance; sustainable macroeconomics, and green building performance. The supply of green building is most likely to be driven by factors including the cost of construction, price signals of other certified buildings, the availability and prices of raw materials and human capital to construct green buildings, advances in green technology, and government policies mandating energy efficiency. Hence, there is a need to broaden the understanding of market-based measures and policies that are effective in producing the desired behaviour among engineers and built environment professionals. These market-based measures and policies must operate at the two levels of economics, namely macroeconomic and microeconomic level.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

PROCESS ENERGY ANALYSIS & INTEGRATION

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	The subject aims to expose students to strategy for design and optimisation of integrated process systems with focus on efficient use of energy. In addition, systematic methods will be taught for analysis and design of thermally driven separation systems (distillation and evaporation), heat exchanger networks and utility systems (furnace, boiler and condenser). Also includes Process synthesis - interaction between process equipment units and efficiencies energy in the chemical processes, Principle of process integration and intensification, Process Integration for energy efficiency, Systematic methodology for energy saving in process industries, Pollution prevention through process integration, Exergy analysis – 3rd Law of thermodynamics, irreversibility, Lost Work approach, Systematic methodology for energy saving in total sites.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	Locate, analyse, critically appraise and synthesise information from a wide variety of sources in order to compile the literature review of the research proposal and to make informed decisions regarding research design and methodology. Select a research topic and evaluate suitability of the research topic using criteria relevant to the field of study such as: scope, relevance, significance, feasibility, ethics, objectivity, originality, etc. in consultation with the supervisor(s). Formulate a clear and concise research problem statement and sub-problems using appropriate criteria and guidelines relevant to the field of study and in consultation with supervisor(s). Generate research question(s), aims and objectives of the study and hypotheses (if applicable) based on relevant criteria and guidelines relevant to the field of study and in consultation with supervisor(s). Compile a research proposal based on institutional and faculty criteria, procedures and guidelines relevant to the field of study and in consultation with supervisor(s).
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

SOLAR THERMAL SYSTEMS

Pre-requisite:	None

Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	The intermittent day solar radiation and its total absence at night causes additional challenges. In some systems like solar water purifiers, you will study that it actually causes total failure of system performance even if the radiation were to stabilise later in the day. We will again show you how our own efforts at CPUT have handled such a problem, and we do invite you to join the struggle in round the clock solar water purification as well as in similar efforts in other systems. Why do we study and work on such 'stubborn' systems? It is simply that solar energy is available everywhere, especially in Africa. The systems – as you will find out during the course - can be designed for a wide range of users: from small, poor African homesteads, to big government and industrial giants. Everyone can find a suitable system to use in these. More importantly, the manufacture of most of them is very basic, often using locally available materials in many places. This can reduce costs and increase availability. What currently lacks in Africa, is a sufficient number of engineers devoted to questioning the status – quo, and taking action to use available resources to solve the everyday problems of people around them.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

SUSTAINABLE BUILDING SERVICES & ENERGY EFFICIENCY

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	Heating, ventilation and air conditioning (HVAC) systems supply fresh air and condition the indoor air temperature and humidity of a building. However, HVAC is reported to consume a disproportionate amount of energy in buildings. HVAC systems normally consist of components to supply, filter, heat, cool and distribute the conditioned air into targeted interior spaces. In an HVAC system, the principle: 'the whole is more than the sum of its parts' is applied. This means the high efficiency of one component can operate at expense of the others. Therefore, HVAC is a key component of climate change mitigation potential in the building sector. In South Africa, there has been an upsurge in electricity prices by more than 200% since 2009. The country also has a shortage of electricity supply and customers are being asked to reduce their energy consumption. Coupled with the power price increases, there is more awareness of how much power consumers are using. Against this background, this subject is aimed at firstly providing an overview of sustainable buildings construction and determinants as applicable to the African continent. Secondly, to enhance students' critical approach to theories, techniques and methods in sustainable building energy projects. This will refine and enhance academic competence in a variety of disciplinary backgrounds and provide an applied focus for postgraduate study with a strong professional and industrial orientation. Thirdly, to develop understanding of theories and practical skills necessary for the students to be responsible for the implementation, operation and management of building energy systems following appropriate practical experience, with minimum further training. Fourthly, to enhance and relate students' communication skills to the needs of the building and renewable energy sector.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

WIND ENERGY - ADVANCED

Pre-requisite:	None
Mode of delivery:	6 periods/week (6 lectures)
Subject outline:	The energy of wind has been exploited for thousands of years. The oldest applications of wind energy include extracting water from wells, making flour out of grain, and other agricultural applications. In recent times, the use of wind energy has evolved to, primarily, generation of electricity. As electricity generators, wind turbines are connected to some electrical network. These networks include battery-charging circuits, residential scale power systems, isolated or island networks, and large utility grids. With the rapid worldwide expansion of wind engineering in the 21st century, it is evident that this technology will play an integral part in the global movement towards cleaner energy production to reduce the global pollutant emissions. This module will prepare students for technical and management work in wind farm development, construction, operations and maintenance. It will also provide an insight into the practical issues of wind energy conversion, so that research efforts can be directed appropriately. A description of the topics which are fundamental to understanding the conversion of wind energy to electricity and its eventual use by society will be presented within the module. These

	topics span a wide range, from meteorology through many fields of engineering to economics and environmental concerns.
Assessment:	All assessments are compulsory. Assessments can include assignments, class tests, tutorials, final summative assessment, debates and presentations.

COURSEWORK MASTERS SUBJECTS (SATELLITE SYSTEMS & APPLICATIONS)

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

ENGINEERING FOR SPACE ENVIRONMENT

Pre-requisite:	None
Mode of delivery:	Direct instruction will form part of the teaching strategy through formal lectures, slide presentations, explicit teaching, guided and shared reading as well as the use of multimedia
Subject outline:	The aim of this course is to learn methods and techniques used in designing space-borne systems operating in aerospace and space environment. Necessary Physics will be covered followed by several simulation tools exercises. **Space environment:** Space weather, Radiation. **Intro to attitude determination and control** **Mechanical load analyses:** Thermal and thermal vacuum, mechanics (vibration and acoustic) **Techniques for robust design:** Reliability analysis, FMEA analysis, FDIR analysis, Software for mission safety
Assessment:	Class tests, assignments, integrated projects, practical work, tutorials, presentations.

GENDER & HUMAN RIGHTS

Pre-requisite:	None
Mode of delivery:	Direct instruction will form part of the teaching strategy through formal lectures, slide presentations, explicit teaching, guided and shared reading as well as the use of multimedia
Subject outline:	**Gender & Development** **Gender Theorisation** • Overview of Gender Theorisation • Depining Gender • Sex and Gender • Conception of Power • Gender and Power Relations • Gender Identity Construction • Universal Ontological Specificity for Women • Judith Butler's Performativity Gender Theory **Gender Representation in the different approaches to development** • The Women in Development (WID) approach • The Gender and Development (GAD) approach • The Gender Mainstreaming approach • Representation of Masculinity and Femininity in development • Power Conception and Gender Relations • Dominance, Subordination, Subjectivity and Inter-Subjectivity • Language and gender and implications for development • Changing pattern of gender representation in development • Gender Identity Re-Signification and development indicators • The role of agency and Activism in development
Assessment:	Class tests, assignments, integrated projects, practical work, tutorials, presentations.

GENERAL HISTORY OF AFRICA

Pre-requisite:	None
Mode of delivery:	Direct instruction will form part of the teaching strategy through formal lectures, slide presentations, explicit teaching, guided and shared reading as well as the use of multimedia
Subject outline:	This course aims at providing the history of Africa in the wider context of the world history. It examines the evolution and development of African states and societies, the cultural systems, the social and political structures, the development of technology and agriculture as well as broad changes and continuities in Africa's historical development. The course touches on major themes such as the central place of Africa in the evolution of humankind, the ancient civilizations of Africa and their links with the outside world, the contacts and interactions among African peoples, Africa's contact with the Arabs and Europeans, the introduction and impact of Islam and Christianity, the slave trade and the prelude to European colonialism. The course will also illustrate how Africans have influenced regions beyond their continent's borders, how they have been influenced from the outside
Assessment:	Class tests, assignments, integrated projects, practical work, tutorials, presentations.

MANAGEMENT OF SPACE TECHNOLOGY

Pre-requisite:	None
Mode of delivery:	Direct instruction will form part of the teaching strategy through formal lectures, slide presentations, explicit teaching, guided and shared reading as well as the use of multimedia
Subject outline:	Management of Space Technology (MoST) is designed to teach students about space business, innovation and management. This course delves into the advantages of space technology for economic growth, new markets and applications as well as space programs management, technology innovation and space-based technology commercialisation. As a first course in MoST, the students are introduced to six major topical areas: Strategic management of Technology, Introduction to corporate finance, Digital marketing, Emerging Technologies, Technology-Based Entrepreneurship, Managing of Diversity. While each of these topics is a rightful subject area in their own, the course aims to introduce students to some key focus areas within each of these topical areas.
Assessment:	Class tests, assignments, integrated projects, practical work, tutorials, presentations.

MINI THESIS

Pre-requisite:	None
Mode of delivery:	The masters project is student driven in consultation with the project supervisor.
Subject outline:	The focus areas of the research projects will be aligned with the research niche areas of the CPUT Satellite Programme. These niche areas include satellite subsystems, payloads and applications, applied electromagnetics, space science and radiation, data intelligence and security, system and quality engineering, production planning and control, orbital dynamics, structures, production techniques for multi-functional components, and verification testing
Assessment:	An artifact should be produced at the end of the research period. A technical report or thesis must be produced.

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	Direct instruction will form part of the teaching strategy through formal lectures, slide presentations, explicit teaching, guided and shared reading as well as the use of multimedia
Subject outline:	The course is designed to help students conduct research projects effectively, systematically and with an economy of time and effort. It also raises awareness of the importance of developing good reasoning, reading and writing skills

	and familiarises students with the academic environment. • Research philosophy, concepts, terminology • Problem-solving – the essence of research • Finding and formulating the research problem • Popular research methods • The research proposal • Accessing online information • Surveys and statistics • Experiments and simulation • Qualitative and quantitative research • Publishing research • Time and resource management • Reading and writing • Administration of postgraduate research at CPUT
Assessment:	Class tests, assignments, integrated projects, practical work, tutorials, presentations.

SATELLITE APPLICATIONS

Pre-requisite:	None
Mode of delivery:	Direct instruction will form part of the teaching strategy through formal lectures, slide presentations, explicit teaching, guided and shared reading as well as the use of multimedia
Subject outline:	Deploy advanced methods of digital image processing, interpretation and analysis. Evaluate and apply advanced methods and tools for image data exploration, modelling and prediction for environmental resource management. • Platforms for free acquisition of satellite imagery for environmental resource management; • Introduction to the AMESD/MESA Programme (African Monitoring of the Environment for Sustainable Development); • Time-series analysis and temporal statistics; • Application of GIS and RS techniques for monitoring and spatial analysis (fire, flood, drought, agriculture and livestock); • Application of remote sensing technologies for environmental management and disaster risk assessment; • Advanced GIS and RS methods for land cover change detection, modelling and prediction. • Combination of 2D and 3D data sets for advanced environmental analysis, monitoring and management • GPS-based data collection and verification (field work).
Assessment:	Class tests, assignments, integrated projects, practical work, tutorials, presentations.

SATELLITE MISSION ANALYSIS & DESIGN

Pre-requisite:	None
Mode of delivery:	Direct instruction will form part of the teaching strategy through formal lectures, slide presentations, explicit teaching, guided and shared reading as well as the use of multimedia
Subject outline:	This course aims to provide students with an introduction to Satellite Mission Analysis and design, covering the mission design process from broad mission objectives to a final mission concept baseline. Complete system design and sizing are studied down to subsystem level, including both space and ground segments. The complex interrelationship between the various systems parameters is discussed along with trade-offs between alternative mission architectures. • Introduction (5h): Space projects, applications, standards, TRL, regulations, mission costs • Orbital Mechanics (10h): Kinematics, 2-body problems, Kepler's laws of motion, satellites • Spacecraft payload design and sizing (5h) • Spacecraft Subsystems (15h): Control systems and Propulsion, On-board computing, • Communications, power, Structures and thermal • Launch and operations (5h) • Mission assurance (10h): The space environment and survivability, Reliability, FMEA, FDIR

Assessment:	Class tests, assignments, integrated projects, practical work, tutorials, presentations.

SATELLITE SUBSYSTEMS

Pre-requisite:	None
Mode of delivery:	Direct instruction will form part of the teaching strategy through formal lectures, slide presentations, explicit teaching, guided and shared reading as well as the use of multimedia
Subject outline:	Detailed design of each subsystem (Attitude and Orbital Control Subsystem, On Board Computer Communication Subsystem, Electric Power Subsystem, Structure and Mechanisms) The course is conducted as a project. Each student will take one subsystem. The first two weeks will cover subsystem definitions, trade studies and alternative concepts. The subsystem conceived must be verified to meet the mission and system requirements.
Assessment:	Class tests, assignments, integrated projects, practical work, tutorials, presentations.

DEPARTMENT OF INDUSTRIAL & SYSTEMS ENGINEERING

DEPARTMENT OFFICE-BEARERS

POSITION	NAME	TELEPHONE	FAX	E-MAIL
Head of Department	Prof B Yan DTech (Mechanical Engineering)	021 969 6225	--	YanB@cput.ac.za
Secretary	Ms SV Ngonda MTech (Business Administration)	021 959 6600	086 778 0505	NgondaSV@cput.ac.za
Postgraduate Research Assistant	Ms B Pupuma ND (Public Management)	021 953 8481	--	PupumaB@cput.ac.za

DEPARTMENTAL STAFF

POSITION	NAME	QUALIFICATIONS
Senior Lecturer / Head of Programme: Industrial Engineering	Mr B Morar	BSc (Mechanical Engineering), MSc (Engineering in Engineering Management)
Head of Programme: Quality	Dr LZ Valentine	BTech (Food Technology), MTech (Quality), PhD (Commerce & Administration)
Senior Lecturer	Dr S Bosman	PhD (Engineering)
Lecturer	Ms L Ganduri	MEng (Manufacturing Systems & Operations Management)
Lecturer	Ms M Harris	ND (Management), MTech (Quality)
Lecturer	Mrs DV Jaftha	ND (Textile Technology), MTech (Quality)
Lecturer	Mr WM Mukendi	BSc (Mechanical), MTech (Mechanical)
Lecturer	Mr W Ngetich	BSc (Industrial Engineering), MTech (Quality)
Lecturer	Mr L Nyanga	MEng (Manufacturing Systems & Operations Management)
Lecturer	Dr BC Swartz	ND (Veterinary Technology), MTech (Quality), DPhil (Quality Management)
Lecturer	Mr T Tendayi	BEng Hons (Industrial & Manufacturing), MSc Eng (Industrial)
Junior Lecturer	Mr D Adams	MTech (Industrial Engineering)
Junior Lecturer	Mr M Gxamza	ND (Operations Management), ND (Industrial Engineering), BTech (Quality), BTech (Industrial Engineering)

QUALIFICATIONS OFFERED

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration	Work Integrated Learning
Diploma in Industrial Engineering	D3INDS	3 years	6 years	6 months
Diploma in Industrial Engineering (Extended)	D3INDX	4 years	8 years	6 months
Advanced Diploma in Industrial Engineering	ADINDS	2 years part time	4 years part time	--
Advanced Diploma in Quality	ADQLTY	2 years part time	4 years part time	--
Master of Engineering in Quality	MGQLTR	2 years	4 years	--
Master of Engineering in Engineering Management	MGENMC	1 years full time 2 years part time	2 years full time 4 years part time	--

DIPLOMA IN INDUSTRIAL ENGINEERING

COURSE AIM

Graduates are competent members of the engineering teams, executing technical tasks by applying their knowledge to the identification and solution of well-defined industrial engineering problems. Graduates obtaining this qualification will be competent in applying industrial engineering techniques and strategies resulting in improved effectiveness and productivity in industry.

PURPOSE AND RATIONALE OF THE QUALIFICATION

The primary purpose of this vocationally-oriented diploma is to develop focused knowledge and skills as well as experience in a work-related context. The Diploma in Industrial Engineering equips graduates with the knowledge base, theory, skills and methodology of one or more engineering disciplines as a foundation for further training and experience towards becoming a competent engineering technician. This foundation is achieved through a thorough grounding in mathematics and natural sciences specific to the field, engineering sciences, engineering design and the ability to apply established methods. Engineering knowledge is complemented by methods for understanding of the impacts of engineering solutions on people and the environment.

CAREER OPPORTUNITIES

Graduates are usually employed by manufacturing firms and may also find employment in the service sector. Training and experience enable the graduate to influence the factors contributing to productivity, including the best utilisation of people, machines, space, materials, information, and money. They undertake investigations and advise management on systems, manufacturing methods, plant layout, materials handling, production control, purchasing and stock control, quality control, work standards and industrial economics.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or TS 5 (60%)	Recommended: MECHT (3)	M (N4) 60% ES (N4) 60% ES (N4) 60%	E (5) (60%) M (5) (60%) ES (3) with 60%

Legend:
M (Maths)
ML (Mathematical Literacy)
TM (Technical Maths)
ES (Engineering Science)
PS (Physical Science)
TS (Technical Science)
MECHT (Mechanical Technology)

PROFESSIONAL REGISTRATION

The Diploma in Industrial Engineering qualification is accredited by the Engineering Council of South Africa (ECSA). This qualification meets the educational requirement for graduates to register as a Candidate or potential for registration as a Professional Engineering Technician with ECSA and with the correct subject selection acceptance as a Candidate to write the examinations for Certificated Engineers.

DURATION

Full-time: Three years, including 6 months of experiential learning.

VENUE

Bellville

DIPLOMA IN INDUSTRIAL ENGINEERING (D3INDS)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st YEAR (All subjects compulsory)									
Engineering Management	ENM150S	01	Y	5	C	--	24	0.20	CE
Engineering Manufacturing Technology	EMT150S	01	Y	5	C	--	24	0.20	CE
Engineering Mathematics 1	MTH153S	01	Y	5	C	--	24	0.20	CE
Engineering Physics	PHY152S	01	Y	5	C	--	24	0.20	CE
Industrial Engineering Design	IED150S	01	Y	5	C	--	24	0.20	CE
2nd YEAR: All 1st year subjects must be passed before admission to 2nd year is allowed. (All subjects compulsory)									
Engineering Economics	EEC260S	01	Y	6	C	ENM150S	24	0.20	CE
Engineering Mathematics 2	MTH262S	01	Y	6	C	MTH153S	24	0.20	CE
Engineering Workstudy	EWY260S	01	Y	6	C	ENM150S	24	0.20	CE
Industrial Production Engineering	PIB260S	01	Y	6	C	--	24	0.20	CE
Qualitative Techniques	QUA260S	01	Y	6	C	MTH153S	24	0.20	CE
3rd YEAR: All 1st and 2nd subjects must be passed before admission to 3rd year is allowed. (All subjects compulsory)									
Facility Layout and Materials Handling	FAM360S	01	Y	6	C	EWY260S, PIB260S, EEC260S, IED150S	24	0.20	CE
Industrial Engineering Project	IEP360S	01	Y	6	C	QUA260S, EEC260S (Co-CIM360S, ORE360S SYE360S)	60	0.50	PR
Computer Integrated Manufacturing	CIM360S	01	S1	6	C	EMT150S, IED150S	12	0.10	CE
Operations Research	ORE360S	01	S1	6	C	PIB260S	12	0.10	CE
Systems Engineering	SYE360S	01	S1	6	C	IED150S, EWY260S	12	0.10	CE

DIPLOMA IN INDUSTRIAL ENGINEERING (EXTENDED)

COURSE AIM

In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the Diploma are spread over two years (Year 0 and 1), allowing a more supportive academic environment. On completion of the two-year Foundational Programme, students will integrate with the normal programme.

DURATION

Full-time: The four-year programme comprises 7 academic semesters and 1 semester of in-service training.

DIPLOMA IN INDUSTRIAL ENGINEERING (EXTENDED) (D3INDX)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Year 0 (All subjects compulsory)									
Engineering Management 1A	ENM150X	01	Y	5	C	--	12	0.10	CE
Engineering Manufacturing Technology 1A	EMT150X	01	Y	5	C	--	12	0.10	CE
Engineering Mathematics 1A	MTH153X	01	Y	5	C	--	12	0.10	CE
Engineering Physics 1A	PHY152X	01	Y	5	C	--	12	0.10	CE
Industrial Engineering Design 1A	IED150X	01	Y	5	C	--	12	0.10	CE

Year 1 will only be offered from 2022

ADVANCED DIPLOMA IN INDUSTRIAL ENGINEERING

COURSE AIM

Graduates are competent members of engineering teams executing technical tasks, and applying their knowledge in independent thinking and communication. They are also proficient in the identification and solution of broadly-defined engineering problems. Graduates obtaining this qualification will be competent in applying industrial engineering techniques and strategies resulting in improved effectiveness and productivity in industry.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is primarily industry oriented. The knowledge emphasises general principles and application or technology transfer. The Advanced Diploma in Industrial Engineering qualification provides students with a sound knowledge base and ability to apply their knowledge and skills to industrial engineering problems, while equipping them to undertake more specialised and intensive learning.

CAREER OPPORTUNITIES

An industrial engineer is usually employed by manufacturing firms, but may also find employment in commerce. Training and experience enable the graduate to influence the factors contributing to productivity, in other words, the best utilisation of people, machines, space, materials, information, and money, and to undertake investigations and advise management on: systems, manufacturing methods, plant layout, materials handling, production control, purchasing and stock control, quality control, work standards, and industrial economics, integrated manufacturing systems, operating information systems, and those of project and logistics management.

PROFESSIONAL REGISTRATION

The Advanced Diploma in Industrial Engineering qualification is accredited by the Engineering Council of South Africa (ECSA). This qualification meets the educational requirement graduates to register as a Candidate or potential for registration as a Professional Engineering Technologist with ECSA and with the correct subject selection acceptance as a Candidate to write the examinations for Certificated Engineers.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

A 360 credit National Diploma or Diploma in Industrial Engineering or an equivalent qualification at NQF L6.

OR

A 240 credit Diploma in Engineering Technology in Industrial Engineering or an equivalent qualification together with the 120 WIL component completed (aligned to ECSA E-21-PN standard for the Advanced Certificate in Engineering Technology in Industrial Engineering or a related field.

Students should obtain a 60% pass in the exit level subjects of the 360 National Diploma/Diploma and 60% for the second year of the Diploma in Engineering Technology together with 60% for the WIL component. Students who do not obtain the 60% average, and with at least 1-year relevant industrial experience may be considered on merit.

All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

Recognition for Prior Learning (RPL) in line with the CPUT RPL policy. RPL will be considered in the context of the CPUT's commitment to alignment with the principles of the NQF and the National Plan for Higher Education in South Africa.

DURATION

Part-time: Two years

VENUE

Bellville

ADVANCED DIPLOMA IN INDUSTRIAL ENGINEERING (ADINDS)

Students register for three subjects per semester over the two years (as indicated in the table below). Each subject is only offered every two years, with a new intake every year.

Year 1 is offered in 2021 and Year 2 is offered in 2022. Students can start in any year as there are no pre-requisite subjects.

Assessment Type: CE – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester 1 or 2 subject

Period of Study	Year/Semester Subject	Subject name	Subject Code	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
1st Year of the Advanced Diploma									
4	S1	Environmental Engineering	EME460S	C	--	6	7	0.050	CE
4	S1	Quality Engineering	QTE470S	C	--	7	14	0.100	CE
4	S1	Systems Engineering	SSE470S	C	--	7	14	0.100	CE
4	S2	Computer Integrated Manufacturing	CIM470S	C	--	7	14	0.100	CE
4	S2	Industrial Sociology	IDS460S	C	--	6	7	0.050	CE
4	S2	Project Engineering	PJE470S	C	--	7	14	0.100	CE
2nd Year of the Advanced Diploma									
4	Y	Research Methodology	REM479S	C	--	7	14	0.100	CE
4	S1	Enterprise Engineering	ENE470S	C	--	7	14	0.100	CE
4	S1	Logistics Engineering	LGE470S	C	--	7	14	0.100	CE
4	S2	Enterprise Resource Planning	ERP470S	C	--	7	14	0.100	CE
4	S2	Maintenance Engineering	MNE470S	C	--	7	14	0.100	CE

ADVANCED DIPLOMA IN QUALITY

COURSE AIM

Graduates are equipped to become quality practitioners in the manufacturing, commercial and servicing industries. They use analytical, quantitative and qualitative techniques and technologies in a variety of organisational situations, in order to implement, maintain and improve technologies, techniques and productivity.

PURPOSE AND RATIONALE OF THE QUALIFICATION

The qualification equips the qualifying learner coming from a production and/or service environment to become a quality practitioner specialising in quality technologies. The qualified person will apply a body of knowledge of quality and quality principles, tools and techniques to develop, implement, maintain and improve competitiveness in his/her organisational field.

CAREER OPPORTUNITIES

With globalisation and the opening of international markets, the demand for quality assurance of products and services is at an all-time high, in all sectors of industry, as well as in government sectors.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

HEQSF aligned Diplomas (NQF level 6), pre HEQSF aligned National Diploma (NQF level 6), pre-HEQSF aligned Bachelor's degree (NQF level 6) and HEQSF aligned Bachelor's (NQF level 7):

A National Diploma in Industrial, Civil, Mechanical, Chemical, Electrical Engineering or Food Technology or Analytical Chemistry or Biomedical Technology or Environmental Management or Operations Management with an average pass mark of at least 60% for the final year subjects of the National Diploma.

OR

A Diploma in Industrial, Civil, Mechanical, Chemical, Electrical Engineering or Food Technology or Analytical Chemistry or Biomedical Technology or Environmental Management or Operations Management with an average pass mark of at least 60% for the final year subjects of the Diploma.

OR

A BSc degree (Biotechnology, Environmental and Water Sciences studies, Mathematics/Statistics, Chemistry) an average pass mark of at least 60% for the final year subjects of the Degree.

OR

Applicant who does not obtain the 60% average, and with at least two year post diploma work experience in respective their undergraduate qualification may be considered on merit.

All international qualifications must be evaluated by SAQA (South African Qualifications Authority), before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

DURATION

Part-time: Two years

VENUE

Bellville

ADVANCED DIPLOMA IN QUALITY (ADQLTY)

Assessment Type: **CE** – Continuous evaluation / **EX** – Exam / **PR** – Project based
Subject offering: **Y** – Year subject / **S1** or **S2** – Semester 1 or 2 subject

Period of Study	Year / Semester Subject	Subject Name	Subject Code	Compulsory or Elective	Pre-requisite Co-requisite subjects listed in (brackets)	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
1st Year of the Advanced Diploma (All subjects compulsory)									
4	S1	Integrated Management Systems	IMS470S	C	--	7	15	0.125	CE
4	S1	Statistical Quality Techniques	SQT470S	C	--	7	15	0.125	CE
4	S2	Supply Chain Management & Logistics	SML470S	C	--	7	5	0.042	CE
4	S2	Lean Six Sigma	LSS470S	C	SQT470S	7	15	0.125	CE
2nd Year of the Advanced Diploma (All subjects compulsory)									
4	Y	Integrated Quality Project	QPR470S	C	IMS470S, SQT470S, SML470S, LSS470S, (Co-QAT470S, QPI470S)	7	25	0.208	PR
4	S1	Quality Auditing	QAT470S	C	IMS470S	7	15	0.125	CE
4	S1	Quality Planning	QPI470S	C	SML470S	7	15	0.125	CE
4	S2	Risk & Reliability Engineering	RRE470S	C	IMS470S	7	15	0.125	CE

MASTER OF ENGINEERING IN QUALITY

COURSE AIM

The course equips students with the necessary knowledge and skills to conduct independent research in quality implementation, maintenance and improvement, and to contribute to knowledge production through the understanding, application and evaluation of existing and new knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

The qualifying learner can conduct independent research under minimal guidance in a chosen quality -related field and contribute to knowledge production in that field. The research problem, its justification, process and outcome are reported in a dissertation which complies with the generally accepted norms for research at this level.

CAREER OPPORTUNITIES

With globalisation and the opening of international markets, the demand for quality assurance of products and services is at an all-time high, in all sectors of industry, as well as in government sectors. Graduates play an important and direct role in these fields and are employed in research and development in industry. They are also employed in research positions at higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

A level 8 qualification with a minimum aggregate of 60% in the following qualifications:

- Postgraduate Diploma in Industrial Engineering or Engineering Management or Quality or related field;
- Bachelor of Engineering Technology (Honours) in Industrial Engineering or Engineering Management or Quality or related field;
- Professional Bachelor of Engineering in Industrial Engineering or Engineering Management or Quality; or related engineering field.

Preference will be given to students from Engineering and Applied Sciences

DURATION

Full-time: Minimum 1 year / Maximum 2 years

Part-time: Minimum 2 years / Maximum 4 years

VENUE

Bellville

MASTER OF ENGINEERING IN QUALITY (MGQLTY)

Period of Study	Year / Semester Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
6	Y	QLT690R	Research Project & Dissertation	C	--	9	180	1	CE

MASTER OF ENGINEERING IN ENGINEERING MANAGEMENT

COURSE AIM

Engineering Managers are needed by industry to offer a balanced understanding of best business practices and engineering sciences in our current technological age, known as the fourth industrial revolution (Industry 4.0). The qualification is aimed at preparing engineers for professional practice by enhancing in-depth knowledge and understanding of engineering and technological business principles and expertise, as well as specialist and contextual knowledge, cultivating a critical awareness of developments at the forefront of the field and developing a capacity in them to conduct research.

PURPOSE AND RATIONALE OF THE QUALIFICATION

As engineers progress in their respective engineering careers (industrial, mechanical, electrical, civil, chemical etc.), the skills required from them by industry becomes more complex. Increasing seniority of the roles they fulfil in organizations necessitates skills that are classically regarded as more management skills then technical skills. Engineering managers are responsible for hiring staff, supervising employees, setting budgets and goals for projects, leading research and development projects. Thus, they need to have appropriate technical knowledge and rational skills in the relevant engineering discipline, in addition to several cross-functional skills, such as project management skills, enterprise management skills and the ability to analyse big data. This qualification brings together the technological problem-solving ability of engineering and the organizational, administrative, and planning abilities of management in order to oversee the operational performance of complex engineering driven enterprises, to develop engineering managers who able to streamline operational activities, meet deliverables on time and achieve organization goals.

CAREER OPPORTUNITIES

Fields that are looking for individuals with a qualification in engineering management include chemical process consulting, logistics, manufacturing management, and technical consulting, to name a few. Some career choices to consider include, but are not limited to, automation engineer, client services analyst, design engineer, chemical process director, director of hardware engineering, engineering economics consultant, job cost engineer, material logistics professional, plant manager, processing engineering manager, technical consultant and technology licensing specialist.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

The minimum admission requirements are: An NQF level 8, Bachelor Honours degree, 4-year Bachelor's degree or a Postgraduate Diploma qualification in engineering or cognates sciences, such as engineering design and synthesis or applied sciences. Students should obtain an average pass mark of at least 60% of the NQF level 8 qualification.

International Applicants:
If the applicant has an international qualification, that qualification must be evaluated by SAQA's (South African Qualifications Authority), Unit for Evaluation of Foreign Qualifications before submission of the application (visit www.saqa.org.za).

Recognition for Prior Learning (RPL):
RPL will be considered in the context of the CPUT's commitment to alignment with the principles of the NQF and the National Plan for Higher Education in South Africa, with specific reference to:

- Broadening the social base of higher education
- Increasing access to higher education
- Increasing mobility of students across higher education institutions and other learning contexts
- Accelerating progress through learning programmes
- Increasing the number of graduates
- Developing staff

DURATION

Full-time: Minimum 1 year / Maximum 2 years

Part-time: Minimum 2 years / Maximum 4 years

VENUE

Bellville

MASTER OF ENGINEERING IN ENGINEERING MANAGEMENT

Assessment Type: **CE** – Continuous evaluation / **EX** – Exam / **PR** – Project based
Subject offering: **Y** – Year subject / **S1** or **S2** – Semester 1 or 2 subject

Period of Study	Year / Semester Subject	Subject Code	Subject Name	Compulsory or Elective	Pre or Co-requisite Subject Codes	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
1st Year of the MEng in Engineering Management (All subjects compulsory)									
6	S1	TIM690S	Technology and Innovation Management	C	--	9	15	0.083	CE
6	S1	EMT690S	Enterprise Management	C	--	9	15	0.083	CE
6	S2	IND690S	Industry X.0	C	--	9	15	0.083	CE
6	S2	RMT690S	Research Methods	C	--	9	15	0.083	CE
2nd Year of the MEng in Engineering Management									
6	Y	RPJ690S	Research Project	C	RMT690S	9	90	0.500	PR
6	S1	BFE690S	Business for Engineers	C	--	9	15	0.083	CE
Choose 1 Elective:									
6	S2	LPE690S	Large Project Engineering	E	--	9	15	0.085	CE
6	S2	SCT690S	Supply Chain Management	E	--	9	15	0.085	CE

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject, e.g. Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for qualification purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

DIPLOMA SUBJECTS: INDUSTRIAL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

COMPUTER INTEGRATED MANUFACTURING

Pre-requisite(s):	Engineering Manufacturing Technology, Industrial Engineering Design
Mode of delivery	Lectures: 3 hours per week; Tutorials 1½ hours per week; Contact time: 54 hours
Subject outline:	Manufacturing Operations; Introduction to Automation; Industrial Control Systems; Hardware components for automation and process control, PLCs& other components; Manufacturing systems; Single station cells, Manual assembly lines, Transfer lines; Robotics Automated Material Handling Systems; Group Technology; Flexible Manufacturing Systems; Automated assembly lines; Lean Production & Agile Manufacturing Enterprise Wide Integration; Machine Utilisation Indices; Overall Equipment Effectiveness (OEE); Total Productive Maintenance (TPM).
Assessment:	Formative Test: 20%, Tutorials and Assignments: 10%, Practical: 20%, Final Summative Test: 50%:

ENGINEERING ECONOMICS

Pre-requisite(s):	Engineering Management, Engineering Mathematics 1
Mode of delivery	Lectures: 3 hours per week; Tutorials: 1½ hours per week; Contact time: 108 hours
Subject outline:	Management accounting, cost and revenue classification, accounting for materials and labour, accounting for overhead expenditure, absorption costs and variable costing, cost-volume-profit analysis, special studies: measuring relevant costs for decision-making, capital investment decisions (feasibility of new projects), the budgeting process, operational control, management control and performance measurement standard costing and variance analysis. Financial statements, overview of financial management, the time value of money, risk and return, financial statement analysis, the cost of capital, capital budgeting, working capital, credit policy and current asset management, sources of finance, forms of business, business plans, entrepreneurship.
Assessment:	Formative Test 1: 10%, Tutorials 1: 10%, Formative Test 2: 10%, Tutorials 2: 10%, Mini-Project: 10%, Final Summative Test: 50%:

ENGINEERING MANAGEMENT

Pre-requisite(s):	None
Mode of delivery	Lectures: 3 hours per week; Tutorials: 1½ hours per week; Contact time: 108 hours.

Subject outline:	The aim of this course is to: • develop the student's ability to become competent and effective communicators • develop essential professional and team work skills • develop engineering general knowledge • bring students to a basic level of knowledge so that management issues, tools and theories can be understood and applied where required. • provide learners with insight into the purpose or aim of the various Labour laws. • provide learners with insight into the nature of management involvement in personnel management. • prepare students to deal with various complex issues regarding labour relations which they will have to address as future engineers and managers.
Assessment:	Information Literacy: 15%, Assign/Oral 1: 10%, Assign/Oral 2: 10%, Assign/Oral 3: 10%, Tutorials: 5%, Final Summative Test: 50%:

ENGINEERING MANUFACTURING TECHNOLOGY

Pre-requisite(s):	None
Mode of delivery	Lectures: 2 hours per week, Tutorials: 1 hours per week. Practical: 1½ hours per week Contact time: 108 hours.
Subject outline:	• Safe working practices as well as safety legislation applicable in an engineering environment. • The uses of hand tools, marking-out equipment and measuring equipment used to produce components in an engineering workshop environment. • Operating procedures and functions of main parts of metal removal machines used in an engineering workshop. • Various steel profiles and fasteners, including keys and keyways, used in an engineering environment. • Safe operating procedure to be employed when welding two pieces of metal. • Fabricate a functional component/model safely from an engineering drawing. • Operate a metal cutting lathe to produce a component as per specifications supplied. • Join two pieces of metal using manual metal arc welding and oxy-acetylene gas welding equipment. • The Occupational Health & Safety Act (OHSA), • Functions and duties of stakeholders in safety structures are described. • Hazards in the workplace. • MIG and TIG welding. • Manufacturing of plastics, raw materials, types of plastics/polymers, characteristics and application. • Powder metallurgy/sintered metals. • Metal forming processes – hot, cold and warm working for both bulk deformation processes and sheet metal working • Machining processes, machine operations and tooling • Economic and product design considerations
Assessment:	Formative Test 1: 10%, Safety Test and Tutorials : 10%, Practical: 10%, Assignments: 10%, Mini-Project: 10%, Final Summative Test: 50%:

ENGINEERING MATHEMATICS 1

Pre-requisite(s):	None
Mode of delivery	Lectures: 2 hours per week, Tutorials: 2 ½ hours per week. Contact time: 108 hours
Subject outline:	• Functions and Models (Four ways to represent a Function) • Functions and Models (Mathematical Models: A catalogue of essential Functions) • Complex Numbers • Radians Measure • Limits and Derivatives (Tangent &Velocity Problems and the limit of a function; Calculating limits using the limit laws and continuity) • Limits and Derivatives (Derivatives and Rates of change) • Differentiation Rules (Derivatives of polynomials, Exponential functions and logarithmic functions) • Differentiation Rules (Product and quotient rules, derivatives of trigonometric functions and the chain rule) • Differentiation Rules (Rates of change in the natural and social sciences)

- Applications of Differentiation (maximum & minimum values and the mean value theorem, (optimization problems).
- Integrals (Definite Integral, Indefinite integrals, The substitution rule)
- Applications of Integration (Areas between curves, Volumes, average value of a function).
- Matrices (Operations with matrices, Inverse of a matrix, solution of systems of linear equations using inverse of matrix method).

Assessment:	Five written tests throughout the year with weight of 10% each and a Final Integrated Summative Assessment (FISA) of 50%.

ENGINEERING MATHEMATICS 2

Pre-requisite(s):	Engineering Mathematics 1
Mode of delivery	Lectures: 2 hours per week, Tutorials: 2 ½ hours per week. Contact time: 108 hours
Subject outline:	The course deals with specific techniques of derivatives, integrations and the solution of differential equations as mathematical models: • Implicit Derivation and Logarithmic derivation • Partial derivation and higher order partial differentiation • Applications of derivations to engineering problems and numerical method (Newton Raphson) • Integration by parts Techniques • Integration using partial fractions Techniques • Techniques to integrate complex trigonometric functions • Introduction to Differential Equations • First-Order Differential Equations (Direct Integration, Separation of variables, Homogeneous Des, Integrating factor method…). • Modelling with First-Order Differential Equations. • Differential Equations of Higher Order. • Modelling with Higher-Order Differential. • Laplace Transform
Assessment:	Five written tests throughout the year with weight of 10% each and a Final Integrated Summative Assessment (FISA) of 50%.

ENGINEERING PHYSICS

Pre-requisite(s):	None
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week. Contact time: 108 hours
Subject outline:	Introduce units of measurement, symbols used, etc. Construct and perform measurements of the parameters listed above using electrical instruments. Apply Kirchhoff's Law to these circuits. Perform calculations of total resistance, current, voltage, and power for a series/parallel circuit. Analyse simple magnetic circuits. Perform calculations and determine circuit properties such as field strength, permeability and flux density. Measurements, Units conversion and Numbers, Forces applied on a body or systems, free-body diagram (FBD), Moments of forces, calculations of reactions at the structures supports, internal forces in the structures or frames, Analytical and experimental methods for the determination of the centroids and centre of gravity, friction of bodies sliding on incline moving with a constant velocity or accelerating, Kinematic part of mechanics, linear motion and angular motion of body or two bodies connected, Work, Energy and power, Newton laws of motion.
Assessment:	Three written tests throughout the year with weight of 10% each; 2 x Laboratory Reports of 10% each, and a Final Integrated Summative Assessment (FISA) of 50%.

ENGINEERING WORKSTUDY

Pre-requisite(s):	Industrial Engineering Design, Engineering Manufacturing Technology, Engineering Management
Mode of delivery	Lectures: 3 hours per week; Tutorials 1½ hours per week; Contact time: 108 hours

Subject outline:	**Productivity:** A look at productivity (principles and concepts) and the relationship this has on the quality of life. Topics covering basic needs, quality of life and productivity, what is productivity, productivity in the individual enterprise and the task of management. Including how the total time of a job is made up, and the interrelationship of the various methods used to reduce ineffective time. **Introduction to Work Study, techniques and the human factor**: Topics include; why is work-study valuable, techniques of work-study and their relationship, basic procedure of work-study, and work-study and production management including the human factor in enterprise operations. **Working conditions and the working environment**, overview of specifications, best practices and the impact of working environment on performance of work. Topics will include occupational safety and health organization, safety criteria, the prevention of industrial accidents, working premises, good housekeeping, lighting, noise and vibration control, and climatic conditions. Exposure to toxic substances, personal protective equipment, ergonomics and Working time. **Method Study Techniques**: Exploring the various new techniques that are now at the disposal of work-study specialists to assist them with their analysis and development of improved methods of work, from recording, examining to developing. **Method Study and the selection of jobs**: Topics will include the approach to method study, selecting the work to be studied, and limiting the scope of the work to be studied. Layout: Industrial layouts. Topics will include. Types of layouts, the handling of material, developments in manufacturing technology, process planning, handling and process planning & general remarks on work measurement. **Work measurement**: The application of techniques designed to establish the times for a qualified worker to carry out a task at a defined rate of working. **Time study**: Selecting and timing the job and Rating the job; from study to standard time; setting time standards for work with machines. Techniques of Work Measurement; PMTS, MTM 1, Synthesis, Analytical Estimating, Activity Sampling and Modular Arrangement of Predetermined Time System (MODAPTS). **Critical Examination Technique (Kipling's Questioning Technique)**. Demonstrating the Kipling technique in the analysis of captured work operations showing data analysis from the present to the proposed improvements. **Ergonomics**: An extension of material covered in term 1 and 2 which will include in greater detail how the human body functions (operates), understand its limitations, then design/re-design the work environment (adapt) to suite human capacities & needs. Topics will include; the working environment, physical human aspects, and the human psychological components. **Value Engineering**: *"Products have become more complex and sophisticated; techniques need to be adapted to the "systems" approach, which is the norm in many production environments today"*. Topics explore value methodology, value analysis, value engineering, & value management. **Laboratory practicals:** Lab Work Integrated Projects that combines various Outline Process Charts, Worker/Material/Machine Process Chart, Multiple Activity Charts, Two handed Flow Process Charts and Flow Diagram, including Time Study – Stop Watch, PMTS, and MODAPTS in setting work methods and standard time etc. for typical industry jobs.
Assessment:	Laboratory Project Report 1: 10%, Laboratory Project Report 2: 10%, Laboratory Project Report 3: 10%, Integrated Project Report: 10%, Formative tutorial: 10% and Final Summative written Test: 50%.

FACILITY LAYOUT AND MATERIALS HANDLING

Pre-requisite(s):	Engineering Economics, Engineering Work study, Industrial Engineering Design, Industrial Production Engineering, Qualitative Techniques
Mode of delivery	Lectures: 3 hours per week; Tutorials 1½ hours per week; Contact time: 54 hours
Subject outline:	Draft a typical business plan outlying the need and feasibility of the product to be manufactured in the factory to be designed. The business must include: - a Market Survey, Company Description & Management Team, Product Description, Market Sales Forecast (show 5-year growth trend), Financial Calculations (Payback, ROI, Setup Cost, Breakeven Analysis, Cash flow Statement), etc. Design of the unique product for manufacture in the factory; - viz. the exploded view of the product, design and drawings for each of the components of the product, and compile the comprehensive parts list for the product.

	Develop the production routings for each of the components to be manufactured in the factory, summarize the routings in a spreadsheet to ensure a minimum of 50 workstations, and decide on the appropriate production style for the factory based on the volume and variety of the product. Compile the Assembly Chart, the Operation Process Chart, the Process Diagrams and associated Flow Diagrams, and finally the Flow Process Chart. Design the competing Master Flow Patterns, select the evaluation criteria and apply decision matrix. Apply the Activity Relationship Chart, the Work Sheet and Activity Relationship Diagram to determine the various relationships and locations of the auxiliary services in relation to production. Design the Receiving, Storeroom, Warehouse, Shipping department, Offices, Maintenance, Tool room, Cafeteria, Locker Room, Toilets, Medical Room, etc. Summarize all the areas on a Total Space Requirement Sheet. Design each individual work station (workplace) with everything in its immediate surroundings. For each of these work stations apply Modapts to determine the time standard for each of the workstations. String the individual work stations together, as per the Flow Process Chart, to form the layouts for the production lines in which specific components will be processed. Clearly indicate the material flow through the factory. Finally, put the detailed factory together, showing all the detail inside of factory with detailed flow-lines of material movement through factory, areas labelled, drawn to scale, and showing adequate dimensions, etc.
Assessment:	Project Based: Project Report 1: 20%, Project Report 2: 30%; Project Report 3: 50%.

INDUSTRIAL ENGINEERING DESIGN

Pre-requisite(s):	None
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week. Contact time: 108 hours
Subject outline:	Carry out Industrial Engineering designs using various forms of electronic media. Understand the stages in the life cycle of a product, characteristics of Global competition, characteristics of a competitive product, research and development: its role in the design of product, research and development: its role in the design of products, factors influencing forward move of a product. Go through the product development process – identification of need, feasibility study, concept generation, concept selection. Apply Quality Function Deployment, house of quality, Translation process of quality function deployment (QFD) in developing a product for a customer. Create 3D model and engineering drawings of the products. Create a prototype for the product. General Computer literacy; - develop knowledge and understanding of appropriate use of computer application software and apply them to solve business problems. Word Processing Using Microsoft Word; - use word processing software to create, edit, save, and print written documents. Creating Spreadsheets using Microsoft Excel; - use spreadsheet software to analyse data and make business decisions. Creating presentations using Microsoft PowerPoint; - use Microsoft Office PowerPoint for professional presentations. Project Management using Microsoft Project; - Microsoft Project as a tool that helps plan and manage the activities of a projects.
Assessment:	Portfolio based. Assignments and spot tests form continuous assessment. Project to be submitted in a report,

INDUSTRIAL ENGINEERING PROJECT

Pre-requisite(s):	Engineering Economics, Qualitative Techniques, Computer Integrated Manufacturing, Operations Research, Systems Engineering
Mode of delivery	Lectures: 1½ hours per week for the first 6 months, Practical Reflections: 1 hour per week for the 6 months of Industry work.
Subject outline:	Students gain work-based experience doing projects, assignments and tasks in the work place. These projects are based on real life situations, must have practical applications, and form part of the daily duties of the student in the workplace. A list of required learning areas is indicated below as projects 1 & 2. The student must cover at least two of these core learning areas. Evidence of this must be shown in Logbook. A project report must be handed in for each of the projects completed at the end of the training period. The Logbook and projects are assessed by the Work Integrated Learning (WIL) co-ordinator. The student is expected to present a 15 minute oral presentations to the assigned supervisors at the end of each completed project in the workplace. The WIL co-ordinator and supervisor will assess one oral presentation.

	Project 1 topic: Health & Safety Standards, and any other applicable Standards/Laws. **Project 2 topic:** Work Study, Materials Handling & Facility Layout, Production Planning & Control, Quality Management, Management Information Systems, Productivity Measurements or Financial Feasibility Studies/Costing. **Work-preparedness programme: 10% component.** This will be done in the semester prior to the Industrial Engineering Project is started, so as to prepare students for their upcoming industry placement.
Assessment:	Oral Presentation: 10%, Logbook: 20%, Project Report 1: 20%, Project Report 2: 50%.

INDUSTRIAL PRODUCTION ENGINEERING

Pre-requisite(s):	Engineering Mathematics 1, Engineering Management
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week. Contact time: 108 hours
Subject outline:	Introduction to Operations Management and Productivity, Operations Strategy in a global environment. Layout Strategy: Objectives, types, load-distance analysis of process-oriented layouts, balancing work cells and balancing of production flow in product-oriented facilities. Managing Quality: definition of quality, International Quality Standards, Total Quality Management, Tools of TQM, and The Role of Inspection. Statistical Process Control; - process capability: Cp and Cpk. Forecasting: time series forecasting methods, regression analysis and monitoring & controlling forecasts. Inventory Management: Inventory classification, ABC analysis and Cycle Counting. Materials Requirements Planning: Independent and dependent demand inventory, MRP, DRP and ERP, inputs and outputs of MRP, computer order releases, Short-Term Scheduling: Shop loading (using Gantt charts) and job sequencing (using priority rules, critical ratio, and Johnson’s rule). Queuing Theory, Activity Scheduling, Project Management and Network Scheduling, Scheduling for Batch Processing, The Design and Scheduling of Flow Processing Systems, Materials Administration, Inventory Management, Maintenance and Reliability, Lean Operations, Theory of Constraints.
Assessment:	Assignment: 10%, Formative Test: 20%, Project Report: 20%, and Final Summative written Test: 50%.

OPERATIONS RESEARCH

Pre-requisite(s):	Engineering Mathematics 2, Industrial Production Engineering
Mode of delivery	Lectures: 3 hours per week; Tutorials 1½ hours per week; Contact time: 54 hours
Subject outline:	• Transportation and Assignment Methods, • Game Theory, • Decision Trees, • Linear Programming: Graphical and Computer Methods, • Linear Programming Modelling Applications, Linear Programming: The Simplex Method, • Network Models, • Waiting Lines and Queuing Theory Models, • Simulation (Monte Carlo, inventory analysis, queuing problem, maintenance policy, role of computers). • Markov Analysis, • Dynamic Programming.
Assessment:	Assignment: 10%, Formative Test: 20%, Project Report: 20%, and Final Summative written Test: 50%.

QUALITATIVE TECHNIQUES

Pre-requisite(s):	Engineering Mathematics 1
Mode of delivery	Lectures: 3 hours per week, Tutorials: 1½ hours per week. Contact time: 108 hours
Subject outline:	**Introduction to Statistics:** • Data collection and experimental design • Descriptive Techniques (frequency distributions, averages, standard deviation, median, variance, etc), • Probability and distributions (Probability theories - Poisson, binomial, geometric and normal distributions), Sampling and sampling theories, confidence intervals, Hypothesis testing, Goodness to fit, Correlation and

	Regression analysis, Chi-Tests and F-Distributions Nonparametric Tests **Introduction to Quality:** • Total Quality Management - Principles and Practices • Lean Enterprise, Six Sigma (Lean Six Sigma), Toyota Production System • Statistical Process Control (SPC) Charts (SPC, self-control, dominance in processes, • SPC -charts for Variables, SPC -charts for Attributes, • Companywide Assessment of Quality • Quality Improvement and Cost Reduction (management controllable defects, operator controllable defects, motivation for quality, self-control) • Employee Involvement • Quality Systems (ISO 9000, ISO 14000, SABS, other) • Reliability • Taguchi Experiments • Quality in Manufacturing in the 21st Century.
Assessment:	Assignments: 10%, Class Tests: 10%, Laboratory Project Report: 10%, Integrated Project Report: 10%, Class Tests: 10% and Final Summative written Test: 50%.

SYSTEMS ENGINEERING

Pre-requisite(s):	Engineering Work study
Mode of delivery	Lectures: 3 hours per week; Tutorials 1½ hours per week; Contact time: 54 hours
Subject outline:	Systems Thinking Methodology, systems analysis / system interrogation. Ethics / Social Responsibility. Green Technologies / Carbon Footprint / Respecting the Environment / Sustainable Designs. Management information systems (MIS) analysis and design; - Introduction to information systems, structure of MIS, systems concepts, planning, development, implementation, operation, control and maintenance of MIS. Performance improvement programs; - introduction to productivity. Realst; - introduction, change in real terms, contribution & calculation of price recovery and productivity to profit., data specification, productivity measurement in service functions, the creation and distribution of wealth formula. Partial productivity measurement, operator performance, departmental performance, overall performance. Machine performance indices. Incentive schemes.
Assessment:	Assignment: 10%, Formative Test: 20%, Project Report: 20% and Final Summative written Test: 50%.

ADVANCED DIPLOMA SUBJECTS: INDUSTRIAL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

COMPUTER INTEGRATED MANUFACTURING

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Assignments, Practicals, independent self-study: 80 hours.
Subject outline:	• Introduction to Manufacturing and Production • CAD Systems • Computer Control of Machines • Robotics • Automated Material Handling and Storage • Group Technology and Manufacturing Cells • Flexible Manufacturing Systems • CIM and Enterprise Integration
Assessment:	Assignment: 10%, Formative Test: 15%, Practical: 25% and Final Summative written Test: 50%.

ENTERPRISE ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Projects, Assignments, independent self-study: 80 hours.
Subject outline:	• Overview of Enterprise Engineering • Idea Generation • Screening Ideas • Feasibility Studies & Research • Preliminary Design & Development • Pilot Run, Testing & Verification • Final Design and Process Plans • New Product Launch • After Sales Services & Customer Support • The future developments in Enterprise Engineering
Assessment:	Assignment: 5%, Formative Test: 15%, Project: 30% and Final Summative written Test: 50%.

ENTERPRISE RESOURCE PLANNING

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Assignments, Practicals, independent self-study: 80 hours.
Subject outline:	• An Introduction to information systems • Information Systems in Organizations. Hardware: Input, Processing, and Output Devices • Basic ERP Concepts. Software: Systems and Application Software • ERP Implementation • Consultants, Vendors, and Employees. Success and Failure Factors of the ERP Implementation. ERP Operation and Maintenance • Implementation and maintenance of ERP systems • ERP-present and future
Assessment:	Assignment: 10%, Formative Test: 15%, Practical: 25% and Final Summative written Test: 50%.

ENVIRONMENTAL ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures: 2 hours per week, Consulting: 1 hour per week. Contact time: 30 hours. Projects, Assignments, independent self-study: 40 hours.
Subject outline:	• Introduction to engineering principles • The chemical & physical processes • The concept of environmental degradation & pollution • Study of green engineering • Water usage & treatment • The production & use of energy • Practical application of environmental engineering • Legislation & legal policies • Research & design projects
Assessment:	Assignment: 5%, Formative Test: 15%, Project: 30% and Final Summative written Test: 50%.

INDUSTRIAL SOCIOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures: 2 hours per week, Consulting: 1 hour per week. Contact time: 30 hours. Projects, Assignments, independent self-study: 40 hours.
Subject outline:	• Studying work and society • Work society and the impact of globalization and technology • Work organizations • Unionization of the workforce • Industrial relations • Future trends in industrial sociology
Assessment:	Assignment: 5%, Formative Test: 15%, Project: 30% and Final Summative written Test: 50%.

LOGISTICS ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Projects, Assignments, independent self-study: 80 hours.
Subject outline:	• Introduction to Logistics. Reliability, Maintainability, and Availability Measures • Measures of Logistics and System Support • System Engineering Process • Logistics and Supportability Analysis • Logistics in System Design and Development • Logistics in the Production/Construction phase • Logistics in the operational and retirement phase • Logistics Management
Assessment:	Assignment: 5%, Formative Test: 15%, Project: 30% and Final Summative written Test: 50%.

MAINTENANCE ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Assignments, Practicals, independent self-study: 80 hours.

Subject outline:	• Introduction to maintenance engineering, application and significance to a country and organisational performance. • Life-cycle cost: Cost and performance parameters. • Availability and maintainability of assets: Relations between asset life-cycle cost and asset availability and maintainability. • Application of maintenance; maintainability, meantime between failures (MTBF) and meantime to repair (MTTR). • Cost and performance parameters • Life-cycle cost's reliability and quality aspects; and Design for maintainability • Assessment and evaluation of assets and maintenance data acquisition
Assessment:	Assignment: 10%, Formative Test: 15%, Practical: 25% and Final Summative written Test: 50%.

PROJECT ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Projects, Assignments, independent self-study: 80 hours.
Subject outline:	• The World Of Project Management (PM) • The Manager, The Organisation and The Team • Planning the Project • Budgeting The Project • Scheduling The Project • Allocating Resources To The Project • Monitoring And Controlling The Project • Evaluating And Terminating The Project
Assessment:	Assignment: 5%, Formative Test: 15%, Project: 30% and Final Summative written Test: 50%.

QUALITY ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Projects, Assignments, independent self-study: 80 hours.
Subject outline:	• Differing Perspectives on Quality • Quality Theory • Global Supply Chain Quality and International Quality Standards • Strategic Quality Planning • The Voice of the Customer • The Voice of the Market • Quality and Innovation in Product and Process Design • Designing Quality Services • Managing Supplier Quality in the Supply Chain • The Tools of Quality • Managing Quality Improvement Teams and Projects • Implementing and Validating the Quality System
Assessment:	Assignment: 5%, Formative Test: 15%, Project: 30% and Final Summative written Test: 50%.

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Projects, Assignments, independent self-study: 80 hours.
Subject outline:	• Research as a means to uncover new knowledge and develop new technology

	• Research and innovation strategy • Formulation of research objectives, research questions and research hypotheses • Overview of research methodologies • The empirical methodology • The survey methodology • The case study methodology • The theoretical synthesis methodology • Research ethics • Academic writing: the research proposal and research report • Preparing conference proceedings and journals • Planning and executing research • Use of available resources: library, online and Turnitin
Assessment:	Assignment: 5%, Formative Test: 15%, Project: 30% and Final Summative written Test: 50%.

SYSTEMS ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures: 4 hours per week, Consulting: 1 hour per week. Contact time: 60 hours. Assignments, Practicals, independent self-study: 80 hours.
Subject outline:	• Learning in and about Complex Systems • System dynamics in Action • Modeling Process • Structure and Behavior of Dynamic Systems • Causal Loop Diagrams Stocks and Flows diagrams • Dynamics of Stocks and Flows • Closing the Loop: Dynamics of simple structure • Modeling S-Shaped Growth • Model Testing • Lab work. (Modelling software & Manual)
Assessment:	Assignment: 10%, Formative Test: 15%, Practical: 25% and Final Summative written Test: 50%.

ADVANCED DIPLOMA SUBJECTS: QUALITY

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

INTEGRATED MANAGEMENT SYSTEMS

Pre-requisite:	None
Mode of delivery:	Lectures 3 hours per week (face to face lectures as well as online offering)
Subject outline:	This subject integrates three management systems into one complete organizational framework. This will enable the alignment of all organizational functions into a unified system to ensure performance improvement and efficiency throughout an organization.
Assessment:	**Summative assessment:** End of semester 3 hour long final assessment under formal test conditions **Formative assessments:** Homework for preparation towards an assessment, also for verifying understanding of certain concepts, methods, and techniques The assignment is often group work, to test team dynamics, leadership, time management. Here peer evaluation is encouraged.

INTEGRATED QUALITY PROJECT

Pre-requisite:	Integrated Management Systems, Statistical Quality Techniques, Supply Chain Management & Logistics, Lean Six Sigma
Co-requisite:	Quality Auditing, Quality Planning
Mode of delivery:	Lectures 3 hours per week (face to face lectures as well as online offering), coupled with individual consultation where the need arises.
Subject outline:	The Integrated Quality Project aims to create a connection between the different subjects offered in the Advanced Diploma course. The goal of the curriculum is to construct distinct demonstration of what the student needs to practice in industry and their collection of the knowledge areas gained throughout the two year course. In essence the project provided students the opportunity to practice the application of their knowledge and skills in the workplace.
Assessment:	**Formative assessments:** Weekly discussions leading to the identification of a feasible problem, in the case of the organization not assigning one to the student. This will continue until the final submission of the Problem Identification which will be assessed according to a rubric. The methodology will happen in the same fashion as stipulated above. Graded discussion groups if the need arises – (All Bloom’s level). Peer feedback in class – class discussion **Summative assessment:** End of semester hand in of Final Report.

LEAN SIX SIGMA

Pre-requisite:	Statistical Quality Techniques
Mode of delivery:	Lectures 3 hours per week (face to face lectures as well as online offering)
Subject outline:	The goal of the Lean Six Sigma course is to teach students about the reduction of waste in all of its forms throughout the operation. The fundamentals of streamlining operations to order, using 5S and visual factory form the core of the subject. Students are taught to identify where in the material and information flows waste exist and taught to eliminate it and measure it through operational costs
Assessment:	**Formative assessments:** Fortnightly online journal entries, feedback given to students with one week. (Blooms level – analyse and evaluate). Graded discussion groups if the need arises – (All Bloom’s level). Peer feedback in class – class discussion **Summative assessment:** End of semester 3 hour long final assessment under formal exam conditions.

QUALITY AUDITING

Pre-requisite:	Integrated Management Systems
Mode of delivery:	Lectures 3 hours per week (face to face lectures as well as online offering)

Subject outline:	The role of an **internal audit** is to provide independent assurance that an organisation's risk management, governance and **internal** control processes are operating effectively.
Assessment:	**Summative assessment:** End of semester 3 hour long final assessment under formal test conditions **Formative assessments:** Homework for preparation towards an assessment, also for verifying understanding of certain concepts, methods, and techniques. The assignment is often group work, to test team dynamics, leadership, time management. Here peer evaluation is encouraged.

QUALITY PLANNING

Pre-requisite:	Supply Chain Management & Logistics
Mode of delivery:	Lectures 3 hours per week (face to face lectures as well as online offering)
Subject outline:	Planning for Quality involves a deep understanding of Quality in its different dimensions, together with an understanding of the distinction between Service Quality and Product Quality. Here one must be explicit in your explanation that Product quality is not superior over Service quality or vise versa. Customer perceptions of quality and customer satisfaction are dealt with in great detail since they are any business' number one priority. Without customers no business can survive
Assessment:	**Summative assessment:** End of semester 3 hour long final assessment under formal test conditions **Formative assessments:** Homework for preparation towards an assessment, also for verifying understanding of certain concepts, methods, and techniques. The assignment is often group work, to test team dynamics, leadership, time management. Here peer evaluation is encouraged.

RISK & RELIABILITY ENGINEERING

Pre-requisite:	Integrated Management Systems
Mode of delivery:	Lectures 3 hours per week (face to face lectures as well as online offering)
Subject outline:	This subject will introduce the various techniques for risk analysis, failure consequences assessment, and methods for mitigation through decision support systems and other relevant methods.
Assessment:	**Summative assessment:** End of semester 3 hour long final assessment under formal test conditions **Formative assessments:** Homework for preparation towards an assessment, also for verifying understanding of certain concepts, methods, and techniques. The assignment is often group work, to test team dynamics, leadership, time management. Here peer evaluation is encouraged.

STATISTICAL QUALITY TECHNIQUES

Pre-requisite:	None
Mode of delivery:	Lectures 3 hours per week (face to face lectures as well as online offering)
Subject outline:	The subject content includes the use of basic statistical tools for the purpose of identifying variation. The two types of variation are introduced, and the content focusses on collecting, summarizing, presenting and analyzing a set of data for describing, evaluating and monitoring processes, for quality control.
Assessment:	**Formative assessments:** Fortnightly online journal entries, feedback given to students with one week. (Blooms level – analyse and evaluate) Graded discussion groups if the need arises – (All Bloom's level) Peer feedback in class – class discussion **Summative assessment:** End of semester 3 hour long final assessment under formal exam conditions.

SUPPLY CHAIN MANAGEMENT & LOGISTICS

Pre-requisite:	None
Mode of delivery:	Integrated management systems

Subject outline:	Lectures 3 hours per week (face to face lectures as well as online offering)
Assessment:	The subject includes topics like; Introduction to Supply Chain management, Logistic environmental analysis, Forecasting and demand management, Warehouse operations and facility design, SCM for competitive advantage and many more
	Summative assessment: End of semester 3 hour long final assessment under formal test conditions **Formative assessments:** Homework for preparation towards an assessment, also for verifying understanding of certain concepts, methods, and techniques. The assignment is often group work, to test team dynamics, leadership, time management. Here peer evaluation is encouraged.

DEPARTMENT OF MARITIME STUDIES

DEPARTMENT OFFICE-BEARERS

POSITION	NAME	TELEPHONE	E-MAIL
Head of Department	Ms T Williams	021 440 5755	WilliamsTH@cput.ac.za
Secretary	Ms N Nkani	021 440 5752	NkaniN@cput.ac.za Maritime@cput.ac.za

DEPARTMENTAL STAFF

POSITION	NAME	QUALIFICATIONS
Lecturer	Mr F Conradie	ND (Maritime Studies), Deck Officer CoC
Lecturer	Dr D Lambert	Chief Engineer CoC, MBA, PhD
Lecturer	Ms L D Louw	ND (Maritime Studies), MPhil (Shipping Law)
Lecturer	Mr B Ntamba Ntamba	BEng (Electromechanical Engineering), MTech (Mechanical)
Lecturer	Mr E La Vita	ND (Mechanical), PGCE, Second Engineer CoC, MSc (Maritime Affairs)
Academic Instructor	Mr P Naidoo	ND (Maritime Studies)
ECP Co-ordinator	Ms E Rzyankina	Diploma (Chemical), BSc (Mechanical), MTech (Mechanical), PGDip (TL&HE)
Junior Lecturer	Ms S Ntuli	ND (Maritime Studies); PGDip (Shipping Law), Deck Officer CoC
Junior Lecturer	Mr N Shange	BTech (Mechanical Engineering)
Junior Lecturer (ECP)	Ms A Magudu	BTech (Mechanical Engineering)

QUALIFICATIONS OFFERED

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration	Work Integrated Learning
Bachelor of Marine Engineering	BPMARE	3 years	6 years	--
Bachelor of Marine Engineering (Extended)	BPMARX	4 years	7 years	--
Bachelor of Nautical Science	BGNSCI	3 years	6 years	--
Bachelor of Nautical Science (Extended)	BGNSCX	4 years	7 years	--

BACHELOR OF MARINE ENGINEERING

COURSE AIM

The aim of the degree program is to provide the student with the opportunity to obtain a Bachelor of Marine Engineering degree. This degree program will equip students with the necessary skills to find work within the maritime sector, both ashore and at sea. Should the student wish to pursue a career at sea, the qualification is approved by the South African Maritime Safety Authority (SAMSA).

PURPOSE AND RATIONALE OF THE QUALIFICATION

Persons achieving this qualification will be able to, independently as well as under supervision, integrate analytical and practical engineering techniques and engineering knowledge to solve well-defined and open-ended engineering problems. They will also be able to select criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

CAREER INFORMATION

Should the student wish to pursue a career at sea, the qualification is approved by the South African Maritime Safety Authority (SAMSA).

CAREER OPPORTUNITIES

The qualification provides an opportunity for Marine Engineer Officers (or aspirant Marine Engineering Officers) to obtain both a Bachelor's Degree, and a $STCW_{95}$ compliant certificate of competency (once other industry related requirements have been met). Career opportunities also exist in the shore-based maritime industry, within many of the disciplines that support the maritime industry.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or TS 5 (60%)	Eyesight and Medical at approved SAMSA Medical Practitioner	E (N4) 60% M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:
E (English)
M (Maths) PS (Physical Science)
TM (Technical Maths) TS (Technical Science) ES (Engineering Science)

PROFESSIONAL REGISTRATION AND ACCREDITATION

The academic content housed within the degree program is accredited by SAMSA, right up to Chief Engineering Officer level.

DURATION

Full-Time / Three years. The final year of the program is devoted to professional licencing examinations, practicals, laboratory work and research projects.

VENUE

Granger Bay Campus

CONTACT

Contact: Admin office
Telephone: +27 21 440 5752 / 5780
Fax: N/A
Email: maritimeinfo@cput.ac.za

Contact: Ms Theresa Williams
Telephone: +27 21 440 5755
Fax: +27 21 440 5759
Email: williamsth@cput.ac.za

BACHELOR OF MARINE ENGINEERING (BPMARE)

Assessment Type: CE – Continuous evaluation / EX – EX
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Year/ Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre-requisites/ (Co-requisites are listed as -Co)	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (All subjects compulsory)								
Y	MDD151S	Marine Engineering Drawing & Design	C	--	5	6	0.1	CE
Y	MEK152S	Marine Engineering Knowledge 1	C	--	5	12	0.133	CE
Y	MMT152S	Marine Engineering Mathematics	C	--	5	16	0.232	CE
Y	MEP150S	Marine Engineering Physics	C	--	5	28	0.117	CE
S1	CSM150S	Computer Science for Marine Engineers	C	--	5	6	0.05	CE
S1	MMS150S	Marine Material Science	C	--	5	6	0.05	CE
S1	MCS150S	Maritime Communication & Signals	C	--	5	6	0.05	CE
S2	AEL150S	Applied Electrotechnology 1	C	(Co-MEP150S, MMT152S)	5	8	0.062	CE
S2	FMH150S	Applied Fluid Mechanics & Hydraulics	C	(Co-MEP150S, MMT152S)	5	8	0.062	CE
S2	APT150S	Applied Thermodynamics 1	C	(Co-MEP150S, MMT152S)	5	8	0.062	CE
S2	NAR150S	Naval Architecture 1	C	(Co-MEP150S, MMT152S)	5	8	0.062	CE
2nd Year (All subjects compulsory)								
Y	AMC262S	Applied Mechanics of Machines	C	MEP150S	6	16	0.133	CE
Y	ASM262S	Applied Strength of Materials	C	MEP150S	6	16	0.133	CE
Y	MEK262S	Marine Engineering Knowledge 2	C	MEK152S	6	20	0.167	CE
Y	NAR262S	Naval Architecture 2	C	NAR150S	6	20	0.167	CE
S1	AEL260S	Applied Electrotechnology 2	C	AEL150S	6	8	0.067	CE
S1	APT261S	Applied Thermodynamics 2	C	APT150S	6	8	0.067	CE
S1	MMS260S	Marine Manufacturing & Safety	C	MMS150S	6	6	0.050	CE
S2	IET260S	Industrial Electronics	C	AEL260S	6	8	0.067	CE
S2	MRA260S	Marine refrigeration & Aircon	C	--	6	8	0.067	CE
S2	SMN260S	Shipping Management 1	C	--	6	10	0.083	CE
3rd Year (All subjects compulsory)								
Y	MEK372S	Marine Engineering Knowledge 3	C	MEK262S	7	24	0.200	CE
Y	MEP372S	Marine Engineering Project	C	SMN260S	7	36	0.300	CE
Y	MLS372S	Marine Law & Shipping Practice	C	SMN260S	7	16	0.133	CE
S1	RME370S	Research Methodology	C	--	7	8	0.067	CE
S1	SMN370S	Shipping Management 2	C	SMN260S	7	10	0.083	CE
S2	MPE370S	Marine Power and Electrical Systems	C	AEL260S, AMC262S	7	10	0.083	CE
S2	REP370S	Research project	C	RME370S	7	16	0.133	PR

BACHELOR OF MARINE ENGINEERING (EXTENDED)

COURSE AIM

The aim of the ECP program is to provide students with an extended curriculum (foundation year) before continuing with a Bachelor of Marine Engineering degree. This ECP program will equip students with a grounded introduction to Marine Engineering.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Students entering the program from previously disadvantaged schools struggle with first year Mathematics and Science orientated subjects. For this reason, DMS offers a fully foundational model for students who want to enter a Bachelor of Marine Engineering degree program.

The foundation year prepares students for higher education, by inducting them into conceptual and technical knowledge in their chosen field of study Bachelor of Marine Engineering. This preparatory year will focus on the introductory information needed for study at DMS. Students will take courses such as mathematics for marine engineers, physical science for marine engineers, computer studies, communication and introduction to maritime studies.

CAREER INFORMATION

Should the student wish to pursue a career at sea, the qualification is approved by the South African Maritime Safety Authority (SAMSA).

CAREER OPPORTUNITIES

The ECP year is a preparation year that allows for Marine Engineering students to gain sufficient insight with regards to available career paths within the maritime industry and shore-based maritime employment.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 26 using Method 2 E (First language) 4 (50%) M 3 (40%) or TM 4 (50%) PS 3 (40%) or TS 4 (50%)	Eyesight and Medical at approved SAMSA Medical Practitioner	E (N4) 50% M (N4) 50% ES (N4) 50%	E (5) (50%), M (5) (50%), ES (3) with 60%

Legend:
E (English)
M (Maths) PS (Physical Science)
TM (Technical Maths) TS (Technical Science) ES (Engineering Science)

PROFESSIONAL REGISTRATION AND ACCREDITATION

The academic content housed within the ECP program equips the student for entry into the mainstream degree program, which is accredited by SAMSA, right up to Chief Engineering Officer level.

DURATION

Full-Time: Four years.

VENUE

Granger Bay Campus

CONTACT

Contact: Admin office
Telephone: +27 21 440 5752 / 5780
Fax: N/A
Email: maritimeinfo@cput.ac.za

Contact: Ms Theresa Williams
Telephone: +27 21 440 5755
Fax: +27 21 440 5759
Email: williamsth@cput.ac.za

BACHELOR OF MARINE ENGINEERING (EXTENDED) (BPMARX)

Year / Semester	Subject Code	Subject Name	Compulsory / Elective	Pre-requisites/ (Co-requisites are listed as -Co)	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
Year Zero (All subjects compulsory)								
Y	MEK150X	Introduction to Maritime Studies	C	--	5	32	0.2	CE
Y	CSM150X	Maritime Communication & Computer Literacy	C	--	5	24	0.15	CE
Y	MMT150X	Mathematics for Marine Engineers	C	--	5	32	0.2	CE
Y	MEP150X	Physical Science for Marine Engineers	C	--	5	32	0.2	CE

Once students have completed year Zero, they continue with year 1 of the mainstream qualification.

BACHELOR OF NAUTICAL SCIENCE

COURSE AIM

The aim of the Bachelors of Nautical Science course is to introduce nautical sciences, shipboard operations, and certain commercial aspects of the maritime industry to students and to make them understand the applications of those sciences and operations in various aspects of the industry.

The outcomes of the Bachelor of Nautical Science are intended to widen the scope of employment opportunities, for graduates, in both the offshore (sea-going) and land-based maritime industries.

PURPOSE AND RATIONALE OF THE QUALIFICATION

The purpose of the Bachelors of Nautical Science is to equip graduates with the necessary knowledge, understanding, skills and abilities to, not only, become competent navigation/deck officers at sea, but to also create opportunities for personal intellectual growth ashore. The qualification shall assist graduates to become technically proficient and assist with South Africa's National Skills Development agenda by developing scarce skills.

The qualification is aligned, internationally, to the requirements of the International Maritime Organisations' (IMO) Convention governing the Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW78), as amended by the Conference in Manila in 20210. Nationally, the programme is aligned to the South African Maritime Safety Authority's Code of Qualifications (SAMSA Code), as amended.

CAREER INFORMATION

The outcomes of the Bachelor of Nautical Science are intended to widen the scope of employment opportunities, for graduates, in both the offshore (sea-going) and land-based maritime industries.

CAREER OPPORTUNITIES

Ship Management – Education, Training and Development; Ship's Navigating Officer; Marine Pilot; Tug Master; Vessel Traffic Services Operator; Port Operations

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or TS 5 (60%)	Eyesight and Medical at approved SAMSA Medical Practitioner	E (N4) 60% M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:
E (English)
M (Maths) PS (Physical Science)
TM (Technical Maths) TS (Technical Science) ES (Engineering Science)

PROFESSIONAL REGISTRATION AND ACCREDITATION

The academic content housed within the degree programme is aligned to the SAMSA Code right up to the level of Master Mariner.

DURATION

Full-Time: Three years. The final year of the program is devoted to professional licencing examinations, practicals, and research projects.

VENUE

Granger Bay Campus

CONTACT

Contact: Admin office
Telephone: +27 21 440 5752 / 5780
Fax: N/A
Email: maritimeinfo@cput.ac.za

Contact: Ms Theresa Williams
Telephone: +27 21 440 5755
Fax: +27 21 440 5759
Email: williamsth@cput.ac.za

BACHELOR OF NAUTICAL SCIENCE (BGNSCI)

Assessment Type: CE – Continuous evaluation / EX – EX
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Year/ Sem Subject	Subject Code	Subject Name	Compulsory or Elective	Pre-requisites/ (Co-requisites are listed as -Co)	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (All subjects compulsory)								
Y	MAW152S	Marine Mathematics	C	--	5	24	0.2	CE
Y	MET152S	Marine Meteorology	C	--	5	16	0.133	CE
Y	NVG152S	Marine Navigation 1	C	--	5	16	0.133	CE
S1	CRB150S	Collision Regulations & IALA Buoyage 1	C	--	5	6	0.05	CE
S1	CMS152S	Computer Skills	C	--	5	6	0.049	CE
S1	MSC150S	Marine Science	C	--	5	12	0.1	CE
S1	CSG150S	Maritime Communication & Signals	C	--	5	6	0.049	CE
S2	CWK150S	Chartwork 1	C	CRB150S, (Co-NVG152S)	5	8	0.067	CE
S2	ENS150S	Electronic Navigation Systems 1	C	CRB150S	5	12	0.1	CE
S2	NVA150S	Naval Architecture 1	C	MSC150S, (Co-MAW152S)	5	8	0.067	CE
S2	SSF150S	Seamanship & Safety (Practical)	C	--	5	6	0.05	CE
2nd Year (All subjects compulsory)								
Y	ENS261S	Electronic Navigation Systems 2	C	ENS150S	6	24	0.200	CE
Y	NVA262S	Naval Architecture 2	C	NVA150S	6	24	0.200	CE
Y	NVG262S	Marine Navigation 2	C	NVG152S	6	24	0.200	CE
Y	STR260S	Sea Transport	C	--	6	16	0.133	CE
S1	SMG270S	Shipping Management 2	C	--	7	10	0.071	CE
S2	PPL260S	Passage Planning	C	CWK150S	6	12	0.086	CE
S2	MSP260S	Marine Law & Shipping Practice 2	C	--	6	10	0.071	CE
3rd Year (All subjects compulsory)								
Y	SMG372S	Shipping Management 3	C	SMG270S	7	22	0.183	CE
Y	MSP370S	Marine Law & Shipping Practice 3	C	MSP260S	7	16	0.133	CE
Y	SPJ370S	Shipping Project 3	C	SMG270S, MSP260S	7	46	0.383	CE
S1	RMT370S	Introduction to Research Methodology	C	--	7	8	0.068	CE
S1	NVA370S	Naval Architecture 3	C	NVA262S	7	12	0.086	CE
S2	MKD370S	Marine Engineering for Deck Officers	C	--	7	16	0.114	CE

BACHELOR OF NAUTICAL SCIENCE (EXTENDED)

COURSE AIM

The aim of the ECP program is to provide students with the option of an extended curriculum (foundation year) before embarking on a Bachelor of Nautical Science degree. This ECP program will equip students with a grounded introduction to Marine Navigation and Nautical Science.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Students entering the program from previously disadvantaged schools struggle with first-year Mathematics and Science orientated subjects. For this reason, Department of Maritime Studies is proposing to offer a fully foundational model for students who want to enter a Bachelor of Nautical Science degree program.

The foundation year prepares students for higher education, by inducting them into conceptual and technical knowledge in their chosen field of study Bachelor of Nautical Science. This preparatory year will focus on the introductory information needed for study at Department of Maritime Studies. Students will take courses such as mathematics for marine engineers, physical science for marine engineers, computer studies, communication and introduction to maritime studies.

CAREER INFORMATION

The outcomes of the Bachelor of Nautical Science are intended to widen the scope of employment opportunities, for graduates, in both the offshore (sea-going) and land-based maritime industries.

CAREER OPPORTUNITIES

The ECP year is a preparation year that allows for Nautical Science students to gain sufficient insight with regards to available career paths within the maritime industry and shore-based maritime employment.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 26 using Method 2 E (First language) 4 (50%) M 3 (40%) or TM 4 (50%) PS 3 (40%) or TS 4 (50%)	Eyesight and Medical at approved SAMSA Medical Practitioner	E (N4) 50% M (N4) 50% ES (N4) 50%	E (5) (50%), M (5) (50%), ES (3) with 60%

Legend:
E (English)
M (Maths) PS (Physical Science)
TM (Technical Maths) TS (Technical Science) ES (Engineering Science)

PROFESSIONAL REGISTRATION AND ACCREDITATION

The academic content housed within the ECP program equips the student for entry into the mainstream degree program, which is accredited by SAMSA, right up to the level of Captain on board a ship.

DURATION

Full-Time: Four years. The final year of the program is devoted to professional licencing examinations, practicals, and research projects.

VENUE

Granger Bay Campus

CONTACT

Contact: Admin office
Telephone: +27 21 440 5752 / 5780
Fax: N/A
Email: maritimeinfo@cput.ac.za

Contact: Ms Theresa Williams
Telephone: +27 21 440 5755
Fax: +27 21 440 5759
Email: williamsth@cput.ac.za

BACHELOR OF NAUTICAL SCIENCE (EXTENDED) (BGNSCX)

Assessment Type: CE – Continuous evaluation / EX – EX
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Year / Semester	Subject Code	Subject Name	Compulsory / Elective	Pre-requisites/ (Co-requisites are listed as -Co)	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
Year Zero (All subjects compulsory)								
Y	CML150X	Computer Literacy	C	--	5	12	0.075	CE
Y	CSG150X	Introduction to Maritime Studies	C	--	5	32	0.200	CE
Y	IMS150X	Maritime Communication	C	--	5	12	0.075	CE
Y	MNI150X	Mathematics for Nautical Scientists	C	--	5	32	0.200	CE
Y	PSN150X	Physical Science for Nautical Scientists	C	--	5	32	0.200	CE

Once students have completed year Zero, they continue with year 1 of the mainstream qualification.

PROMOTION CRITERIA & EXCLUSION RULES

Promotions

Candidates shall complete all subjects for the preceding year before being promoted to the next year. In isolated cases, on the merits of the case, this rule may be relaxed.

Exclusions

Candidates may be excluded if they fail more than 50% of their registered subjects. On appeal, via the head of department, each case shall be reviewed on its merits.

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For Example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for qualification purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

BACHELOR OF MARINE ENGINEERING SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

APPLIED ELECTROTECHNOLOGY 1

Pre-requisite:	None
Co-requisite:	Marine Engineering Physics, Marine Engineering Mathematics
Mode of delivery:	Lectures
Subject outline:	Basic concepts used in the study of electricity and circuits, including the fundamental laws of electrical phenomena, and methods for the analysis of circuits based on the underlying physics and mathematical models
Assessment:	Continuous Evaluation

APPLIED ELECTROTECHNOLOGY 2

Pre-requisite:	Applied Electrotechnology 1
Mode of delivery:	Lectures
Subject outline:	Operation principles and characteristics of electrical machines as well as the physics behind the operation of these machines. The unit provides the students with advanced theoretical knowledge required to understand the practical concepts involving DC and AC electrical power generators, motors, transformers and distribution systems
Assessment:	Continuous Evaluation

APPLIED FLUID MECHANICS & HYDRAULICS

Pre-requisite:	None
Co-requisite:	Marine Engineering Physics, Marine Engineering Mathematics
Mode of delivery:	Lectures
Subject outline:	Principles of fluid mechanics relating to marine power plant and associated structures and systems required by the Engineering Watchkeeper involved in operating such a plant.
Assessment:	Continuous Evaluation

APPLIED MECHANICS OF MACHINES 2

Pre-requisite:	Marine Engineering Physics
Mode of delivery:	Lectures
Subject outline:	Advanced theoretical knowledge required to understand the practical concepts involving machinery, systems and equipment on commercial vessels and related shore-based installations. It analyses the mechanical engineering applications of marine machinery and systems, including internal and external combustion engines, pumping and piping systems, lifting gear, drive systems and structural members
Assessment:	Continuous Evaluation

APPLIED STRENGTH OF MATERIALS 2

Pre-requisite:	Marine Engineering Physics
Mode of delivery:	Lectures
Subject outline:	The main topics covered in this course are analysis and design of structural members subjected to tension, compression, torsion, and bending, including fundamental concepts. We look also on transformation of stress and strain, combined loading and combined stress, deflections of beams, and stability of columns.
Assessment:	Continuous Evaluation

APPLIED THERMODYNAMICS 1

Co-requisite:	Marine Engineering Mathematics, Marine Engineering Physics
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to familiarize aspiring marine engineering officers with the function and control of thermodynamic systems by using appropriate theories and applications, e.g. the creation of maximum efficiency for useful energy production in steam power plants
Assessment:	Continuous Evaluation

APPLIED THERMODYNAMICS 2

Pre-requisite:	Applied Thermodynamics 1
Mode of delivery:	Lectures
Subject outline:	This module provides the students with the advanced theoretical knowledge required to understand the practical concepts involving machinery, systems and equipment on commercial vessels and related shore based installations. It analyses the thermodynamic applications of marine machinery and systems, including internal and external combustion engines, refrigeration plants, and air compressors.
Assessment:	Continuous Evaluation

COMPUTER SCIENCE FOR MARINE ENGINEERS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	This module is critical especially in our day and age of the digital world or fourth industrial revolution. The module equips students with knowledge needed to be competent in the internet of things, coding, report findings in an acceptable format and producing high quality graphical representation.
Assessment:	Continuous Evaluation

INDUSTRIAL ELECTRONICS

Pre-requisite:	Applied Electrotechnology 2
Mode of delivery:	Lectures
Subject outline:	Theoretical and practical electronics knowledge applied to various ship-board systems. It addresses the analogue, digital and power electronics involved with engine room and bridge equipment such as radar, echo sounder, gyro compass, communication, computer networking etc. The unit provides also students with the knowledge and skills to plan manage and carry out control engineering operations, maintenance and repairs on signal sensing and measuring devices, transducers, controllers and final controlling elements on commercial vessels
Assessment:	Continuous Evaluation

INTRODUCTION TO MARITIME STUDIES (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide students with a foundation of all the various aspects of the maritime industry including nomenclature, transportation and logistics as well as the function of regulating bodies.
Assessment:	Continuous Evaluation

MARINE ENGINEERING DRAWING & DESIGN

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The module enables Marine Engineer students to understand and make freehand sketch of mechanical and electrical components from which an accurate drawing can be generated. Also, to read, interpret and generate an engineering drawing that conforms to the South African National Standard Code of Practice for Engineering Drawing – Part 1: General Principles (SANS – 0111-1). In addition to the above, the aim is to efficiently use computer aided software to design hull shapes, appendages and decks. The unit involves Computer Aided Design (CAD) modelling as applied to ship construction and structures, including the use of CAD in design work
Assessment:	Continuous Evaluation

MARINE ENGINEERING KNOWLEDGE 1

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The unit describes the types of ships and the equipment and machinery on-board these ships required to do trading. It further explains the working principles and the operational parameters of important machinery such as diesel engines, steam turbines, boilers, steering gear, refrigeration plant, electrical plant etc.
Assessment:	Continuous Evaluation

MARINE ENGINEERING KNOWLEDGE 2

Pre-requisite:	Marine Engineering Knowledge 1
Mode of delivery:	Lectures
Subject outline:	This unit will provide students with an understanding of the construction, operating principles, and characteristics of the ship's associated auxiliary systems (both Diesel Engines and Steam Turbines) , such as to enable safe and efficient operation at Engineer Watchkeeper level during steady state, transient, and fault conditions. The unit provides students with the knowledge and skills to plan, manage and carry out engineering operations, maintenance, and repairs on diesel engine and ancillary systems on commercial vessels.
Assessment:	Continuous Evaluation

MARINE ENGINEERING KNOWLEDGE 3

Pre-requisite:	Marine Engineering Knowledge 2
Mode of delivery:	Lectures
Subject outline:	This includes the design, operational principles, construction, safety, statutory requirements, trouble shooting, testing and measurements, repairs and maintenance to enable safe and efficient operation of the machinery (large 2-stroke slow speed and 4-stroke medium speed propulsion system) from a management level engineer. It also includes liaison with internal and external stakeholders.
Assessment:	Continuous Evaluation

MARINE ENGINEERING MATHEMATICS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	Basic knowledge to solve mathematical problems involved in theoretical marine engineering units of the course. The students gain mathematical skills at the basic and high level to solve algebra, trigonometry, and calculus problems which are applied to Applied Mechanics, Thermodynamics, Naval Architecture and Electro-technology studies.
Assessment:	Continuous Evaluation

MARINE ENGINEERING PHYSICS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is for aspirant marine engineering officers to become competent in the application of engineering sciences and mechanics to satisfy the needs of the maritime industry and commerce
Assessment:	Continuous Evaluation

MARINE ENGINEERING PROJECT

Pre-requisite:	Shipping Management 1
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to allow students an opportunity to select a project, of their choice, ideally related to the area of research to be used in the drafting of research proposal. The project is done in a team to develop knowledges, skills and understanding of leadership and teamwork appropriate to the operational level on board a ship
Assessment:	Continuous Evaluation

MARINE LAW & SHIPPING PRACTICE

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The aim of this course is to give a full knowledge of the legal aspects of being an engineer officer on the operational level. The learner's knowledge of the method of governance in South Africa; the IMO and other international controlling bodies as well as company policies and procedures that are used to enforce rules and regulations on board ships is enforced and consolidated. The focus of the course is on pollution prevention, safety and security awareness.
Assessment:	Continuous Evaluation

MARINE MANUFACTURING & SAFETY

Pre-requisite:	Marine Material Science
Mode of delivery:	Lectures
Subject outline:	This module provides an introduction to fundamental aspects of the rational engineering approaches and issues that influence the construction of marine vessels, on-board systems. The unit will serve sympathetic approaches of the procedures, processes, tools, techniques, strategies and tactics used for managing on-site construction and production operations in a multi-tasking team environment. This unit further develops soft skills gained in the first year and project management in the second year. Moreover, the unit will cover heat treatments in steel, quality and safety-related issues to understand its relevance for theory and practise employed during the construction and production of maritime infrastructures
Assessment:	Continuous Evaluation

MARINE MATERIAL SCIENCE

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	This module provides students with knowledge and understanding of fundamental aspects and properties of materials used in the construction of marine vessels. The unit will cover corrosion and nature of materials.
Assessment:	Continuous Evaluation

MARINE POWER AND ELECTRICAL SYSTEMS

Pre-requisite:	Applied Mechanics of Machines 2, Applied Electrotechnology 2
Mode of delivery:	Lectures
Subject outline:	This includes the design, installation, construction, trouble shooting, maintenance, commission, and calibration of the HV propulsion machinery, ancillary machinery, and related systems in line with statutory and operational requirements. The unit also deals with planning operation and electrical maintenance functions during routine operations and maintenance cycles, manage and allocate the required procedures and resources to sustain the operation of the vessel, and plan and carry out HV switching operations for repairs including Propulsion systems. This also includes liaisons and reporting to shipping, industry and statutory stakeholders
Assessment:	Continuous Evaluation

MARINE REFRIGERATION & AIRCON

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	In the unit, concepts of working merchant ships, yachts and vessels are discussed and cover all type of equipment you are likely to be working on. This includes the provisions refrigeration system, living quarters AC and switchroom cooling systems.
Assessment:	Continuous Evaluation

MARITIME COMMUNICATION & COMPUTER LITERACY (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide learners with a foundation on standard maritime terms, ways of communication on board ships at sea as well as a foundation in basic computer skills, including information literacy.
Assessment:	Continuous Evaluation

MARITIME COMMUNICATION & SIGNALS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to ensure that students, in a shipboard context can communicate verbally, non-verbally and in writing in a more confident and skilled manner using electronic and other media at their disposal
Assessment:	Continuous Evaluation

MATHEMATICS FOR MARINE ENGINEERS (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide learners with a foundation in engineering maths with specific focus on marine application as preparation for Mathematics in the second year of studies.
Assessment:	Continuous Evaluation

NAVAL ARCHITECTURE 1

Co-requisite:	Marine Engineering Physics, Marine Engineering Mathematics
Mode of delivery:	Lectures

Subject outline:	The purpose of this module is for students to develop an understanding of the principles of marine engineering by providing knowledge and skills on ship's general layout and plans, including hydrostatics, stability, structural members and watertight integrity with reference to trading merchant vessels. It provides the students with the design features of engineering applicable to commercial vessels.
Assessment:	Continuous Evaluation

NAVAL ARCHITECTURE 2

Pre-requisite:	Naval Arcitecture 1
Mode of delivery:	Lectures
Subject outline:	The module provides students of marine engineering with an applied knowledge of both fundamental and detailed concepts of a vessel's hydrostatics and structure and their associated practical implications. The unit is essential to an adequate knowledge within any marine engineering degree. The unit provides the naval architectural context within which certain on-board operations are conducted Hence the unit forms one foundation for concurrent and subsequent studies within the course
Assessment:	Continuous Evaluation

PHYSICAL SCIENCE FOR MARINE ENGINEERS (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide learners with a foundation knowledge in applied physics with specific focus on marine engineering problem solving.
Assessment:	Continuous Evaluation

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to adequately prepare aspirant marine engineering officers for the rigours of post-graduate research and assisting them in thesis/dissertation preparation.
Assessment:	Continuous Evaluation

RESEARCH PROJECT

Pre-requisite:	Research Methodology
Mode of delivery:	Lectures
Subject outline:	This unit is designed to provide students with an opportunity to complete their final year project by employing various research methods and techniques with which they have been equipped. The aim of this unit is to encourage students to apply the principles of business research in conducting a real-life research project in Marine Engineering related fields
Assessment:	Continuous Evaluation

SHIPPING MANAGEMENT 1

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to prepare candidates in the soft skills required for global shipping in order to optimally use the frugal resources available. This unit provides students with knowledge and ability to apply effective resource management in the allocation, assignment and prioritization of on board and related shore-based resources and

	effective communications with shipboard and shore personnel and organisations. The students are also exposed to decision making techniques and risk aversion
Assessment:	Continuous Evaluation

SHIPPING MANAGEMENT 2

Pre-requisite:	Shipping Management 1
Mode of delivery:	Lectures
Subject outline:	This module develops students' abilities and capabilities in managing the complex international freight system. It covers aspects of managing the movement of goods across national and international borders efficiently and effectively. It explains different actors and activities involved in managing international freight, with specific focuses on freight forwarding and multi-modalism that are important functions in facilitating international trade. Students are able to obtain an insight into freight forwarding operations and the day-to-day practical issues that go with the profession. Besides, this unit comprehensively overviews the issues related to multi-modalism, a critical component of seamless transport essential for an integrated supply chain. Finally, this unit explores how emerging issues such as technological, legal and environmental affect the operations of moving freight, and discusses different technological capabilities and solutions for improving the performance of freight management.
Assessment:	Continuous Evaluation

BACHELOR OF NAUTICAL SCIENCE SUBJECTS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

CHARTWORK 1

Co-requisite:	Navigation 1, Collision Regulations and IALA Buoyage 1
Mode of delivery:	Practical class
Subject outline:	The subject details the planning and execution of a safe passage, taking into account all navigational hazards, weather conditions, sufficient under keel clearance as well as logistics and economics of arriving at a port in time
Assessment:	Continuous Evaluation

COLLISION REGULATIONS & IALA BUOYAGE 1

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to ensure that candidates have a thorough knowledge and more depth understanding and application of the requirements of the International Regulations for the Prevention of Collisions at Sea, as amended.
Assessment:	Continuous Evaluation

COMPUTER LITERACY (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this course is to as students to find their way around a computer, write basic documents, use a spreadsheet, browse the Web, send and receive emails as well as familiarisation of library resources.
Assessment:	Continuous Evaluation

COMPUTER SKILLS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	This module is critical especially in our day and age of the digital world or fourth industrial revolution. The module equips students with knowledge needed to be competent in the internet of things, coding, report findings in an acceptable format and producing high quality graphical representation.
Assessment:	Continuous Evaluation

ELECTRONIC NAVIGATION SYSTEMS

Pre-requisite:	None
Co-requisite:	Collision Regulations & IALA Buoyage 1
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to equip students with the fundamental knowledge and skills required to operate the electronic navigation systems commonly fitted aboard trading merchant vessels. In addition, this module should adequately prepare students to effectively participate in shipboard watchkeeping duties on the navigational bridge. The unit also equips students, at operational level, with the fundamental knowledge and skills to operate, interpret and analyse information obtained from the electronic navigation systems commonly fitted aboard trading merchant vessels.
Assessment:	Continuous Evaluation

INTRODUCTION TO MARITIME STUDIES (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide students with a foundation of all the various aspects of the maritime industry including nomenclature, transportation and logistics as well as the function of regulating bodies.
Assessment:	Continuous Evaluation

INTRODUCTION TO RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to adequately prepare aspirant marine engineering officers for the rigours of postgraduate research and assisting them in thesis/dissertation preparation
Assessment:	Continuous Evaluation

MARINE ENGINEERING FOR DECK OFFICERS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide aspiring navigating officers with foundation knowledge on marine engineering systems and its operation on board ships.
Assessment:	Continuous Evaluation

MARINE LAW & SHIPPING PRACTICE 2

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The aim of this course is to give a full knowledge of the legal aspects of being a Navigation Officer at the Operational level as defined in the STCW Convention. The learner's knowledge of the method of governance in South Africa; the IMO and other international controlling bodies as well as company policies and procedures that are used to enforce rules and regulations on board ships is enforced and consolidated. The focus of the course is on pollution prevention, safety and security awareness and the management of subordinates.
Assessment:	Continuous Evaluation

MARINE LAW & SHIPPING PRACTICE 3

Pre-requisite:	Marine Law & Shipping Practice 2
Mode of delivery:	Lectures
Subject outline:	The primary aim of this course is to give a full knowledge of the legal aspects of being a Navigation Officer at the Management level as defined in the STCW Convention. The learner's knowledge of the method of governance in South Africa; the IMO and other international controlling bodies as well as company policies and procedures that are used to enforce rules and regulations with the specific focus of command on board ships is enforced and consolidated. The focus of the course is on pollution prevention, safety and security awareness and the management of subordinates.
Assessment:	Continuous Evaluation

MARINE MATHEMATICS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to equip aspirant watchkeeping officers, at an operational level, with the fundamental knowledge and skills which will enable them to cope with basic and advanced calculations in navigation, naval architecture and other marine related subjects.
Assessment:	Continuous Evaluation

MARINE METEOROLOGY

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to adequately equip aspiring mariners with the necessary knowledge and skills which will enable them to understand the marine environment, make informed decisions concerning the safety of the vessel and its crew and the safest, most economical choice of passage. In addition, the module intends to inform students about the frugality of our marine resources including our responsibility to prevent marine pollution
Assessment:	Continuous Evaluation

MARINE NAVIGATION 1

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	On completion of this unit, the student will have the skills, knowledge and attributes to undertake shipboard navigational, watchkeeping and marine communication tasks as a trainee deck officer under the supervision of a Deck Officer. The unit equips students with general knowledge of marine charts, sailing method, elementary navigation and astronomy
Assessment:	Continuous Evaluation

MARINE NAVIGATION 2

Pre-requisite:	Marine Navigation 1
Mode of delivery:	Lectures
Subject outline:	On completion of this unit, the student will have the skills, knowledge and attributes to undertake shipboard navigational, watchkeeping and marine communication tasks at Management level. The unit equips students with enhanced knowledge of marine charts, sailing method, navigation and astronomy.
Assessment:	Continuous evaluation

MARINE SCIENCE

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is for aspirant watchkeeping officers to become competent in the application of engineering sciences and mechanics to satisfy the needs of the maritime industry and commerce
Assessment:	Continuous Evaluation

MARITIME COMMUNICATION & SIGNALS

Pre-requisite:	None
Mode of delivery:	Lectures

Subject outline:	The purpose of this module to provide students with the skills and knowledge required to communicate effectively between ship and/or shore stations using the protocols laid down in the International Code of Signals, primarily using visual signals, but also using electronic and other media at their disposal. Other information of a practical nature is also included covering common flag etiquette.
Assessment:	Continuous Evaluation

MARITIME COMMUNICATION (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide learners with foundation knowledge in standard maritime terminology and introduce learners to the various modes of communication used in the maritime industry.
Assessment:	Continuous Evaluation

MATHEMATICS FOR NAUTICAL SCIENTISTS (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide foundation knowledge for learners in marine mathematics with practical application of problem solving of marine related challenges.
Assessment:	Continuous Evaluation

NAVAL ARCHITECTURE 1

Pre-requisite:	None
Co-requisite:	Marine Mathematics
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is for students to develop an understanding of the principles of naval architecture and to equip students with the fundamental and basic knowledge of ship stability calculations, for differing load conditions, and ship design and construction methodology.
Assessment:	Continuous Evaluation

NAVAL ARCHITECTURE 2

Pre-requisite:	Naval Architecture 1
Mode of delivery:	Lectures
Subject outline:	On completion of this unit, students will have the knowledge and skills to be able to demonstrate a comprehension of the principles relating to ships stability and seaworthiness and be able to calculate statical stability of a ship while acknowledging the importance of dynamical stability, making sure that the vessel complies with the IMO stability criteria under all loaded conditions and calculate the vessel's stability for all stages of the intended voyage.
Assessment:	Continuous Evaluation

NAVAL ARCHITECTURE 3

Pre-requisite:	Naval Architecture 2
Mode of delivery:	Lectures
Subject outline:	The module enables student in controlling and managing the stability of the vessel when at sea and in port to ensure the safety of the vessel, its cargo and crew is a prime domain of responsibility of the ship's officer. This unit focuses on the conceptual knowledge and practical application of ship stability on commercial vessels.

	A student completing this unit will be able to apply various stability concepts addressing aspects in statical and dynamical stability, ensuring that regulatory recommendations are met and that the vessel maintains its stability under all conditions of its operation. It is further designed to blend the theoretical concepts with real life experience; using typical shipboard stability applications
Assessment:	Continuous Evaluation

PASSAGE PLANNING

Pre-requisite:	Chartwork
Mode of delivery:	Practical application
Subject outline:	The purpose of this module is to equip students, at a management level, with a general knowledge of marine charts more advanced sailing methods, navigation, and astronomy. In this unit students will apply the concepts and principles underlying various methods of position fixing, passage planning, and evaluate the quality of position fixes. The unit further encompasses the study of different models of the shape of the earth, the understanding of nautical astronomy, using information to predict tidal heights and times and in-depth study of navigational errors and limitations of the ship's compass equipment. The unit also provides senior deck officers with theoretical knowledge and practical skills required to determine the optimal route for a voyage with respect to meteorological factors and the associated sea state.
Assessment:	Continuous Evaluation

PHYSICAL SCIENCE FOR NAUTICAL SCIENTISTS (ECP)

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To provide learners with a foundation knowledge in physical science with application in the maritime domain.
Assessment:	Continuous Evaluation

SEA TRANSPORT

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	On completion of this unit a student will be able to properly plan, load, carry and deliver various types of cargoes including cargoes of hazardous and perishable nature. The unit discusses the industry practices and procedures appropriate to the type of cargo and ships they are carried, the development of cargo handling equipment and the regulatory requirements to be complied with. The module exposes aspirant shipboard officers, at a management level, to the economic dynamics of global shipping, ship owning and ship managing, crewing regimes and cargo handling and stowage operations.
Assessment:	Continuous Evaluation

SEAMANSHIP & SAFETY (PRACTICAL)

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of this module is to equip students with a general knowledge of general seamanship and shipboard safety procedures. Upon completion of this module, candidates shall have successfully completed the following outcomes in Knots, bends, hitches, Watchkeeping practice, Man-overboard procedures, Abandoning ship procedures, Survival at sea, Ship manoeuvring and ship handling in all conditions and Responding to emergencies and distress signals at sea and Responding to emergencies in port.
Assessment:	Continuous Evaluation

SHIPPING MANAGEMENT 2

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The subject introduces learners to the various aspects of shipping management, including the legislative framework in general, shore based management, operational requirements onboard ships at sea and the carriage of goods by sea.
Assessment:	Continuous Evaluation

SHIPPING MANAGEMENT 3

Pre-requisite:	Shipping Management 3
Mode of delivery:	Lectures
Subject outline:	This module develops students' abilities and capabilities in managing the complex international freight system. It covers aspects of managing the movement of goods across national and international borders efficiently and effectively. It explains different actors and activities involved in managing international freight, with specific focuses on freight forwarding and multi-modalism that are important functions in facilitating international trade. Students are able to obtain an insight into freight forwarding operations and the day-to-day practical issues that go with the profession. Besides, this unit comprehensively overviews the issues related to multi-modalism, a critical component of seamless transport essential for an integrated supply chain. Finally, this unit explores how emerging issues such as technological, legal and environmental affect the operations of moving freight, and discusses different technological capabilities and solutions for improving the performance of freight management.
Assessment:	Continuous Evaluation

SHIPPING PROJECT 3

Pre-requisite:	Marine Law 2, Shipping Management 2
Mode of delivery:	Lectures
Subject outline:	This unit is designed to provide students with an opportunity to complete their final year project by employing various research methods and techniques with which they have been equipped. The aim of this unit is to encourage students to apply the principles of business research in conducting a real-life research project in Nautical Science related fields
Assessment:	Continuous Evaluation

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of this module is to adequately prepare aspirant marine engineering officers for the rigours of post-graduate research and assisting them in thesis/dissertation preparation.
Assessment:	Continuous Evaluation

DEPARTMENT OF MECHANICAL ENGINEERING

DEPARTMENT OFFICE-BEARERS

POSITION	NAME	TELEPHONE	E-MAIL
Head of Department	Mr S Nqabisa (Acting)	021 953 8642	NqabisaS@cput.ac.za
Secretary	Ms K Mohamed	021 953 8655	MohamedKu@cput.ac.za
Administrative Assistants	Ms N Soyekwa	021 959 8431	SoyekwaNo@cput.ac.za
	Ms T Bangani	021 959 6742	BanganiT@cput.ac.za

DEPARTMENTAL STAFF

POSITION	NAME	QUALIFICATIONS
Professor	Prof MAE Kaunda	BSc (Hons), MSc, PhD (Mechanical), Pr Eng
Professor	Prof GJ Oliver	BA, BSc (Honours), MSC, Doctor of Technical Sciences
Associate Professor	Dr O Philander	MTech (Mechanical), PhD (Mechanical)
Heads of Programmes		
Extended Curriculum:	Mr L Meyers	MEng (Mechanical)
Mainstream Diploma:	Mr S Nqabisa	MTech (Mechanical)
AdvDip & BTech:	Mr W Kohlhofer Mr HT Fawkes	MSc (Mechanical) MSc (Mechanical)
Mechatronics:	Mr O Ayodele	BSc (Hons) (Mechanical), MTech (Mechanical)
Cooperative Education Coordinators (Mechanical)	Mr G Morris Mr P Tebele Mr Z Mlumiso	BTech (Mechanical) BTech (Mechanical), BTech (Project Management), BTech (Quality) BTech (Mechanical)
Senior Lecturer	Ms V C Cain	MTech (Mechanical), MSc (Mechanical)
Senior Lecturer	Dr ET Muluh	PhD (Biomedical Engineering), DPhil
Senior Lecturer	Mr TZ Ngewana	BSc (Maths & Physics), MSc (Mechanical)
Senior Lecturer	Dr TN Ngonda	BSc (Mechanical), MEng (Mechanical), PhD (Mechanical), Pr Eng
Senior Lecturer	Mr MN Riddles	MTech (Mechanical)
Senior Lecturer	Dr AM Rugbani	BSc, MSc, PhD (Mechanical)
Senior Lecturer	Dr RA Ziegler	BA, HDE, MPhil, DPhil
Lecturer	Mr WW Alexander	BTech (Mechanical)
Lecturer	Mr T Chipanga	Diploma in Technical Education, MTech (Mechanical)
Lecturer	Ms FC du Preez	BEng (Hons), MEng (Industrial Engineering)
Lecturer	Mr EK Erfort	BTech (Mechanical)
Lecturer	Mr EJ February	MTech (Mechanical)

POSITION	NAME	QUALIFICATIONS
Lecturer	Dr H Fidder	MTech (Mechanical), PhD (Applied Physics)
Lecturer	Mrs F Harris	BA, Higher Diploma in Education, MTech (Quality)
Lecturer	Dr F Ismail	DEng (Mechanical)
Lecturer	Mr MH Ludick	MTech (Mechanical)
Lecturer	Mr CM Magoda	Diploma in Teaching (Physics and Mathematics), MTech (Mechanical)
Lecturer	Mr SR Makhomo	MTech (Mechanical)
Lecturer	Mr WP Mitchell	Baccalaureus Engineering (Mechanical), Diploma (Datametrics)
Lecturer	Dr V Msomi	BSc (Hons) (Industrial Science), MSc (Material Science and Engineering), DTech (Mechanical)
Lecturer	Dr O Nemraoui	PhD (Materials Engineering)
Lecturer	Mr S Pietrangeli	MTech (Mechanical)
Lecturer	Mr M N Riddles	MTech (Mechanical)
Lecturer	Mr SC Saal	MTech (Mechanical)
Lecturer	Mrs L Middleton	BSc, Master of Applied Science
Junior Lecturer	Mr WB Boshoff	BTech (Business Administration Management)
IT Technician	Ms C Komani	ND (Electrical: Light Current), BTech (Project Management)
Laboratory Technician	Mr D Barnard	ND (Mechanical)
Laboratory Technician	Mr L Curry	NHD (Electrical: Light Current)
Laboratory Technician	Mr WC Daniels	BTech (Mechanical)
Laboratory Technician	Mr M Jenkins	ND (Mechanical)
Laboratory Technician	Mr A Janodien	BTech (Mechanical)
Laboratory Technician	Mrs S Mabuwa	MEng (Mechanical)
Laboratory Technician	Mr M Masekwana	BTech (Mechanical)
Laboratory Assistant	Mr A Abrahams	Grade 8
Laboratory Technician	Mr M Fasi	ND (Mechanical)
Laboratory Assistant	Mr MW Gillion	National Technical Certificate
Laboratory Assistant	Mr R Williams	Grade 12

QUALIFICATIONS OFFERED

Qualification Type	Qualification Code	Minimum Duration	Maximum Duration	Work Integrated Learning
MECHANICAL ENGINEERING				
Diploma in Mechanical Engineering	D3MCHE	3 years	6 years	12 months
Diploma in Mechanical Engineering (Extended)	D3MCHX	4 years	8 years	12 months
Advanced Diploma in Mechanical Engineering	ADMCHE	1 year (full-time) 2 years (part-time)	2 years (full-time) 4 years (part-time)	--
Master of Engineering in Mechanical Engineering	MGMCHR	1 year (full-time) 2 years (part-time)	3 years (full-time) 4 years (part-time)	--
Doctor of Engineering in Mechanical Engineering	DGMCHR	2 years (full-time) 4 years (part-time)	4 years (full-time) 6 years (part-time)	--
MECHANICAL ENGINEERING: MECHATRONICS				
Diploma in Mechanical Engineering in Mechatronics	D3MECH	3 years	6 years	12 months
Advanced Diploma in Mechanical Engineering in Mechatronics	ADMECH	1 year (full-time)	2 years (full-time)	--

DIPLOMA IN MECHANICAL ENGINEERING

COURSE AIM

Graduates will be able to integrate analytical and practical mechanical engineering techniques and mechanical engineering knowledge to solve engineering problems. They will also be able to use given criteria to assess mechanical processes and outcomes.
Purpose and rationale of the Qualification

Persons achieving this qualification will be able to, independently as well as under supervision, integrate analytical and practical engineering techniques and engineering knowledge to solve well-defined and open-ended engineering problems. They will also be able to select criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Persons achieving this qualification will be able to, independently as well as under supervision, and integrate analytical and practical engineering techniques and engineering knowledge to solve well-defined and open-ended engineering problems. They will also be able to select criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

CAREER OPPORTUNITIES

A graduate will be a member of a team, including engineers, designers, technologists and technicians in the design, construction, marketing, installation and maintenance of mechanical equipment. Mechanical Engineering students follow streams such as manufacturing, maintenance, design, research and development, and also complete the Government Certificate of Competency. These streams open up employment opportunities at mining companies, automotive plants, engineering and production companies, building service contractors and consulting engineers, and give students the knowledge and skills to become entrepreneurs.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or TS 5 (60%)	Recommended: One of the following: ELECT (3), EGD (3), MECHT (3)	E (N4) 60% M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60%

Legend:
E (English)
M (Maths)
PS (Physical Science)
TM (Technical Maths)
TS (Technical Science)
ES (Engineering Science)

PROFESSIONAL REGISTRATION

The National Diploma: Engineering: Mechanical (an equivalent of the new Diploma qualification) is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.

DURATION

Full-time: Three years inclusive of 6 months of Work Place Based Learning (WPBL).

VENUE

Bellville Campus

DIPLOMA IN MECHANICAL ENGINEERING (D3MCHE)

Assessment Type: C – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (all subjects compulsory)									
Computer Skills and Applications	CSA150S	01	Y	5	C	--	14	0.118	CE
Engineering Drawing	MIT150S	01	Y	5	C	--	14	0.118	CE
Engineering Mathematics	MTH155S	01	Y	5	C	--	21	0.175	CE
Engineering Mechanics	EMC150S	01	Y	5	C	--	14	0.118	CE
Mechanical Engineering Manufacturing	MMG150S	01	Y	5	C	--	14	0.118	CE
Physical Science	PSC151S	01	Y	5	C	--	28	0.235	CE
Professional Communication	PFC150S	01	Y	5	C	--	14	0.118	CE
2nd Year (all subjects are compulsory except MNE360S)									
Electrotechnology 2	ELC260S	01	Y	6	C	PSC150S	14	0.111	CE
Fluid Mechanics	FDM260S	01	Y	6	C	PSC150S, EMC150S	14	0.111	CE
Mechanics of Machines	MOM261S	01	Y	6	C	PSC150S, EMC150S	14	0.112	CE
Strength of Materials	STL261S	01	Y	6	C	PSC150S, EMC150S	14	0.111	CE
Thermodynamics	APT260S	01	Y	6	C	PSC150S, EMC150S	14	0.111	CE
Applied Mathematics	AMT260S	01	S1	6	C	MTH155S	14	0.111	CE
Computer Aided Design	CAD260S	01	S1	6	C	MIT150S, MMG150S, CSA150S	14	0.111	CE
Global Environmental Studies	GES361S	01	S2	6	C	PFC150S	7	0.057	CE
Maintenance Engineering	MNE360S	01	S2	6	E	--	7	0.057	CE
Mechanical Engineering Design 2	MED260S	01	S2	6	C	PSC150S, EMC150S (Co-MOM261S, STL261S)	14	0.111	CE
3rd Year (If you did not complete MNE360S in 2nd year, then 2 electives must be taken in 3rd year)									
Mechanical Engineering Project (Work place based Learning)	MIR360S	01	Y	6	C	--	60	0.5	CE
Advanced Mechanical Engineering Manufacturing	MIE360S	01	S1	6	E	MMG150S, CAD260S	7	0.057	CE
Applied Strength of Materials	ASM360S	01	S1	6	C	STL261S	14	0.114	CE
Control Systems Engineering	CSE360S	01	S1	6	E	MOM261S, AMT260S	7	0.057	CE

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Electrotechnology 3	ELC360S	01	S1	6	E	ELC260S	7	0.057	CE
Hydraulics Machines	HDM360S	01	S1	6	C	FDM260S	14	0.114	CE
Mechanical Engineering Design 3	MED360S	01	S1	6	C	MED260S, STL261S, CAD260S	14	0.114	CE
Production Engineering	PIB360S	01	S1	6	C	--	7	0.057	CE
Steam Plant	STP260S	01	S1	6	C	PSC150S, EMC150S	14	0.111	CE

DIPLOMA IN MECHANICAL ENGINEERING (EXTENDED)

COURSE AIM

In the Extended Curriculum with Foundational Provision Programme, first-year subjects of the Diploma are spread over two years, allowing a more supportive academic environment. The Extended Programme covers the same subjects as the mainstream programme but year 1 is done over a period of one year each (classified as year 0 and year 1), as opposed to one year in the mainstream.

It leads to the same qualification, but it provides the student with the opportunity to receive additional support in all year 0 and year 1 subjects. On completion of the two year Foundational Programme, in year 2 students will integrate with the mainstream programme.

WHO QUALIFIES FOR THE EXTENDED PROGRAMME?

Applicants who meet the university entrance requirements and obtain (Mathematics 50% and 45 - 49% Physical Science) or (Physical Science 50% and 45 - 49% Mathematics).

Applicants who were accepted in the mainstream program but are concerned about their background in Mathematics and Physical Science, and feel that they will benefit from the "Extended Programme", may approach the department to be considered for this programme.

Students transferring from "Extended Program" elsewhere must have completed all their year 0 and year 1 subjects to be considered for year 2.

DURATION

Full-time: The four year programme comprisesof three and a half years of academic subjects and 6 months of Work Place Based Learning (WPBL).

VENUE

Bellville Campus

DIPLOMA IN MECHANICAL ENGINEERING (EXTENDED) (D3MCHX)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
Year 0 (all subjects compulsory)									
Computer Skills and Applications	CSA150X	01	Y	5	C	--	14	0.118	CE
Physical Science	PSC150X	01	Y	5	C	--	28	0.235	CE
Professional Communication	PFC150X	01	Y	5	C	--	14	0.118	CE

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st Year (all subjects compulsory)									
Engineering Drawing	MIT150X	01	Y	5	C	--	14	0.118	CE
Engineering Mathematics	MTH155X	01	Y	5	C	--	21	0.175	CE
Engineering Mechanics	EMC150X	01	Y	5	C	--	14	0.118	CE
Mechanical Engineering Manufacturing	MMG150X	01	Y	5	C	--	14	0.118	CE
2nd Year (all subjects compulsory except MNE360S)									
Electrotechnology 2	ELC260S	01	Y	6	C	PSC150X	14	0.111	CE
Fluid Mechanics	FDM260S	01	Y	6	C	PSC150X, EMC150X	14	0.111	CE
Mechanics of Machines	MOM261S	01	Y	6	C	PSC150X, EMC150X	14	0.112	CE
Strength of Materials	STL261S	01	Y	6	C	PSC150X, EMC150X	14	0.111	CE
Thermodynamics	APT260S	01	Y	6	C	PSC150X, EMC150X	14	0.111	CE
Computer Aided Design	CAD260S	01	S1	6	C	MIT150X, MMG150X, CSA150X	14	0.111	CE
Applied Mathematics	AMT260S	01	S1	6	C	MTH155X	14	0.111	CE
Global Environmental Studies	GES361S	01	S2	6	C	PFC150X	7	0.057	CE
Maintenance Engineering	MNE360S	01	S2	6	E	--	7	0.057	CE
Mechanical Engineering Design 2	MED260S	01	S2	6	C	PSC150X, EMC150X (Co-MOM261S, STL261S)	14	0.111	CE
3rd Year (If you did not complete MNE360S in 2nd year, then 2 electives must be taken in 3rd year)									
Mechanical Engineering Project (Work place based Learning)	MIR360S	01	Y	6	C	--	60	0.5	CE
Advanced Mechanical Engineering Manufacturing	MIE360S	01	S1	6	E	MMG150X, CAD260S	7	0.057	CE
Applied Strength of Materials	ASM360S	01	S1	6	C	STL261	14	0.114	CE
Control Systems Engineering	CSE360S	01	S1	6	E	MOM261S, AMT260S	7	0.057	CE
Electrotechnology 3	ELC360S	01	S1	6	E	ELC260S	7	0.057	CE
Hydraulics Machines	HDM360S	01	S1	6	C	FDM260S	14	0.114	CE
Mechanical Engineering Design 3	MED360S	01	S1	6	C	MED260S, STL261S, CAD260S	14	0.114	CE
Production Engineering	PIB360S	01	S1	6	C	--	7	0.057	CE
Steam Plant	STP260S	01	S1	6	C	PSC150X, EMC150X	14	0.111	CE

ADVANCED DIPLOMA: MECHANICAL ENGINEERING

COURSE AIM

Graduates can apply mechanical engineering principles to determine appropriate ways of approaching mechanical engineering activities, as well as to establish and use criteria to assess processes and outcomes.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Persons achieving this qualification will be able to independently integrate mechanical engineering principles, apply these to determine appropriate ways of approaching activities and establish and use criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

CAREER OPPORTUNITIES

Graduates work with engineers, designers, technologists and technicians in the design, construction, marketing, installation and maintenance of mechanical equipment. The work is intellectual, demanding the capacity to think independently and to supervise technical and administrative staff. Students follow streams such as manufacturing, maintenance, design, research and they can complete the Government Certificate of Competency (GCC). These streams prepare graduates for employment by mining companies, automotive plants, engineering and production companies, building service contractors and consulting engineers. Graduates also have the knowledge and skills to become entrepreneurs.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

Applicants should obtain a 60% pass in the exit level subjects of the 360 Diploma (NQF L6) in Mechanical Engineering or its equivalent.

OR

Applicants should obtain a 60% for the second year of the Diploma in Technology of 240 credit (or its equivalent) together with 120 WIL credits.

Applicants who do not obtain the 60% metioned above but has at least least one-year post Diploma qualification relevant industrial experience may be considered on merit.

All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

PROFESSIONAL REGISTRATION

The Bachelor of Technolgy: Engineering: Mechanical (an equivalent of the new Advanced Diploma qualification) is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technologists.

DURATION

Full-time: One year
Part-time: Two years

VENUE

Bellville Campus

ADVANCED DIPLOMA: MECHANICAL ENGINEERING (ADMCHE)

All subjects are compulsory. Engineering Design Project must be registered in the first semester of the year of intended completion of the qualification.

Assessment Type: C - Continuous evaluation / E - EX / PR - Project
Subject offering: Y - Year subject / S1 or S2 - Semester subject

Year / Semester Subject	Subject Name	Subject Code	(C)ompulsory / (E)lective and	Pre-requisites. (Co-requisites in brackets)	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
4th Year (All subjects compulsory)								
Y	Engineering Design Project	EDP471S	C	--	7	28	0.200	PR
S1	Engineering Mathematics	EMA472S	C	--	7	14	0.100	CE
S1	Fluid Mechanics	FLM471S	C	--	7	14	0.100	CE
S1	Heat Transfer	HTR471S	C	--	7	14	0.100	CE
S1	Strength of Materials	STL471S	C	--	7	14	0.100	CE
S2	Environmental Engineering	EVE460S	C	--	6	7	0.050	CE
S2	Project Management	PMA461S	C	--	6	7	0.050	CE
S2	Refrigeration & Air Conditioning	RAC470S	C	--	7	21	0.150	CE
S2	Research Methodology	RME472S	C	--	7	7	0.050	CE
S2	Stress Analysis	SAN471S	C	--	7	14	0.100	CE

MASTER OF ENGINEERING IN MECHANICAL ENGINEERING

COURSE AIM

Graduates will make a contribution, through research, to understanding the application and evaluation of existing knowledge in a specialised area of technology. They will also demonstrate a high level of overall knowledge in that area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

This qualification is offered as either a research-based degree, for which students conduct supervised research in a specialised area of mechanical engineering and complete a dissertation, or a course driven degree, for which students attend classes and complete a research project and paper.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for persons who will make a contribution, through research, to understanding the application and evaluation of existing knowledge in a specialised area of technology. They will also demonstrate a high level of overall knowledge in that area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

CAREER OPPORTUNITIES

Graduates follow a career in research and development in industry, and may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

A level 8 qualification with a minimum aggregate of 60% in the following qualifications:

- Postgraduate Diploma in Mechanical Engineering; Bachelor of Engineering Technology (Honours) in Mechanical Engineering;
- Professional Bachelor of Engineering in Mechanical Engineering; or related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

DURATION

Full-time: Minimum of 1 year / Maximum of 3 years
Part-time: Minimum of 2 years / Maximum of 4 years

VENUE

Bellville Campus

MASTER OF ENGINEERING IN MECHANICAL ENGINEERING (MGMCHR)

Assessment Type: C – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
6th YEAR									
Research project & dissertation	MCH690R	01/02	Y	9	C	--	180	1	CE

DOCTOR OF ENGINEERING IN MECHANICAL ENGINEERING

COURSE AIM

Graduates will make a significant and original contribution to knowledge in a specialised area of technology. They will have a high level of overall knowledge in that specialised area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

PURPOSE AND RATIONALE OF THE QUALIFICATION

This qualification is intended for persons who will make a significant and original contribution to knowledge in a specialised area of technology. They will have a high level of overall knowledge in that specialised area, ranging from fundamental concepts to advanced theoretical or applied knowledge.

CAREER OPPORTUNITIES

Graduates follow a career in research and development in industry and may be employed at research institutes. They are also employed in teaching and research positions at higher education institutions.

ADMISSION REQUIREMENTS

Note that the Admission Requirements listed here are for the 2021 Academic Year - for the 2022 Admission Requirements please check the CPUT website: www.cput.ac.za/study/postgraduate-applications

- A level 9 Masters qualification in Mechanical Engineering or related field.

Prospective postgraduate students for full thesis studies must first find a provisional research topic or research area, and possible supervisor. For information on the fields / areas of study and Supervisors go to:

http://www.cput.ac.za/study/research-areas-and-supervisors

Acceptance is dependent on a supervisor being available for the specific field of study, as well as space / equipment availability - the student should consult with the department before submitting their application.

DURATION

Full-time: Minimum of 2 years / Maximum of 4 years
Part-time: Minimum of 4 years / Maximum of 6 years

VENUE

Bellville Campus

DOCTOR OF ENGINEERING IN MECHANICAL ENGINEERING (DGMCHR)

Assessment Type: C – Continuous evaluation / EX – EX/ PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
7th YEAR									
Research project & dissertation	MCH710R	01/02	Y	10	C	--	360	2	CE

DIPLOMA IN MECHANICAL ENGINEERING IN MECHATRONICS

COURSE AIM

Mechatronics is an inter-disciplinary field, combining traditional electrical, electronic, mechanical, control and computer engineering skills, applied to solve problems that bridge the boundaries between these disciplines, requiring multi-skilled practitioners. Mechatronic engineering includes the study of electronics, software and mechanical engineering in the design and manufacture of products and processes. In addition, the wide and varying range of work involved requires the development of good transferable engineering skills to provide the basis for continuing professional development.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Persons achieving this qualification will be able to, independently as well as under supervision, and integrate analytical and practical engineering techniques and engineering knowledge to solve well-defined and open-ended engineering problems. They will also be able to select criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

CAREER OPPORTUNITIES

Students will therefore follow a course of study that covers a broad range of different disciplines so that they can develop, manage, integrate, manufacture, and operate mechatronics systems and components. Graduates from the programme will follow a career in a multidisciplinary engineering environment in the printing, packaging, food processing, manufacturing, assembly, automation and automotive industries.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

NATIONAL SENIOR CERTIFICATE (NSC)		NATIONAL CERTIFICATE (NC)	NATIONAL CERTIFICATE VOCATIONAL (NCV)
Minimum Admission Requirements	**Further Requirements**	**English Language equivalent to the National Senior Certificate**	**A National Certificate (Vocational) at level (4)**
APS Score of 30 using Method 2 E (First language) 4 (50%) M 4 (50%) or TM 5 (60%) PS 4 (50%) or TS 5 (60%)	**Recommended:** One of the following: ELECT (4), EGD (4), MECHT (4)	E (N4) 60% M (N4) 60% ES (N4) 60%	E (5) (60%), M (5) (60%), ES (3) with 60% **Recommended:** Electro Technology (3) (50%), Mechatronic Systems (3) (50%)

Legend:
E (English)
M (Maths) PS (Physical Science) ELECT (Electrotechnology)
TM (Technical Maths) TS (Technical Science) ES (Engineering Science)

PROFESSIONAL REGISTRATION

The National Diploma: Engineering: Mechanical (Mechatronics) an equivalent of the new Diploma qualification is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technicians.

DURATION

Full-time: Three years inclusive of 6 months of Work Place Based Learning (WPBL).

VENUE

Bellville Campus

DIPLOMA IN MECHANICAL ENGINEERING: MECHATRONICS (D3MCHE)

Assessment Type: C – Continuous evaluation / EX – Exam
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Subject Description	Subject Code	Offering type	Semester/ Year	NQF Level	Elective (E)/ Compulsory (C)	Pre-requisites/ (Co-requisites are listed as -Co)	SAQA Credits	HEMIS Credit	Assessment Type
1st YEAR (all subjects compulsory)									
Computer Engineering	CPE150S	01	Y	5	C	--	14	0,111	CE
Electrical and Electronics Engineering	EEE150S	01	Y	5	C	--	14	0,111	CE
Engineering Drawing	EDR150S	01	Y	5	C	--	14	0,111	CE
Engineering Mathematics	MTH154S	01	Y	5	C	--	21	0,167	CE
Engineering Mechanics	EMH150S	01	Y	5	C	--	14	0,111	CE
Physical Science	PSC151S	01	Y	5	C	--	28	0,222	CE
Professional Communication	PTC151S	01	Y	5	C	--	14	0,111	CE
Mechanical Engineering Manufacturing	MEM150S	01	S2	5	C	--	7	0,056	CE
2nd YEAR (all subjects compulsory)									
Control Systems	CSS260S	01	Y	6	C	MTH154S, EEE150S	14	0,125	CE
Industrial Automation	IAT260S	01	Y	6	C	CPE150S, EEE150S	14	0,125	CE
Mechanical Engineering Design	MIO260S	01	Y	6	C	EDR150S, (Co-STL260S, MOM260S)	14	0,125	CE
Mechanics of Machines	MOM260S	01	Y	6	C	EMH150S, PSC151S	14	0,125	CE
Strength of Materials	STL260S	01	Y	6	C	EMH150S, PSC151S	14	0,125	CE
Thermo-Fluids 2	FLM260S	01	Y	6	C	EMH150S, PSC151S	14	0,125	CE
Embedded Systems	EBS260S	01	S1	6	C	EEE150S, CPE150S, PSC151S	14	0,125	CE
Applied Mathematics	MTH263S	01	S2	6	C	MTH154S	14	0,125	CE
3rd YEAR (all subjects compulsory)									
Mechatronics Industrial Project (Work Place Based Learning)	MIP360S	01	Y	6	C	(Co-CAM360S, STL360S, FLM360S, MIJ360S, PCN360S, GES360S, ENM360S)	60	0.500	CE
Applied Strength of Materials	STL360S	01	S1	6	C	STL260S	14	0.100	CE
Computer Aided Manufacturing	CAM360S	01	S1	6	C	MEM150S, EDR150S, CPE150S	7	0.050	CE
Engineering Management	ENM360S	01	S1	6	C	PTC151S	7	0.050	CE
Global Environmental Studies	GES360S	01	S1	6	C	PTC151S	7	0.050	CE
Mechatronic Design	MIJ360S	01	S1	6	C	MIO260S, EBS260S, CSS260S, IAT260S	14	0.100	CE
Process Control and Industrial Networking	PCN360S	01	S1	6	C	IAT260S, CPE150S, CSS260S	7	0.050	CE
Thermo-Fluids 3	FLM360S	01	S1	6	C	FLM260S	14	0.100	CE

ADVANCED DIPLOMA IN MECHANICAL ENGINEERING IN MECHATRONICS

COURSE AIM

A graduate at this level functions as a technologist who displays competence as a leader of a multidisciplinary engineering team in the execution of engineering projects. The theoretical aspects of the engineering principles covered in the diploma level will be further developed along with supporting skills such as project management and entrepreneurship to produce a well-equipped graduate for the modern competitive engineering environment.

PURPOSE AND RATIONALE OF THE QUALIFICATION

Persons achieving this qualification will be able to independently integrate mechanical engineering principles, apply these to determine appropriate ways of approaching activities and establish and use criteria to judge processes and outcomes. This qualification is intended for engineering practitioners in industry.

CAREER OPPORTUNITIES

The technological advancement towards automation especially in the manufacturing and processing sectors has resulted in an on-going need for personnel that are highly skilled in combining the traditional mechanical, electrical and electronics engineering fields with control and information technology. Graduates will apply proven techniques and procedures to the solution of practical multidisciplinary engineering problems requiring a high level of technical decision-making.

ADMISSION REQUIREMENTS

Note the admission requirements listed below are for the 2021 Academic Year - for the 2022 admission requirements for please check the Prospectus at: www.cput.ac.za/study/apply

Applicants should obtain a 60% pass in the exit level subjects of the 360 Diploma (NQF L6) in Mechanical Engineering (Mechatronics) or its equivalent.

OR

Applicants should obtain a 60% pass in the exit level subjects of the 360 Diploma (NQF L6) in Mechanical Engineering or its equivalent. Additional prerequisites apply, please contact the department.

OR

Applicants should obtain a 60% pass in the exit level subjects of the 360 Diploma (NQF L6) in Electrical Engineering or its equivalent. Additional prerequisites apply, please contact the department.

Applicants who do not obtain the 60% metioned above but has at least least one-year post Diploma qualification relevant industrial experience may be considered on merit.

All international qualifications must be evaluated by SAQA (South African Qualifications Authority) before submission of the application (visit www.saqa.org.za). Once the qualification has been evaluated and the applicant meets the minimum admission requirements (NQF level 6) of the programme the applicant could apply through the normal application process.

SELECTION PROCEDURE

Prospective students should note that the admission requirements are minimum requirements only. Admission is subject to strict selection procedures, thus meeting minimum requirements will not necessarily ensure admission.

PROFESSIONAL REGISTRATION

The Bachelor of Technology: Engineering: Mechanical (Mechatronics) an equivalent of the new Advanced Diploma qualification is accredited by the Engineering Council of South Africa (ECSA). Graduates will comply with the academic requirements for registration as Professional Technologists.

DURATION

Full-time: Minimum one year (two semesters)
Part-time: Two years

VENUE

Bellville Campus

ADVANCED DIPLOMA IN MECHANICAL ENGINEERING IN MECHATRONICS (ADMECH)

Assessment Type: CE – Continuous evaluation / EX – Exam / PR - Project
Subject offering: Y – Year subject / S1 or S2 – Semester subject

Year/Semester Subject	Subject Name	Subject Code	(C)ompulsory / (E)lective and	Pre-requisites. (Co-requisites in brackets)	NQF Level	SAQA Credits	HEMIS Credit	Assessment Type
4th Year (All subjects compulsory)								
Y	Mechatronic Design Project	MDP470S	C	--	7	21	0.150	PR
S1	Engineering Mathematics	EMA470S	C	--	7	14	0.100	CE
S1	Mechatronic Control Systems	MCS470S	C	--	7	14	0.100	CE
S1	Mechatronic System Design & Simulation	SDS470S	C	--	7	14	0.100	CE
S1	Research Methodology	RME470S	C	--	7	7	0.050	CE
S1	Thermo-Fluids	TFL470S	C	--	7	14	0.100	CE
S2	Electronic Devices & Systems	EDS470S	C	--	7	14	0.100	CE
S2	Environmental Engineering	EEN470S	C	--	7	7	0.050	CE
S2	Mechanics of Machines	MOM470S	C	--	7	14	0.100	CE
S2	Project Management	PMA462S	C	--	6	7	0.050	CE
S2	Stress Analysis	SAN470S	C	--	7	14	0.100	CE

PROMOTION CRITERIA & EXCLUSION RULES

Mechanical Engineering department applies the Faculty Exclusion Policy

SUBJECTS: GUIDE TO TERMINOLOGY

CORE SUBJECT: Core subjects form a central part of the programme. Inclusion of such subjects in a curriculum is compulsory.

CO-REQUISITE: A co-requisite subject is one for which a student must be registered together (i.e. concurrently) with another specified subject. For Example, Maths 1 must be taken in the same semester as Mechanics 1 (unless the student has already passed it), because Mechanics 1 relies on content given in Maths 1.

PRE-REQUISITE: A pre-requisite subject is one which a student must have passed in order to gain admission to another subject. For example, Maths 1 is a pre-requisite for Maths 2.

EXPOSURE: An exposure subject is one which a student must have completed, but does not have to have passed in order to gain admission to another subject. For example, Maths 2 is an exposure subject for Thermodynamics 2. This means that the student has had the necessary exposure to important aspects of the subject to be ready to take on the next phase.

ELECTIVE SUBJECT: This is a subject required for qualification purposes (e.g. to make up the required number of credits), but in which the choice of subject is left to the student, and is conditional upon timetable constraints.

DIPLOMA SUBJECTS: MECHANICAL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail. Subjects without a number at the end do not have an equivalent at a higher level

ADVANCED MECHANICAL ENGINEERING MANUFACTURING

Pre-requisite:	Computer Aided Design, Mechanical Engineering Manufacturing
Mode of delivery:	Lectures and practicals
Subject outline:	Coding of CNC milling and turning programs for parts, production of CNC milled and wire cut parts from a CAM program
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

APPLIED MATHEMATICS

Pre-requisite:	Engineering Mathematics
Mode of delivery:	Lectures
Subject outline:	This course will introduce the student to higher mathematics and mathematical problem solving, develop a link between mathematics and Mechatronic engineering, further expand and develop the student's knowledge of and proficiency in mathematics and help the student to understand the mathematical aspects of his/her other subjects better by provide a firm foundation for further study.
Assessment:	Assignments/tutorials, tests and FISA

APPLIED STRENGTH OF MATERIALS

Pre-requisite:	Strength of Materials
Mode of delivery:	Lectures and practicals

Subject outline:	This course builds on from the fundamentals of Strength of Materials, extending the knowledge to deal with more complex problems pertaining to mechanics of deformable bodies. The course affords students the opportunity to develop proficiency in solving a variety of problems encountered in engineering practice. The topics covered include complex stress systems, failure theories, deflections of indeterminate beams, combined stress systems, complex strain, three-dimensional strain and the use of strain gauge rosettes to measure strain on components subjected to external loadings. To this end, the knowledge obtained will be pertinent to create safe designs of components, assemblies and structures.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

COMPUTER AIDED DESIGN

Pre-requisite:	Computer Skills and Applications, Engineering Drawing 1, Mechanical Engineering Manufacturing
Mode of delivery:	Lectures
Subject outline:	Describe traditional mechanical manufacturing processes; use CAD softwareto produce 3D models for computer-aided manufacturing; manually code CNC milling programs for parts; manually code CNC turning programs for parts; produce CNC milled parts from a CAM program; produce CNC wire cut parts from a CAM program
Assessment:	Assignments/tutorials, tests and FISA

COMPUTER SKILLS AND APPLICATIONS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	This course provides the students with skills to operate computers effectively and provide an environment to use and practice computer programmes in a real life scenario. The subject also offers the desire for students to analyse and draw logical conclusions whilst solving problems in projects. With the technological advancement in the world, it is critical for engineers to be aware of the importance and effectiveness of knowledge of computers hence giving them confidence in computer operations and use. This subject forms the basis of other higher level subjects that require research topics, investigation, experiments and reports to be presented in the acceptable formats. The course covers content on computer hardware and software, internet and email, Microsoft Office package (Word, Excel, PowerPoint, Projects) and Programming, which are critical skills required from a Mechanical Engineer.
Assessment:	Assignments/tutorials, tests and FISA

CONTROL SYSTEMS ENGINEERING

Pre-requisite:	Applied Mathematics, Mechanics of Machines
Mode of delivery:	Lectures and practicals
Subject outline:	Control systems, play an integral part in modern society. Many of our daily experiences and interactions are influenced and facilitated through the application of automatically controlled-based technologies. Since these control systems find widespread application in virtually every area from biological, physical, and naturally occurring control systems, persons working within this sector would need a thorough understanding of the basic laws and techniques necessary to perform fundamental analysis and basic design of control systems.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

ELECTROTECHNOLOGY 2

Pre-requisite:	Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	This subject covers the basic concepts and principles of electrical technology in the clearest and simplest form possible. By doing this it will build on and enhance your current knowledge gained in science and prepare you for future subjects in the electrical field. The modern day mechanical engineer should be able to do basic electric calculations especially the electricity requirements for the various machines they design. Therefore, the aim of this course is to introduce students to the

	fundamentals of electricity and electric circuits. The skills and knowledge gained from this course will support them in later courses and in their professional lives. Specifically, students need to become competent in the kind of reasoning that is applied to solving problems in electrical technology and to learn to recognise which of the fundamental scientific principles gets applied to solve electrical input power questions, electrical costs, complex circuits, Electromagnetism and Inductance. Students should also interpret, analyse and acquire the skills needed to research, investigate and report findings in an acceptable format.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

ELECTROTECHNOLOGY 3

Pre-requisite:	Electrotechnology 2
Mode of delivery:	Lectures and practicals
Subject outline:	This subject aims to enable students to do the following: listing and differentiating common industrial control methods and techniques; analyzing simulation data and comparing to actual values; analyzing signals and systems; mathematical modelling of dynamics systems.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

ENGINEERING DRAWING 1

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The objective of this course is to use conventional drawing techniques to develop skills of reading, interpreting and creating engineering drawings using drawing instruments, free-hand sketches and Computer Aided Draughting.
Assessment:	Assignments/tutorials, projects, tests and FISA

ENGINEERING MATHEMATICS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of the course is to: equip the student with knowledge and skills to scientifically analyze numerical data; enable the student to apply statistical analysis knowledge on technical data and equip the student with the knowledge and application of mathematics in engineering systems and processes.
Assessment:	Assignments, tutorials, tests and FISA

ENGINEERING MECHANICS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	Mechanics is the most basic field of knowledge underpinning all of the study and understanding of mechanical engineering. The aim of this course is to introduce students to the fundamentals of mechanics. The skills and knowledge gained from this course will support them in later courses and in their professional lives. Specifically, students need: to become competent in the kind of reasoning that is applied to solving problems in mechanics and to learn to recognise which of the fundamental principles in mechanics need to be applied in which situations and to acquire the skills needed to research, investigate and report findings in an acceptable format.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

FLUID MECHANICS

Pre-requisite:	Engineering Mechanics, Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of this subject is to contribute to the level of competence expected from a mechanical engineering technician the anticipated general outcomes of this subject are to: introduce aspiring technicians to the real life environment where fluid mechanics is used to satisfy the needs of households, industry and commerce; develop the ability and cultivate the desire of the student to observe, analyse and draw logical conclusions in the search for solutions to problems; develop the ability to apply the above knowledge and skills in the solution of problems in the fluid mechanics field and to gain confidence in doing so; develop the ability of the student to combine this knowledge and concepts with those of other disciplines to solve problems encountered in practice; supply the student with the required body of knowledge and concepts encountered in statics and dynamics of fluid mechanics and enhance the ability of the student to research topics, investigate, experiment and to report findings in an acceptable format.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

GLOBAL ENVIRONMENTAL STUDIES

Pre-requisite:	Professional Communication
Mode of delivery:	Lectures
Subject outline:	This subject aims to increase knowledge and capacity of interested participants of current global environmental concerns. Overall, the course will provide students an understanding of environmental issues at both local and global levels. This course is developed to enable students acquire a basic understanding of the key environmental issues of the 21st century, and to be able to integrate this knowledge into their programme of study and to engage in the wider public debate on these issues. Having acquired knowledge, skills and competencies in some of the major areas of the broader environment, graduates would have enhanced employability and have a stronger environmental ethic which they would be able to apply in their working contexts.
Assessment:	Assignments/tutorials, projects, tests, oral presentation and FISA

HYDRAULICS MACHINES

Pre-requisite:	Fluid Mechanics
Mode of delivery:	Lectures and practicals
Subject outline:	Hydraulic Machines is an application of the basic theory of Fluid Mechanics to incompressible flow hydraulic turbomachinery specifically. Common examples of hydraulic machinery in practice are discussed, and worked examples are used to illustrate the theory. Laboratories, demonstrations, assignments, and projects are done to reinforce the theoretical concepts discussed in the lectures. Students are required to do additional reading relating to the subject matter, and for the presentation of assignments, projects and laboratory.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

MAINTENANCE ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	This subject offers knowledge to students as follows: selection of a suitable maintenance strategy for an engineering organisation: emergency/corrective, routine, preventive, predictive, proactive, modification; advantages and disadvantages of various strategies; RCM process and FMEA process; drawing up an asset (plant) register for an engineering organisation: Purpose, asset hierarchy, numbering system, physical fixing methods, asset information; maintenance planning, scheduling and authorisation principles and documents: Work request and order documents, work/service scheduling documents, spares and stores, purchase requisitions, priority systems, backlog management.; equipment life cycle costing: Functions and purpose, graphs used, factors involved in purchasing new equipment; explaining the principles of turning a maintenance department into a profit centre: Direct and indirect maintenance costs; sources and methods for generating maintenance revenue.
Assessment:	Assignments/tutorials, projects, oral presentation, tests and FISA

MECHANICAL ENGINEERING DESIGN 2

Pre-requisite:	Engineering Mechanics, Physical Science
Co-requisite:	Mechanics of Machines, Strength of Materials
Mode of delivery:	Lectures and practicals
Subject outline:	Recognising and applying elements of the design process in case studies; selecting engineering materials suitably for an application according to a set of criteria; demonstrating the fundamentals of mechanical engineering design; shaft sizes and types for power transmission under different loading conditions; using design calculations to join shafts and rods using couplings; selecting appropriate joining and fastening materials; calculations on journal bearings, lubrication theory, belt drives and conveyors; actuators (electric, pneumatic and hydraulic drives) and their usage for engineering design needs; selecting controller devices, sensors and adequately incorporating them in engineering automation needs. Using the knowledge to collate a design project in which calculations and drawings are combined applying the design process.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

MECHANICAL ENGINEERING DESIGN 3

Pre-requisite:	Mechanical Engineering Design 2, Strength of Materials, Computer Aided Design (CAD)
Mode of delivery:	Lectures and practicals
Subject outline:	The student will gain the aptitude to: Recognize and apply elements of the design process and investigation analogy in case studies; gather and interpret information about a technical need; formulate and select appropriate designs which satisfy the mechanical engineering need; design and report successfully on the product; produce documents in a technological environment; use interpersonal skills to facilitate co-operative decision-making and to provide information
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

MECHANICAL ENGINEERING MANUFACTURING

Pre-requisite:	None
Mode of delivery:	Lectures and workshop activities
Subject outline:	The aim of the course is to supply and enable the student to perform elements of manufacturing in an engineering organization, and enhance the ability of learners to exercise communication skills and solve practical problems in an engineering environment. Safe working practices, Safety legislation and Risk control; Selection and use of basic hand tools and use of various measuring equipment; Comprehend the operation of different welding techniques – Arc, Oxy-acetylene Gas, MIG and TIG Welding; Understanding various operations of machining using Centre Lathe, drilling machine, Milling machine and grinding machine; Recognize various material production such as Plastics, Powder Metallurgy and heat treatment of carbon steels; Discover various processes and applications of hot and cold metal forming.
Assessment:	Assignments/tutorials, workshop activities/projects, tests and FISA

MECHANICAL ENGINEERING PROJECT (WORK PLACE BASED LEARNING)

Pre-requisite:	None
Mode of delivery:	Projects are assigned to students by the industry based supervisors. The WIL coordinator visits the students to ascertain their progresses and liaise with the industry based supervisors.
Subject outline:	This subject prepares students to acquire sufficient practical knowledge that could enable them to be absorbed into the industry and begin to function with minima supervision
Assessment:	Projects, time sheets, log book, oral presentations and reports

MECHANICS OF MACHINES

Pre-requisite:	Engineering Mechanics , Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	The subuject aims at strengthening the knowledge of the structure of machines and mechanisms with particular attention to the kinematic, kinetostatic and dynamic analysis of systems with rigid links and to the dynamics of cycle machines. Advanced methods of analysis and synthesis of mechanisms, cams and gears will complement the basic concepts developed at the bachelor level. Elements of machine design and strength of materials are also presented with emphasis to fatigue analysis and structural analysis. At the end of the course students have a deep understanding of all the elements of mechanics that are fundamental for industrial automation, mastering design and construction principles that play a role in modern automatic machines.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

PHYSICAL SCIENCE

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	This course provides a concise, thorough, and relevant introduction to chemistry and physics that prepares students for further study in any engineering field. The course emphasizes the connection between molecular properties and observable physical properties and the connections between chemistry as well physics and other subjects studied by engineering students. It offers students a glimpse of the practical applications of physics and chemistry in science, engineering, and everyday life.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

PRODUCTION ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	To equip students with knowledge and understanding of operations management techniques and principles, which include productivity calculations, facility layout, forecasting and short-term scheduling. On completion of the subject students should be able to define, describe, explain and discuss the relevant matter and be able to: do productivity calculations; apply appropriate techniques when designing goods and services; use the tools of TQM; design process control charts; apply forecasting methods; use the EOQ and POQ models; compute reorder points; identify optional strategies for developing an aggregate plan, and prepare a graphical aggregate plan; develop a product structure (BOM) and build a MRP plan; apply appropriate shorter scheduling techniques .
Assessment:	Assignments/tutorials, tests, projects, and FISA

PROFESSIONAL COMMUNICATION

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The subject offers a wide array of topics from introductory written and oral communication to more specialized themes such as corporate, intercultural, interpersonal, and visual communication. It gives students an essential education that will enhance their communication skills relevant to the mechanical engineering industry. It offers students a glimpse of the practical applications of professional communications into the business world by simulated exercises with feedback from lecturers and peers.
Assessment:	Assignments/tutorials, poster, oral presentations, interviews and reports

STEAM PLANT

Pre-requisite:	Engineering Mechanics , Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	This subject aims to prepare students to have knowledge of: steam plant fundamentals, economics, and legislation; steam generators and auxiliaries, steam plant cycles; steam turbine and auxiliaries and non-conventional thermal power plants.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

STRENGTH OF MATERIALS

Pre-requisite:	Engineering Mechanics , Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	This subject is geared towards helping you understand the conventions and apply the fundamental elements and concepts pertaining to strength of materials. If you apply yourself to understanding, visualizing, acquiring and improving upon the skills presented in the course, you should develop the confidence and ability to solve problems related to solid mechanics / strength of materials.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

THERMODYNAMICS

Pre-requisite:	Engineering Mechanics , Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of this subject is to impart knowledge of the heating & expansion of gases, steam generation, steam power plant & combustion of fuels, thermodynamic renewable energy sources, thermodynamic systems and associated equations; thermodynamics of compressible flow and its applications in nozzles and diffusers; rotor-dynamic machines and applications in aircraft engines and power plants; reciprocating machines and applications in vehicular transport and industry; reversed engines and applications in refrigerators and heat pumps; heat transfer basics and simple applications in heat exchangers and furnaces.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

ADVANCED DIPLOMA SUBJECTS: MECHANICAL ENGINEERING

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

ENGINEERING DESIGN PROJECT

Pre-requisite:	None
Mode of delivery:	Lectures at the initial stage followed by consultations with supervisors at least once in two weeks.
Subject outline:	The aims of this subject are: to expose aspiring technologists to a real life environment where research and the design of components, machines and systems are undertaken to satisfy the needs of industry and commerce; to simulate a work situation; to guide the student to acquire the knowledge and skills necessary for successful completion of a mechanical engineering design and/or research project; to develop problem-solving abilities, and especially skills in observation, analysis and drawing of logical conclusions; to develop innovative thinking; to develop confidence in the application of engineering skills; to encourage a multi-disciplinary approach to problem solving; to report a design solution in an acceptable written and oral format and, where possible to be involved with the manufacture, testing and commissioning thereof; for the student to function individually and as a member of a design team, and for students to recognise when they need guidance and feedback, as well as to make successful use of the supervision provided.
Assessment:	Prototypes, testing or commissioning, computer modelling, experimentation

ENGINEERING MATHEMATICS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The Primary learning objective is to understand how to use solve ordinary and partial differential equations, and be able to use the wave, heat transfer and Laplace equations to solve real world problems.
Assessment:	Assignments/tutorials, tests and FISA

ENVIRONMENTAL ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	Environmental Engineering is an important field that students need to have an appreciation of and have specific competencies and skills in. In particular, issues of the environment such as the social, economic, institutional and legal contexts need to be considered. This subject aims to present the subject with a broad coverage, examining practice and development in a holistic way, so as to assist graduates to deal with environmental problems and offer solutions in an analytical fashion more meaningfully, by also considering technical, economic and social factors. Specific skills in project management, environmental impact assessment (EIA), water and energy audits are covered, with a view to professional, ethical and legal application to engineering problems and their solutions. Having acquired knowledge, skills and competencies in some the major areas of environmental engineering, graduates would have enhanced employability and have a stronger environmental ethic which they would be able to apply in their working contexts.
Assessment:	Assignments/tutorials, projects, oral presentation, tests and FISA

FLUID MECHANICS

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of the subject is to provide the knowledge and skills to: scientifically analyze an open or closed system that includes fluid flow (incompressible or compressible) and predict the performance of a prototype through fluid mechanics modelling.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

HEAT TRANSFER

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of the subuject is to: equip the student with knowledge and skills to scientifically analyze an existing thermal engineering system; enable the student do preliminary design of a thermal engineering system up to commercial level and help the student develop an appreciation of safety, ethical and environmental issues in relation to thermal engineering systems
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

PROJECT MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The main purpose of project management is to complete the project in the shortest possible time, at the lowest possible cost and at expected quality levels. To meet these objectives, the activities of a project should be scheduled subject to their technological and resource constraints and strict time and cost control should be exercised throughout the lifetime of the project.
Assessment:	Assignments/tutorials, projects, oral presentation, tests and FISA

REFRIGERATION & AIR-CONDITIONING

Pre-requisite:	Thermodynamics 3
Mode of delivery:	Lectures
Subject outline:	The purpose of this subject is to: equip the student with knowledge and skills to scientifically analyze and study characteristics and engineering design of heating, ventilating, air conditioning and refrigeration (HVAC&R) systems; enable the student do preliminary design of HVAC&R systems up to commercial level, including ethical and environmental related issues and support the student with a wealth of real-world engineering examples to give him a feel for how refrigeration and air conditioning theory is applied in engineering practice.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of the subject is to: apply knowledge of mathematics, natural science and engineering sciences to applied engineering procedures, processes, systems and methodologies to conduct a qualitative and quantitative research; define and conduct investigations and experiments of broadly defined problems; use appropriate techniques, resources, and modern engineering tools, including information technology when conducting research and research design; communicate effectively with regards to Research methodology, both orally and in writing, with engineering audiences and the affected parties; demonstrate knowledge and understanding of the impact of Research activity on the society, economy, industrial and physical environment, and address issues by analysis and evaluation and the need to act professionally within own limits of competency when conducting research; comprehend and apply ethical principles and commit to professional ethics, responsibilities
Assessment:	Assignments, report writing, proposal and oral presentation.

STRENGTH OF MATERIALS

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of this subject is to: provide the student with the body of established and accepted knowledge regarding the behaviour of structural and machine members under the action and influence of external loads, taking into account

	the internal forces created and the resulting deformations; develop the ability and cultivate the desire within the student to observe, analyse and draw logical conclusions in the handling of the subject matter; develop the ability to apply the above knowledge and skills in the resolution of problems encountered in this field; to develop the ability of the student to combine this knowledge and the concepts involved there in with those of other disciplines, so as to solve problems encountered in practice; help the student develop an appreciation of safety, ethical and environmental issues in relation to structural, mechanical and industrial systems.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

STRESS ANALYSIS

Pre-requisite:	Applied Strength of Materials 3
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of the course is to: equip the student with modern analysis techniques used widely in engineering practice and the sciences, and use these techniques in a general finite element program; equip the student on how to establish computational models of problems of solids and fluids, solve them on your laptop, and assess the accuracy of the result and help the student to capitalize on knowledge of mechanics, reinforce the knowledge, and solve problems that can only be tackled numerically on the computer
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

DIPLOMA SUBJECTS: MECHATRONICS

Note that the details below are summarised – refer to the individual Subject Guides for more detail. Subjects without a number at the end do not have an equivalent at another level.

APPLIED MATHEMATICS

Pre-requisite:	Engineering Mathematics
Mode of delivery:	Lectures and practicals
Subject outline:	This course will introduce the student to higher mathematics and mathematical problem solving, develop a link between mathematics and Mechatronic engineering, further expand and develop the student’s knowledge of and proficiency in mathematics and help the student to understand the mathematical aspects of his/her other subjects better by provide a firm foundation for further study.
Assessment:	Assignments/tutorials, tests and FISA

APPLIED STRENGTH OF MATERIALS

Pre-requisite:	Strength of Materials
Mode of delivery:	Lectures and practicals
Subject outline:	This course builds on from the fundamentals of Strength of Materials, extending the knowledge to deal with more complex problems pertaining to mechanics of deformable bodies. The course affords students the opportunity to develop proficiency in solving a variety of problems encountered in engineering practice. The topics covered include complex stress systems, failure theories, deflections of indeterminate beams, combined stress systems, complex strain, three-dimensional strain and the use of strain gauge rosettes to measure strain on components subjected to external loadings. To this end, the knowledge obtained will be pertinent to create safe designs of components, assemblies and structures.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

COMPUTER AIDED MANUFACTURING

Pre-requisite:	Computer Engineering, Engineering Drawing, Mechanical Engineering Manufacturing
Mode of delivery:	Lectures and workshop activities
Subject outline:	This course is a second subject in engineering design after Mechanical Engineering Manufacturing.This course will be a great learning experience exposing you to interesting Computed Machines for fabrication, challenging you to think deeply to elaborate an Automated manufacturing process, and providing skills useful in professional practice. Software such as EdgeCAM, SolidCAM will be used to perform manufacturing simulations before starting on the real machine.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

COMPUTER ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	This course will give the student a much needed foundation in computers. It takes a foundational approach to the broad subject of computer engineering to enable students to understand computer anatomy and application. The course looks at computer programming using the C language and ends with an introduction of MATLAB which is a “high-level technical computing language and interactive environment used by engineers and scientists worldwide.”
Assessment:	Assignments/tutorials, tests and FISA

CONTROL SYSTEMS

Pre-requisite:	Electrical and Electronics Engineering, Engineering Mathematics
Mode of delivery:	Lectures and practicals
Subject outline:	The essence of Mechatronics is the control system. This course, which is an introduction to Industrial Process Control and industrial networking, has been designed for mechatronics students at diploma level. The aim is to provide the theoretical and practical knowledge needed to develop continuous and discrete control systems. Students will study the open and closed loop systems, dynamic system modelling, transient response, steady-state error criterion amongst other things. The course aims to focus on industrial application of control theory in the mechatronics discipline while still creating an awareness of the complex nature of control systems engineering.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

ELECTRICAL AND ELECTRONICS ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	This subject covers the fundamentals of electrical and electronic engineering, that is, theoretical concepts and practical skills. The students will be introduced to concepts at the basic component and circuit's levels, practical skills are coupled to theoretical concepts through the use of relevant practical experiments and individual project work
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

EMBEDDED SYSTEMS

Pre-requisite:	Computer Engineering, Electrical and Electronics Engineering, Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	This is a hands-on beginner to intermediate course to the principles and practice of embedded system design using the PIC microcontroller. It gives an in-depth treatment of microcontroller design, programming in both assembly language and C.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

ENGINEERING DRAWING

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The objective of this subject is to use conventional drawing techniques to develop skills of reading, interpreting and creating engineering drawings using drawing instruments, free-hand sketches and Computer Aided Draughting.
Assessment:	Assignments/tutorials, projects, tests and FISA

ENGINEERING MANAGEMENT

Pre-requisite:	Professional Communication
Mode of delivery:	Lectures
Subject outline:	This course will equip the student with the ability to apply engineering principles to business practice. Engineering management attempts to combine the technological problem-solving knowledge of engineering and the administrative, organisational, and planning skills of management, thus providing the student with skills to manage engineering businesses from formation to completion.
Assessment:	Assignments/tutorials, projects, tests, oral presentation and FISA

ENGINEERING MATHEMATICS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	This subject introduces students to higher mathematics and mathematical problem solving. To provide the fundamental analytical and underpinning knowledge and techniques needed to successfully complete scientific and engineering principles modules of national engineering diploma degree. To develop a link between mathematics, mathematical computing and Mechatronics Engineering.
Assessment:	Assignments/tutorials, tests and FISA

ENGINEERING MECHANICS

Pre-requisite:	None
Mode of delivery:	Contact lectures and laboratory practicals
Subject outline:	Mechanics is the most basic field of knowledge underpinning all of the study and understanding of mechanical engineering. Therefor the aim of this subject is to introduce students to the fundamentals of mechanics. The skills and knowledge gained from this course will support them in later courses and in their professional lives. Specifically, students need: to become competent in the kind of reasoning that is applied to solving problems in mechanics and to learn to recognise which of the fundamental principles in mechanics need to be applied in which situations and to acquire the skills needed to research, investigate and report findings in an acceptable format
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

GLOBAL ENVIRONMENTAL STUDIES

Pre-requisite:	Professional Communication
Mode of delivery:	Lectures
Subject outline:	This subject aims to increase knowledge and capacity of interested participants of current global environmental concerns. Overall, the course will provide students an understanding of environmental issues at both local and global levels. This course is developed to enable students acquire a basic understanding of the key environmental issues of the 21st century, and to be able to integrate this knowledge into their programme of study and to engage in the wider public debate on these issues. Having acquired knowledge, skills and competencies in some of the major areas of the broader environment, graduates would have enhanced employability and have a stronger environmental ethic which they would be able to apply in their working contexts.
Assessment:	Assignments/tutorials, projects, oral presentation, tests and FISA

INDUSTRIAL AUTOMATION

Pre-requisite:	Computer Engineering, Electrical and Electronics Engineering
Mode of delivery:	Lectures and practicals
Subject outline:	Automation (also called automatic control) is the use of various control systems for operating equipment such as machinery, processes in factories and other applications with minimal or reduced human intervention. To achieve system automation required knowledge from various engineering disciplines such as mechanical, electrical/electronic and computer science/computer engineering. This subject harnesses such knowledge learnt by the student to this point in other areas and couples this with specific knowledge of automation and components of automated systems so as to enable the learner to develop automated systems relevant to the Industrial Revolution (4^{th} Industrial Revolution). Students will study the technology currently available (sensors, actuators, PLCs, communications, IMC, DCS, etc.) as well as the methods used to implement monitoring.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

MECHANICAL ENGINEERING DESIGN

Pre-requisite:	Engineering Drawing
Co-requisite:	Mechanics of Machines, Strength of Materials
Mode of delivery:	Lectures and practicals
Subject outline:	The objective of this subject is to teach the student the existing underpinning knowledge of basic mechanical engineering fundamentals and concepts, and how to use this knowledge in developing skills on an iterative process to solve elementary mechanical engineering design problems.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

MECHANICAL ENGINEERING MANUFACTURING

Pre-requisite:	None
Mode of delivery:	Lectures and workshop activities
Subject outline:	The aim of the course is to contribute to the level of competence expected from a mechanical engineering technician. To this end the learner will be introduced to elements or manufacturing, such as basic hand skills needed to manufacture components, welding and fabrication, machining, production and selection of various materials for certain purposes, metal forming processes, various manufacturing and joining processes. The learner will also be exposed to various metrology instruments.
Assessment:	Assignments/tutorials, workshop activities/projects, tests and FISA

MECHANICS OF MACHINES

Pre-requisite:	Engineering Mechanics, Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	This course introduces you to more advanced concepts of kinematic and dynamic modelling and analysis of mechanisms and machines, including linkage mechanisms and cam mechanisms, reciprocating and rotating machinery. The course enables you to explore in depth core mechanical engineering concepts by integrating and applying contemporary analytical, computational and experimental methods. It relates kinematics and dynamics of mechanisms and machines to their design and allows you to relate theory and practice using a problem-based approach in which you develop project management skills.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

MECHATRONIC DESIGN

Pre-requisite:	Mechanical Engineering Design, Embedded Systems, Control Systems, Industrial Automation
Mode of delivery:	Lectures
Subject outline:	The objective of this subject is to teach the students new concepts that build upon their previously gained knowledge and guide them to apply the knowledge to a practical mechatronic engineering design project at a higher level of competence than their previous design projects
Assessment:	Projects, tests, oral presentations, reports and FISA.

MECHATRONICS INDUSTRIAL PROJECT (WORK PLACE BASED LEARNING)

Pre-requisite:	None
Co-requisite:	Computer Aided Manufacturing, Applied Strength of Materials, Thermo-Fluids 3, Mechatronic Design, Process Control and Industrial Networking, Global Environmental Studies, Engineering Management
Mode of delivery:	Projects are assigned to students by the industry based supervisors. The WIL coordinator visits the students to ascertain their progresses and liaise with the industry based supervisors.
Subject outline:	This subject prepares students to acquire sufficient practical knowledge that could enable them to be absorbed into the industry and begin to function with minima supervision

Assessment:	Projects, time sheets, log book, oral presentations and reports.

PHYSICAL SCIENCE

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	This subject provides a concise, thorough, and relevant introduction to chemistry and physics that prepares students for further study in any engineering field. The course emphasizes the connection between molecular properties and observable physical properties and the connections between chemistry as well physics and other subjects studied by engineering students. It offers students a glimpse of the practical applications of physics and chemistry in science, engineering, and everyday life.
Assessment:	Assignments/tutorials, practicals, tests and FISA

PROCESS CONTROL AND INDUSTRIAL NETWORKING

Pre-requisite:	Industrial Automation, Computer Engineering, Control Systems
Mode of delivery:	Lectures and practicals
Subject outline:	This subject introduces students (or Prospective Interns) to industrial automation and control, and particularly to prepare them to face thechallenges and realities at the work place. To help bridge the gap between theoretical acquired knowledge and practical apprenticeship by rallying the theory learned in class to the practice as it is done in the process and automation industries.
Assessment:	Assignments/tutorials, practicals, tests and oral presentations

PROFESSIONAL COMMUNICATION

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	This subject aims to prepare students to become effective and competent communicators as well as independent learners and to enhance students' ability to identify appropriate sources of information in response to specific information needs to evaluate, integrate and use the information gathered in written tasks and in oral presentations
Assessment:	Assignments/tutorials, poster, oral presentations, interviews and reports

STRENGTH OF MATERIALS

Pre-requisite:	Engineering Mechanics, Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	This course is geared towards helping you understand the conventions and apply the fundamental elements and concepts pertaining to strength of materials. If you apply yourself to understanding, visualizing, acquiring and improving upon the skills presented in the course, you should develop the confidence and ability to solve problems related to solid mechanics / strength of materials.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

THERMO-FLUIDS 2

Pre-requisite:	Engineering Mechanics, Physical Science
Mode of delivery:	Lectures and practicals
Subject outline:	This course is an introduction to basic theories of fluid and thermal sciences. Common examples of fluid and thermal systems in practice are discussed, and worked examples are used to illustrate the theory. Laboratories, demonstrations, assignments, projects and site visits are done to strengthen the theoretical concepts discussed in the lectures. Students are required to do additional reading relating to the subject matter, and for the presentation of assignments and laboratory reports.

Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

THERMO-FLUIDS 3

Pre-requisite:	Thermo-Fluids 2
Mode of delivery:	Lectures and practicals
Subject outline:	This course is an application to the basic theories of Fluid Mechanics and basic Applied Thermodynamics courses to incompressible flow hydraulic turbo-machinery specifically. Common examples of hydraulic machinery systems in practice are discussed, and worked examples are used to illustrate the theory. Laboratories, demonstrations, assignments, projects and site visits are done to strengthen the theoretical concepts discussed in the lectures. Students are required to do additional reading relating to the subject matter, and for the presentation of assignments and laboratory reports.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

ADVANCED DIPLOMA SUBJECTS: MECHATRONICS

Note that the details below are summarised – refer to the individual Subject Guides for more detail.

ELECTRONIC DEVICES & SYSTEMS

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	This subject will equip the student with the knowledge to evaluate the performance of digital and analogue devices and systems, the knowledge and skills to scientifically analyze electronic components, as well as enable the student to apply circuit techniques in designing electrical systems.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

ENGINEERING MATHEMATICS

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The purpose of the course is to: equip the student with knowledge and skills to scientifically analyze numerical data; enable the student to apply statistical analysis knowledge on technical data and equip the student with the knowledge and application of mathematics in engineering systems and processes.
Assessment:	Assignments/tutorials, tests and FISA

ENVIRONMENTAL ENGINEERING

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	Environmental Engineering is an important field that students need to have an appreciation of and have specific competencies and skills in. In particular, issues of the environment such as the social, economic, institutional and legal contexts need to be considered. This subject aims to present the subject with a broad coverage, examining practice and development in a holistic way, so as to assist graduates to deal with environmental problems and offer solutions in an analytical fashion more meaningfully, by also considering technical, economic and social factors. Specific skills in project management, environmental impact assessment (EIA), water and energy audits are covered, with a view to professional, ethical and legal application to engineering problems and their solutions. Having acquired knowledge, skills and competencies in some the major areas of environmental engineering, graduates would have enhanced employability and have a stronger environmental ethic which they would be able to apply in their working contexts
Assessment:	Assignments/tutorials, projects, reports, oral presentation, tests and FISA

MECHANICS OF MACHINES

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	This subject covers fundamental concepts that are critical to designing more user friendly and cost-effective mechanisms and machines through the application of scientific and engineering principles related to mechanics of machines. A deliberate approach is pursued to integrate the graphical, analytical and computational methods to study the dynamical effects. Kinematics is enhanced using specialised motion study simulation software such as Linkages and Adams. On the other, kinetics considers all other aspects that produces the desired motion. These critical considerations include velocities and accelerations, forces acting on mechanisms, static and dynamic balancing, and vibrations. In this process, emphasis is placed on studying existing systems with intentions of developing improved versions or new versions of mechanisms and machines.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

MECHATRONIC CONTROL SYSTEMS

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of the subject is to equip the student with the knowledge and skills to significantly apply analysis tools to mathematically assess the design of mechatronic control systems up to industrial level. Enable the student to do preliminary investigation to study the stability of nonlinear control systems, specifically in mechatronic systems context. Help the student to develop and design a controller so that the closed loop meets the desired design characteristics and specifications in simulation and experimental environment.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

MECHATRONIC DESIGN PROJECT

Pre-requisite:	None
Mode of delivery:	Lectures at the initial stage followed by consultations with supervisors at least once in two weeks.
Subject outline:	Engineering design is a process that attempts to find the best solution to an engineering problem. The problem must first be carefully defined, requirements and constraints must be identified and the criteria for assessing the success of the design must be known before any design concepts (ideas) can be compared. The design concept that best satisfies the criteria is then developed into a final design that is supported by engineering analysis and manufacturing drawings. Your project may also require manufacture of your design and testing (or simulation and results). The aim of this subject is to expose the student to the major facets of moderately sized industrial and nonindustrial projects in mechatronic engineering. Students are required to identify and develop a solution of a specific, real-world problem. It is expected of the student to run the project from its inception to completion. A project will preferably have the elements of specification, design and manufacture, culminating in the production of an artifact which is relevant either to the industry or to the consumer. However, it could also be an analytical study of a relevant mechatronic engineering technology or method.
Assessment:	Research proposal, prototypes/simulations, demonstration, oral presentation, poster, scientific paper and thesis

MECHATRONIC SYSTEM DESIGN & SIMULATION

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of the course is to equip the student with both theoretical and practical modeling and simulation skills, and provide the student with an overview of the state-of-the-art within modeling of mechatronic systems, including the governing equations for steady-state and dynamic modeling of the basic electronic, electrical, hydraulic, pneumatic and mechanical sub-systems of a mechatronic system and combining these equations into models of closed loop controlled mechatronic systems.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA

PROJECT MANAGEMENT

Pre-requisite:	None
Mode of delivery:	Lectures
Subject outline:	The main purpose of project management is to complete the project in the shortest possible time, at the lowest possible cost and at expected quality levels. To meet these objectives, the activities of a project should be scheduled subject to their technological and resource constraints and strict time and cost control should be exercised throughout the lifetime of the project.
Assessment:	Assignments/tutorials, projects, tests and FISA

RESEARCH METHODOLOGY

Pre-requisite:	None
Mode of delivery:	Lectures and consultation by students
Subject outline:	The purpose of the subject is to: apply knowledge of mathematics, natural science and engineering sciences to applied engineering procedures, processes, systems and methodologies to conduct a qualitative and quantitative research; define and conduct investigations and experiments of broadly defined problems; use appropriate techniques, resources, and modern engineering tools, including information technology when conducting research and research design; communicate effectively with regards to Research methodology, both orally and in writing, with engineering audiences and the affected parties; demonstrate knowledge and understanding of the impact of Research activity on the society, economy, industrial and physical environment, and address issues by analysis and evaluation and the need to act professionally within own limits of competency when conducting research; comprehend and apply ethical principles and commit to professional ethics, responsibilities.
Assessment:	Assignments, report writing, proposal and oral presentation

STRESS ANALYSIS

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of the course is to: equip the student with modern analysis techniques used widely in engineering practice and the sciences, and use these techniques in a general finite element program; equip the student on how to establish computational models of problems of solids and fluids, solve them on your laptop, and assess the accuracy of the result and help the student to capitalize on knowledge of mechanics, reinforce the knowledge, and solve problems that can only be tackled numerically on the computer.
Assessment:	Assignments/tutorials, tests, projects and FISA

THERMO-FLUIDS

Pre-requisite:	None
Mode of delivery:	Lectures and practicals
Subject outline:	The purpose of the course is to: equip the student with knowledge and skills to scientifically analyze an existing thermal engineering system; Enable the student do preliminary design of a thermal engineering system up to commercial level and help the student develop an appreciation of safety, ethical and environmental issues in relation to thermal engineering systems.
Assessment:	Assignments/tutorials, practicals/projects, tests and FISA