Computer Studies

Upper Secondary

Syllabus

Papua New Guinea
Department of Education

Acknowledgements

Contents

Secretary's message

This Computer Studies syllabus is to be used by teachers to teach Upper Secondary students (Grades 11 and 12) throughout Papua New Guinea. This syllabus builds upon concepts, skills and attitudes learnt in Lower Secondary and provides a sound foundation for further learning.

The Upper Secondary Computer Studies syllabus links to the National Education Plan's vision, which is that secondary education enables students to achieve their individual potential to lead productive lives as members of the local, national and international community.

This subject provides the opportunity for deeper understanding of the information technology and computing revolution, which will enable students to meet individual needs as well as local and global demands and challenges. Students with Computer Studies knowledge and skills will be equipped to participate fully in the global world of the 21st century.

Teachers play a leading role by being innovative and creative and keeping abreast of new information and technological innovation.

I commend and approve this syllabus as the official curriculum for Computer Studies to be used in all schools with Grades 11 and 12 students throughout Papua New Guinea.
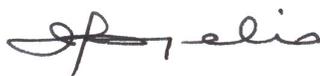
DR JOSEPH PAGELIO
Secretary for Education

Introduction

This syllabus is based on the curriculum principles from the National Curriculum Statement. It has been designed using learning outcomes that identify the knowledge, skills, attitudes and values that all students achieve or demonstrate by the end of Grade 12. It is linked to the national curriculum learning area Culture and Community and builds on the knowledge and skills students have learnt since elementary grades. This Computer Studies syllabus offers a number of pathways to post-secondary study and the workforce. It has specialised and general applications in both areas.

Lower Secondary Design and Technology strands	Lower Secondary Design and Technology units	Upper Secondary Computer Studies strands	Upper Secondary Computer Studies units
Planning Making Marketing Evaluating	**Computing** Computer Basics Word Processing 1 Presentation Graphics **Options** Word Processing 2 Databases Information Management Spreadsheets 1 Spreadsheets 2 The Internet School-developed units	Information Communication Technology	Computer Fundamentals File and Information Management Word Processing Computers and Society Desktop Publishing The Internet Information and Communication Systems Multimedia Spreadsheets Databases Computers and Employment

Computer Studies requires a good level of English competency. Students need to be fluent in reading, writing and speaking English for research, report writing and oral and written presentations, as well as for typing or data entry and software application uses.

Information technology (IT) has been an integral phase in nation building since its inception in the middle of the 20th century. The use of computers in many countries has grown into a powerful medium, which helps drive the economies and social and political environments of most developed nations. The influence of IT has gained tremendous momentum in Papua New Guinea in the last decade. Papua New Guinea is developing Computer Studies to meet its needs and demands. Relevant stakeholders have seen the need for the country to be an IT-using nation and are assisting private and state institutions to develop a computer-literate society. This syllabus is designed to cater for this growing need. Secondary schools offering this syllabus are offering vital knowledge and skills training, which is relevant to students and will support the achievement of the Government's development priorities.

Computer Studies is to be timetabled for 240–250 minutes per week in Grades 11 and 12.

Rationale

Development in technology has progressed very fast. The technological revolution is significantly changing the way of the world. Computer technology is pervasive, penetrating all sectors of the economy, creating new jobs, changing others and enhancing many activities. It allows students to explore an area of interest and to develop the specific knowledge and skills of computer-based technology.

In order for Papua New Guinea to keep abreast of the global community, computer technology must become an integral part of business, government and education. Geographical isolation will no longer be a hindrance to Papua New Guinea's advancement. The continual improvements in computer technology are breaking geographical barriers, bringing people closer together and Papua New Guinea closer to the rest of the world.

Students studying Computer Studies are at the forefront of advances in communication, information and computer technology. This subject will enable them to develop practical, technical and organisational skills.

Aims

Computer Studies aims to enable students to:

- make a worthwhile contribution to the social and economic development of the country through the use of computer technology skills
- develop knowledge, skills, values and attitudes in computer technology that will be transferable to their career paths and future life directions
- provide students with basic knowledge of computer technology that enhances their personal and professional productivity
- communicate effectively through the use of technological innovations.

Strands

The study of Computer Studies is described in the following strands:

Information

'Information literacy' is the ability to gather information from multiple sources, select relevant material and organise it into a form that will allow the user to make quality decisions or take specific actions.

This strand identifies the information that is taken from data. Whatever data is encoded in the computer is interpreted in various ways to collect accurate and reliable information. This information comes in a variety of ways after processing, organising and analysing data to meet the needs of the end user.

Students learn concepts in data input, processing and output to help them to make informed decisions on information found in all areas of their lives.

Communication

Communication deals with the process involved in the transfer of information from one place to another. This transfer can happen in a variety of ways. In computer communications, data travels electronically at very high speed. The speed of computer communication creates a big impact on computer users, in ways never imagined before. Continuous improvement in the use of satellite communications and the internet are making the world a smaller place.

Students understand the use of a range of communications hardware and software devices. They develop an awareness of the opportunities provided by the growing need for communication.

Technology

Technology is about the knowledge and creative processes that are involved in the development of hardware and software tools, techniques and the use of materials. Technology is designed and produced to meet a range of human needs, from personal to business, education and government.

Students learn about technologies that meet user needs and the impacts of those technologies.

Learning outcomes

The syllabus learning outcomes describe what students know and can do at the end of Grade 12. The level of achievement of the learning outcomes should improve during the two years of Upper Secondary study, and it is at the end of the study that students are given a summative assessment on the level of achievement of the learning outcomes.

The Computer Studies learning outcomes identify the knowledge, skills, attitudes and values all students achieve or demonstrate at the end of Grade 12. The learning outcomes for Computer Studies are listed below.

Students can:

1. identify and describe computer hardware and software and their functions and capabilities
2. demonstrate knowledge and understanding of the legal and ethical issues of using information technology
3. apply basic skills in using computer software for research purposes
4. apply basic skills and concepts in creating documents using word processing
5. demonstrate understanding of the internet and e-mail and related issues
6. apply knowledge and skills in creating solutions to information problems using a range of software
7. develop multimedia presentations using a range of hardware and software devices
8. identify and describe a variety of information systems and how these are used within organisations.

Learning outcomes mapped against units											
Learning outcomes	**Grade 11 units**						**Grade 12 units**				
	11.1	11.2	11.3	11.4	11.5	11.6	12.1	12.2	12.3	12.4	12.5
1. Identify and describe computer hardware and software and their functions and capabilities	✓						✓				
2. Demonstrate knowledge and understanding of the legal and ethical issues of using information technology				✓		✓					
3. Apply basic skills in using computer software for research purposes		✓				✓					
4. Apply basic skills and concepts in creating documents using word processing			✓								✓
5. Demonstrate understanding of the internet and e-mail and related issues				✓		✓					✓
6. Apply knowledge and skills in creating solutions to information problems using a range of software					✓		✓	✓	✓	✓	✓
7. Develop multimedia presentations using a range of hardware and software devices					✓			✓			
8. Identify and describe a variety of information systems and how these are used within organisations	✓					✓	✓				

Unit sequence and content

Grade 11 units	Grade 12 units
11.1 Computer Fundamentals *10 weeks* • Information-processing cycle • A brief history of computers • Generations of computers • Classification of computers • Input and output devices • Storage devices • System box	**12.1 Information and Communication Systems** *30 weeks* • Information systems • Networking • Network software • Communication systems
11.2 File and Information Management *10 weeks* • File management • Information management • Information organisation • Information analysis	**12.2 Multimedia** *10 weeks* • Introduction • Creating an interactive presentation • Delivering and controlling a presentation • Integrating multimedia with other programs
11.3 Word Processing *10 weeks* • Creating and saving a new document • Formatting documents • Editing text • Viewing a document • Finalising and printing the document • Working with tables and lists • Working with graphics	**12.3 Spreadsheets** *10 weeks* • Spreadsheets and their purpose • Moving around in a spreadsheet • Creating and saving spreadsheets • Performing calculations • Managing worksheet and workbook information • Formatting worksheets • Creating a chart • Setting up a page and printing
11.4 Computers and Society *10 weeks* • Impacts on society • Measures to protect computers and data • Environmental, social and ethical issues • Government controls and laws on ICT • Ergonomics in ICT	**12.4 Databases** *10 weeks* • Getting started • Working with data • Working with tables and relationships • Creating and customising queries • Creating and customising forms • Creating useful reports
11.5 Desktop Publishing *10 weeks* • Working with publications • Planning and designing a page • Working with text • Drawing and working with graphic objects • Working with tables • Presenting and printing the publication	**12.5 Computers and Employment** *3 weeks* • Career options in ICT • Job search on the internet and in other media • Formatting résumés or CVs • Formatting job application letters
11.6 The Internet *10 weeks* • Web fundamentals • Web security • Search techniques • Website evaluation • Evaluating internet-based resources • Communication protocols	

Grade 11 units	Grade 12 units
• Electronic mail (e-mail) • Creating webpages • Working with images and multimedia effects • Creating hyperlinks • Working with special effects	

Grade 11 units

It is suggested that the practical units be taught concurrently with the theory units throughout the year.

11.1 Computer Fundamentals

Term 1: 10 weeks (theory only)

This unit is designed for students who require an introduction to the basic terminology, concepts and operations needed for success in this syllabus. The unit covers basic system software and application software operation, and the operation of hardware.

Learning outcomes

Students can:

1. identify and describe computer hardware and software and their functions and capabilities
8. identify and describe a variety of information systems and how these are used within organisations.

To achieve the learning outcomes, students:
- identify and demonstrate the appropriate use of a range of hardware and software components and peripheral devices
- describe the major components of a computer system and explain their functions.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The unit emphasises identifying and demonstrating the appropriate uses of a range of hardware and software components.

Information-processing cycle
- what is a system?
  - water cycle, digestive system, knowledge databases, transaction systems, accounting systems, expert systems
- what is a computer?
- what is a computer system?
- input, processing, storage, output, communication

A brief history of computers
- early times
- the abacus
- the pioneers
- the modern computer

- characteristics of computers

Generations of computers

- first generation of computers
- second generation of computers
- third generation of computers
- fourth generation of computers
- fifth generation of computers

Classification of computers

- supercomputers
- mainframe computers
- workstations
- microcomputers
- artificial intelligence (AI)

Input and output devices

Input devices

- keyboard
  - traditional keyboard (QWERTY)
  - specialty keyboards (dumb, intelligent, internet terminals)
  - wireless keyboards
- pointing devices
  - mouse (USB optical, ps2)
  - touchpad
  - touch screen
  - trackball
  - light pen
  - joystick
- source data-entry devices
- scanner devices
  - optical scanners (flatbed scanner, portable scanner)
  - barcode readers (handheld wand readers, platform scanners)
  - character and mark recognition devices: magnetic-ink character recognition (MICR); optical-character recognition (OCR); optical-mark recognition (OMR)
- human biology input devices (biometric scanner)
  - face recognition system
  - speech or voice recognition system
  - finger and palm prints recognition
- image capturing devices
  - digital camera
  - digital video camera

- webcams and video-input devices
- videoconferencing camera
- digitising devices
  - graphics tablets
  - digital note pads
- audio input devices
  - voice (voice recognition systems): discrete-speech recognition systems; continuous-speech recognition systems
  - music (musical interface digital interface [MIDI])
- sensors; found in:
  - aerial survey, astronomy, automation, biometrics, communication satellites, defence system, guided missiles, intelligent transport systems, naval vessels, robot, solar energy, space lab, surveillance technology, thermometer, torpedo (weapon), traffic control
- radio-frequency identification tag (RFID)
  - pager
  - pulsar
  - radar identification (IFF)

Output devices
- monitors
  - cathode-ray tube (CRT)
  - flat-panel monitor or liquid crystal display (LCD)
  - e-books (e-book readers)
  - data projectors
  - high-definition television (HDTV)
- printers
  - impact printers (dot matrix)
  - non-impact (laser, thermal printer, ink-jet)
  - photo printers
  - plotters
  - Braille
- audio and video output devices
  - sound output (audio speakers, headphones)
  - video output (video conferencing)
  - voice output (text-to-speech system [narrator])
- combination input and output devices
  - fax machines
  - multifunction devices
  - internet telephone
  - terminals (dumb, intelligent, network or thin client or network computer, internet or Web)

Storage devices

Units of measurement
- bits, bytes, kilobytes, megabytes, gigabytes, terabytes

Primary (internal) storage
- random access memory (RAM)
- read-only memory (ROM)

Secondary (external) storage
- floppy disks
- memory stick (flash drive)
- smart cards (sd, smart media)
- hard disk
- optical disk
- CD-ROM disc
- DVD-ROM, DVD-video, and laser disks
- Blu-ray disk
- erasable optical disks (CD-RW, DVD-RAM, DVD-RW, and DVD+RW)

System box
- main board (central processor unit (CPU), buses, peripheral communication interface (PCI))
- power supply unit
- cooling fan
- ports (USB, serial, parallel, PS2, RJ45)

Software
- system software (operating systems, device or utility drivers)
- application software
- care and appropriate use of hardware and software

11.2 File and Information Management

Term 2: 10 weeks

In this unit, students learn about accessing and retrieving information using computers. They learn to use CD-ROMs or DVD-ROMs containing encyclopaedias, databases and spreadsheets to find and manage information. The emphasis of the unit is on developing the skills students need to be able to search for usable and appropriate information.

Learning outcomes

Students can:

3. apply basic skills in using computer software for research purposes.

To achieve the learning outcome, students:
*   organise, analyse and evaluate information from electronic sources
*   use problem-solving processes when accessing and retrieving information using computers
*   describe ethical practices used when accessing and retrieving information
*   create and manage files and folders.

Content

Students acquire knowledge and skills through the learning and teaching of this content. Information is collected, analysed, presented and communicated effectively.

File management
*   ethical use of computer files and programs
*   use basic computer management skills to:
    –   access and exit software
    –   organise files (folder creation, renaming, copying, moving and deleting)
    –   manage files (saving, retrieving)
    –   use disk utilities (formatting, copying, deleting, creating backup, saving)

Information management

Accessing and retrieving information
*   access or retrieve information:
    –   identify a need for information
    –   identify appropriate resources
    –   use catalogues

– define search parameters
• use a database
• use information retrieved from different sources
• research HIV and AIDS issues

Information organisation
• identify useful information from search
• take notes or paraphrase from search
• cite electronic sources for bibliography

Information analysis
• compare information from at least two sources
• identify trends in data
• evaluate information for accuracy, relevance, appropriateness, comprehensiveness and bias
• prepare reports on analysis using a computer application (word processor, spreadsheet or presentation graphic tools)
• data and information security

11.3 Word Processing

Term 2: 10 weeks (practical)

In this unit students develop their word-processing skills to design solutions to problems presented through a case study or design brief. The emphasis of the unit is the design and production of a word-processed document to suit the needs of an individual, business or an organisation.

Learning outcomes

Students can:

4. apply basic skills and concepts in creating documents using word processing.

To achieve the learning outcome, students:
•   apply skills and concepts to create suitable documents for the end user
•   create well-designed documents using word processing.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The content emphasises the design and production of a word-processed document.

Creating and saving a new document

Starting Word
•   Word window
•   what's new in Word

Getting familiar with the Word screen
•   menu bar
•   toolbars
•   shortcuts
    –   right mouse click
    –   keyboard

Getting help
•   search and content help
•   'office assistant'

Creating a new document
•   create a new blank document using task pane
•   create a document from a template
•   create a document based on another document
•   enter text into Word document

Saving and opening a document
- save a document for the first time
- save another copy of the document
- save to another folder
- save a document onto a storage device

Closing a document and exiting Word
- close a document and exit Word
- open and retrieve a Word document

Formatting documents

Formatting characters
- change the fonts
    - font type and font size
    - default font
- formatting text
    - bold, italic, underline, colour
    - font dialogue box
    - format painter
    - font case

Formatting a paragraph
- align text in a document
    - left, right, centre and justify
- create indents
    - left and right indents using the ruler
    - left and right indents using menu options
    - first line indent
    - hanging indent
- create bulleted and numbered lists
    - create bulleted lists
    - create numbered lists
    - customise bulleted and numbered list styles
- adjust line or paragraph spacing
    - set line spacing
    - set spacing between paragraphs
- add border and shading to paragraphs
    - add border to a paragraph
    - add shading to a paragraph
- using tabs
    - use default tab stop
    - set left, right, centre and decimal tab stops
    - enter information using tabs
    - adjust tab stop position

- change tab stop type
- delete all customised tab stops
- create leader tab stop
- create form using tab stop with leader

Formatting pages
- set page margins, paper size and orientation
  - set margins
  - change page orientation and paper
- creating page and section breaks
  - insert a hard page break
  - delete a page break
  - insert a section break
  - delete a section break
- adding headers and footers
  - add headers and footers
  - create different headers and footers for different pages
  - add a logo to a header or footer
  - insert page numbers

Editing text

Automating text options in Word
- enable or disable the autocomplete
- use autotext
  - create an autotext entry
  - change an autotext entry
  - delete an autotext entry
- use autocorrect options
- set the autocorrect options
- use quick spelling correction
- use quick grammar correction

Inserting, overtyping and deleting text
- insert text in a document
- insert date and time in a document
- overtype text in a document
- enter text with click and type
- delete a word, sentence, paragraph and an entire document

Selection techniques
- select a word, a line of text and a sentence
- select a paragraph and the entire document

Moving and copying text
- cut and paste

- copy and paste
- move and copy text with drag and drop

Using undo and redo
- use undo to reverse your last actions
- use redo to redo an action

Viewing a document
- normal view
- web layout view
- print layout view
- outline view
- reading layout view

Using reading layout
- page through the document
- navigate a document with the document map
- jump to a particular screen using thumbnails
- highlight content you want to remember
- revise the document
- add comments
- turn reading layout view off

Finalising and printing the document
- proofing your document
  - spelling and grammar check
  - use of research task pane
  - use of thesaurus
  - find and replace text and/or specific formatting
- previewing and printing
  - preview and print a document
  - use advanced printing options
  - print a document to a file
  - print multiple copies or specific page ranges
  - print selected parts
  - use print dialogue box to print to a different printer
  - set printer-specific options

Working with tables and lists
- create tables
  - create a table using the menu option or the table button
  - enter data into the table
  - align text or graphics in the table
- managing tables

- select a cell, row, column or entire table
- change column width using the mouse or the menu option
- change row height using the mouse or the menu option
- make multiple rows and/or columns the same size
- change the space between cells in a table
- insert or delete rows and/or columns to a table
- merge or split cells in a table
- formatting
  - format a table automatically
  - add a border line and/or shading to a table
  - apply changes to borders and shading
  - bulleted and numbered lists
  - convert a table to a text
  - convert text to a table
  - format bullets and numbers, including outline numbering
- performing calculations
  - perform calculations in a table

Working with graphics
- insert and format text boxes
  - insert a text box
  - format a text box
  - modify colours and lines
  - apply text box fill effects
- adding autoshapes
  - insert autoshape object
  - colour an autoshape
- insert pictures and WordArt
  - insert clipart or picture from the clipart gallery
  - insert a picture from another file
  - insert WordArt object
- creating watermark
  - create a text or picture watermark

11.4 Computers and Society

Term 3: 10 weeks (theory—1 lesson per week)

In this unit, students develop an appreciation and understanding of the impacts that information and communication technologies are having on themselves and communities worldwide. In doing so, students also discuss environmental, social and ethical issues to do with the use of ICT, including the government law on ICT. Students are also introduced to different threats to computers and the importance of safeguarding data at the individual and organisational level.

Learning outcomes

Students can:

2. demonstrate knowledge and understanding of the legal and ethical issues of using information technology
5. demonstrate understanding of the internet and e-mail and related issues.

To achieve the learning outcomes, students:

- describe and make informed judgements about the effects of the use of computers in our society
- identify different ways of safeguarding important data and computer hardware and software
- demonstrate their understanding of viruses and spyware and critically discuss the different methods of controlling them
- understand Government controls and laws on ICT
- discuss environmental, social and ethical issues concerning use of ICT
- discuss the importance of proper work ethics when using computers.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The emphasis is on enabling students to make informed judgements about the effects of computers in our society.

Impacts on society
- computers in
    - business
    - communications
    - education
    - entertainment
    - home
    - medical world
    - military or national security
    - scientific research

- employment and career opportunities
  - telecommuting
  - call centres
  - e-commerce
  - online or phone banking

Measures to protect computers and data
- protection of data
  - backup procedures
  - disaster-recovery plans
  - encryption
- identification and access
  - what you have (cards, keys, signatures, badges)
  - what you know (PINs, password, digital signatures)
  - who you are (physical traits (biometric devices))
- safety requirements—user and equipment
  - virus and anti-virus
  - spyware and anti-spyware
  - cleaning agents
  - system failures
  - computer theft and vandalism

Environmental, social and ethical issues
- moral and ethical issues
  - work ethics—social responsibility (content and control of information)
  - issues affecting society (computer crimes, HIV and AIDS, hackers and crackers, pornography)
  - identity theft (wallet or purse theft, mail theft, mining the trash, telephone solicitation, insider access to databases)
  - economic issues (technology, the job killer?, haves and have-nots)
- environmental problems
  - manufacturing by-products
  - disposal of by-products (e-waste management)
  - environmental blight
  - possible risks of nanotechnology
- mental health problems
  - isolation
  - gambling
  - stress
  - information overload

Government controls and laws on ICT
- impact of copyright laws
- internet ethics and objectionable materials

- government controls and laws on ICT

Ergonomics in ICT
- design of furniture
- placement of equipment
- keyboarding techniques
- work routine
- total work environment
- design of software

11.5 Desktop Publishing

Term 3: 10 weeks (practical)

In this unit, students are introduced to basic skills in desktop publishing, including text and graphic manipulation to enhance document production. Students develop skills in creating and working with documents, including the use of publisher software.

Learning outcomes

Students can:

6. apply knowledge and skills in creating solutions to information problems using a range of software
7. develop multimedia presentations using a range of hardware and software devices.

To achieve the learning outcomes, students:

• apply skills and concepts to create flyers, brochures, information leaflets, banners and newsletters that suit the needs of the end user.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The content emphasises the design and production of publications using a range of multimedia devices and desktop-publishing software; for example, Pagemaker®, Adobe Illustrator, Photoshop, MS Publisher, Quark Xpress.

Working with publications
• create a publication from a design template
• add and edit personal information
• craft a publication
• manage a publication

Planning and designing a page
• choose a page layout
• navigate a page
• add headers and footers
• apply background

Working with text
• create and format text boxes
• link text boxes
• format font and text
• insert and format WordArt

Drawing and working with graphic objects
- use drawing tools
- use peripherals such as scanners, digital cameras or mobile phones to transfer data and pictures
- format and enhance graphic objects
- insert clip art and pictures
- work with design gallery
- manipulate graphic objects

Working with tables
- work with tables
- format tables

Presenting and printing the publication
- preview, present and/or print the publication

11.6 The Internet

Term 4: 10 weeks (practical)

This unit introduces students to the fundamentals of the internet and its application in the wider context. Students are introduced to the different search techniques to enable them to effectively search for and retrieve information from the World Wide Web. Students are also introduced to the various authoring languages required to design and publish web pages on the World Wide Web.

Learning outcomes

Students can:

2. demonstrate knowledge and understanding of the legal and ethical issues of using information technology
3. apply basic skills in using computer software for research purposes
5. demonstrate understanding of the internet and e-mail and related issues
8. identify and describe a variety of information systems and how these are used within organisations.

To achieve the learning outcomes, students:

- describe and discuss the different components of the internet
- acquire different search techniques to search for information and to critically evaluate web-based resources
- demonstrate an understanding of e-mail, its importance in business and government and its safe use
- create a webpage using special effects, hyperlinks and other web components
- integrate other applications in creating a presentable webpage.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The emphasis is on students designing and developing web pages, using web design applications or an HTML editor (WYSIWYG), and being shown the procedures involved in publishing their webpages.

Web fundamentals

- the internet
  - internet service providers (ISPs)
  - types of connection (dialup, broadband, wireless)
  - setting up an internet connection
  - the World Wide Web (WWW)
  - HTTP, a webpage, HTML, URLs
- browsers

– effective use of browsers

– using search engines

– list favourites

– pages for quick viewing

– sharing bookmarks and favourites

– finding pages recently visited

– making pages available for offline viewing

Web security

- spyware

- hacking

- firewalls

- safe use of the internet

Search techniques

- simple search techniques (keyword searching)

- advanced search techniques (boolean operators, search engines, advanced searching)

- citing internet resources

Creating bookmark links

- create bookmarks

- create a link to a bookmark on the current page or another page

- create an image map

Website evaluation

- download time
  - fast download of pages
- navigational ease
  - moving easily from page to page
  - links are working
- attractive
  - pages are attractive and suitable
- content
  - information is correct and clearly labelled
- graphics, video and sounds
  - have a purpose
  - help the users understand the content
- currency
  - regular updating of content
- accuracy
  - authenticity of the author

Evaluating internet-based resources

- author
  - an authority on the topic or subject
  - creator or compiler of other information sources
- producer
  - clearly shown
  - well-known professional organisation
- site
  - URL clearly noted
  - ending (suffix: .edu, .ac, .com, .pg, .org and so on)
  - location clearly indicated
- publication
  - single page or part of a series
  - abstract or full text of an article
  - publisher location
- purpose
  - to inform others of new research
  - summarise existing research
  - advocate a position
  - stimulate discussion
- date of publication
  - date the page is published
  - regularly updated
- arrangement
  - information is clearly presented
  - easy to locate the information
- intended audience
  - who the information is targeting (professionals, advocates, consumers and so forth)
- coverage
  - covers the information required
  - is linked to other related articles
- writing style or reasoning
- information presented in a thoughtful, orderly, well-reasoned manner and is well-researched
  - assumptions and opinions well-documented
  - any bias is easy to detect
- references
  - well-documented
  - link to primary sources
  - current and relevant

Saving pictures or text from a webpage

- save an image from a webpage

- print an image from a webpage

Web browser add-ons
- how add-ons end up on your computer
- some add-ons can shut down your browser

Communication protocols
- transmission control protocol or internet protocol (TCP/IP)
- file transfer protocol (FTP)

Electronic mail (e-mail)
- send e-mail messages
- read messages
- spam
- phishing or malicious e-mail messages
- transfer of viruses via e-mail

Organising e-mail messages
- delete an e-mail message
- find e-mail messages in message folders
- manage e-mail messages with rules
- add, delete, or switch folders
- move or copy a message to another folder
- store messages on an e-mail server

Introducing the address book
- open the address book
- add a contact to the address book
- add names directly from e-mail messages to the address book
- import a business card
- change contact information
- create a group of contacts
- add a contact to an existing group
- create a business card
- add a digital ID to the address book from another source
- organise names in the address book

Organising contacts and folders
- delete contacts from your address book
- print address book information

Creating webpages
- create a one-page website
- create a website using wizard or templates
- open and/or close a website or webpage

Working with web folders
- create, rename or delete a folder
- move a file to a folder

Working with images and multimedia effects

Insert images
- insert an image or an autoshape
- add fill colour to an autoshape
- insert WordArt or ClipArt

Customise images
- resize and align an image
- add alternative text and border to an image
- add space around an image
- create a thumbnail image

Insert background sound and video clips
- insert and/or remove background sound on a webpage
- insert video and set video properties on a webpage
- display message if the video cannot play
- remove a video from a webpage

Creating hyperlinks

Insert text and image hyperlinks
- insert a link to another page on the current website
- insert a link to a page on a different website
- insert and change an e-mail link and colours

Working with special effects

Create web components
- insert and edit an animation
- reverse the scroll direction of the animation
- set the speed and movement of the animation
- change animation size and/or background colour
- insert and set a hit counter

Use special effects
- create animated pages with page transition

Presentation
- publish the webpage

Grade 12 units

12.1 Information and Communication Systems

30 weeks: 10 weeks per term (2 lessons per week for whole year)

Information systems use people and processes to change data into information. A roll book is an example of a paper-based information system. In this unit students learn about the role computers play in an information system and how communication of data across networks is achieved. These systems support people who are working together by enabling them to exchange and share data and information.

Information and Communication Systems is a year-long unit. It will be taught in parts as a theory topic under the three subtopics of 'Information systems', 'Network systems' and 'Communication systems'.

Learning outcomes

Students can:

1. identify and describe computer hardware and software and their functions and capabilities
6. apply knowledge and skills in creating solutions to information problems using a range of software
8. identify and describe a variety of information systems and how these are used within organisations.

To achieve the learning outcomes, students:

• analyse and describe an information system in terms of the information processes and equipment required
• describe the effects of information systems on the individual, society and the environment
• describe communications hardware, software and methods of connection
• describe suitable data protection and security procedures for a network.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The emphasis is on students analysing and describing an information and communication system in terms of the information processes and equipment required.

Information systems
• what a system is
• what an information system is
• the role of a network in an information system
• characteristics of an information system

Types and purposes of information systems

- database, communications, transaction processing, decision support, automated manufacturing, multimedia
- manage information used within an organisation
- data security and protection in the network: back up and restore procedures; antivirus protection; firewalls

Design and plan an information system

- components of information systems (hardware, software and people)
- relationship between information processing and the components of an information system
- settings for information systems (business, education, government)

Issues related to information systems

- acknowledgement of data sources (copyright)
- the Freedom of Information Act
- privacy principles
- accuracy and reliability of data sources
- access to data, ownership and control of data
- new trends in the organisation, processing, storage and retrieval of data, such as data warehousing and data-mining

Networking

- definition
- characteristics and functions of network devices (hardware: servers, clients, peripherals, switches, routers, cables)
- storage media: capacity, capabilities and limitations
- client–server versus peer-to-peer
- cabling standards
- system software (device drivers; operating systems such as Windows, Unix, Oracle, Mac OS)

Specification of local area network (LAN)

- design topology of LAN (star, bus, hybrid, ring)

Hardware installation

- cabling: straight turn; cross link or cross over

Network software

System software

- network operating systems
- workstation operating system
- antivirus software
- firewall
- device drivers

Application software
- general-purpose software
  - word processing
  - spreadsheets
  - databases
  - desktop publishing
  - web browsing
- specialised software

Basic LAN setup
- checking cable connections
- connecting equipment
- checking network adaptors and protocols
- checking TCP/IP setup; using ipconfig.exe
- checking PING utility
- windows networking options (user names and passwords)
- checking files and print sharing
- file folders and sharing options

Communication systems
- what a communication system is
- examples of communication systems
- transmitting and receiving in communication systems
- information processes in communication systems
- current issues related to communication systems
- transmission media (satellite, fibre optics, cables, infra-red)

Essentials of communications
- hardware required (modem, cables, routers, switches or hubs)
- software required (log-on procedures, protocol)
- protocol and 'handshaking' (TCP/IP, wireless application protocol or WAP), hypertext transfer protocol (HTTP), file transfer protocol (FTP)
- dialup
- synchronous and asynchronous: parity

Methods of connection (media)
- cables: UTP (Cat 5, 6 and so on), fibre optics
- wireless: infrared, Bluetooth, microwave and satellite
- telephone: dialup, broadband, asymmetric digital subscribers line (ADSL)
- costs and benefits of transmission media

Hardware and software associated with communications via the internet
- browsers and search engines
- voice mail and facsimile, videoconferencing and teleconferencing, telecommuting

12.2 Multimedia

Term 1: 10 weeks (practical)

In this unit students investigate the effects of multimedia on the communication, presentation and manipulation of information. They gain an understanding of, and experience in, developing solutions to problems using multimedia applications.

Learning outcomes

Students can:

6. apply knowledge and skills in creating solutions to information problems using a range of software

7. develop multimedia presentations using a range of hardware and software devices.

To achieve the learning outcomes, students:

*   explain the different uses of multimedia and interactive multimedia applications
*   use design tools to represent the design of a multimedia presentation
*   capture images using imaging devices, connect image devices to computers, download and save unedited images in a computer
*   do a presentation of the movie or slideshow to an audience.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The emphasis is on students demonstrating the use of multimedia and interactive multimedia applications.

Introduction

*   definition
*   different types of media
*   different multimedia applications
*   hardware and software requirements
*   techniques or steps

Creating an interactive presentation

Creating hyperlinks in a presentation

*   create hyperlink to
    – a location in the current presentation
    – another presentation
    – a file or web page
    – an e-mail address

Creating action buttons
- insert music or sound effects
- insert an action button

Adding music and sound
- insert music or sound effects
- stopping the sound during a presentation
- playing a CD during a presentation
- add a sound effect to an animation

Adding movies and animated GIFs
- add a movie or animated GIF
- start a movie on a mouse click or keyboard

Delivering and controlling a presentation

Applying animation effects and transitions
- apply an animation scheme
- apply custom animations to text, objects or elements of a chart
- adding transitions

Delivering your presentation
- run an on-screen presentation
- navigate during presentation
- use highlight annotation during presentation
- keep ink annotations after presentation

Setting timing and creating self-running presentations
- set timing for a show manually
- create a self-running presentation

Creating custom shows within a presentation
- create and present a custom show
- create a hyperlink to a custom show
- remove a custom show

Packaging a presentation
- packaging for CD
- viewing a packaged presentation

Integrating multimedia with other programs
- for example:
  - embedding a spreadsheet into a slide
  - editing an embedded object
  - linking to a spreadsheet
  - exporting multimedia files to another document

12.3 Spreadsheets

Term 2: 10 weeks (practical)

This unit aims to develop students' knowledge and skills to equip them to use spreadsheets as a tool to make informed choices in personal and workplace contexts. Students use spreadsheets to solve information problems in a business or organisational setting.

Learning outcomes

Students can:

6. apply knowledge and skills in creating solutions to information problems using a range of software.

To achieve the learning outcome, students:
• demonstrate the ability to use basic features and functions of spreadsheet tools to record and analyse data
• apply appropriate skills and techniques in formatting, manipulating and protection of data.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The emphasis is on students demonstrating the ability to use basic features and functions of spreadsheet tools to record and analyse data.

Spreadsheets and their purpose
• explore the features of spreadsheet software
• introduce spreadsheet tools
    − use main menu
    − show or hide toolbars
    − use shortcut menu using right mouse click or keyboard
    − search help, content help, online help
    − type a question for help box, use office assistant or get help in a dialogue box
    − detect and repair errors in a spreadsheet
    − recover spreadsheet when it is not responding
    − set the auto-recover options
    − recover a spreadsheet file

Moving around in a spreadsheet

Moving around with the cursor
    − activate a cell using the mouse

- move to a cell using keyboard, 'go to' command, name box
- move within selected range, or to other sheets within a workbook

Selecting a range of cells in workbook
- select a single cell, range of cells
- select a range of cells using <shift>
- select the entire column, row, worksheet
- select non-adjacent ranges
- select multiple worksheets

Creating and saving spreadsheets
- enter text (label) into a cell
- edit cell contents
- edit contents using formula bar
- replace and/or delete contents in a cell
- enter a number as a value into a cell
- enter date into a cell
- use autofill to enter text, as options or to enter sequence numbers
- customise autofill
- use pick list to enter data
- enter data into a range of cells
- fill a range of cells with the same data
- save a workbook for the first time or a copy using 'save as'
- save to another folder or a storage device
- save into a different file format
- close the current workbook

Performing calculations

Using simple formulas
- enter a formula using the keyboard
- enter formula in a cell or a range reference using the mouse
- use autosum to calculate total quickly
- use relative references and/or absolute references

Using simple functions
- how to enter a function directly
- how to use the insert function

Using autocalculate and labels
- how to use autocalculate to do a calculation without using formula
- how to accept and use label (natural language) in formulas

Managing worksheet and workbook information

Managing worksheet information
- move information using cut and paste or drag and drop

- copy information using copy and paste
- use 'paste special' option
- insert or delete a new row and/or multiple rows
- insert or delete a new or multiple columns

Managing workbook information
- rename worksheet
- add new worksheet
- rearrange worksheet
- copy worksheet
- hide and unhide worksheet and/or workbook
- format worksheet tab
- add worksheet background
- delete worksheet

Formatting worksheets

Adjusting column width or row height
- adjust column width using mouse or menu
- adjust row height using mouse or menu
- hide and unhide rows and columns
- freeze a column or row
- split a worksheet in panes

Formatting cell using toolbar
- change font, font size, font colour
- apply bold, italic, underline
- align and indent data in a cell
- merge cells and centre data
- change number to percentage
- increase and decrease decimal points
- copy format using format painter

Formatting cell using menu options
- double underline using menu option
- align vertically
- change text orientation
- wrap text in a cell
- format numbers, date
- change cell background colour
- add outline or double line border
- format table using autoformat

Creating a chart

Creating a chart using the chart wizard
- using the chart wizard

- move, resize, change chart type
- change chart source data
- change data series in legend with the X-axis
- move existing chart to another worksheet

Changing chart options
- change chart title, X axis and Y axis title
- change gridlines and legend options
- insert data labels
- add data table
- delete data series
- add data series using the mouse
- delete chart

Formatting chart
- change font format, text orientation, object colour, the order of data series
- use combination of chart type
- create a pie chart
- use 3-D view to rotate chart
- explore a wedge in a pie chart
- create a picture chart

Setting up a page and printing

Setting up a page
- insert and remove page break
- set and clear print area
- change page orientation, scaling, paper size, page margin
- align to centre of page
- add header and footer

Previewing and printing
- print preview
- print active sheets
- print selected cells
- print chart
- print multiple copies

12.4 Databases

Term 3: 10 weeks (practical)

Students appreciate that computer database systems have a capacity to store, retrieve and manipulate data better than non-computer systems. Students develop skills in modifying existing databases and designing new databases for specific purposes.

Learning outcomes

Students can:

6. apply knowledge and skills in creating solutions to information problems using a range of software.

To achieve the learning outcome, students:

• understand how databases work and how they are implemented in business and organisations
• collect and organise data to manipulate reports, forms and queries
• apply the basic features of databases to print out accurate relevant and timely reports
• use, design, create and evaluate databases and justify decisions made when querying them
• create, add, delete, sort, filter and set multiple criteria in a query.

Content

Students acquire knowledge and skills through the learning and teaching of this content. The emphasis is on developing skills in using, designing, creating and evaluating databases.

Getting started

Understanding how a database works
• starting databases
• opening, saving and closing a database

Getting familiar with the database screen
• using the menu
• moving the toolbar and menu bar
• using the toolbar button
• using the shortcut menu with right mouse click

Getting help and maintenance
• searching for help
• using the content help
• using the 'type a question for help' box

- using office assistance help
- getting help in a dialogue box
- detecting and repairing errors in Access
- how to restart Access when it is not responding

Working with database objects
- opening a table, query, form and/or report
- rename an object

Working with data

Managing data
- navigating through records
- moving to a specific record
- adding, editing and deleting records

Controlling and searching records
- sorting and finding records
- filtering and selecting records by selection and by criteria

Working with tables and relationships

Creating and customising tables
- creating a new blank database
- creating a new table
- setting primary key
- rearranging fields
- adding and deleting fields
- changing data type

Getting external information
- import and/or link tables

Managing relationships
- create and/or delete table relationships

Creating and customising queries

Creating select queries
- creating queries quickly

Controlling queries output
- opening or switching query to design view
- rearrange, delete and/or add a field(s)
- sort the query output
- filter the query output with criteria
- set multiple criteria

- hiding a field

Creating and customising forms

Creating forms effectively
- creating a form quickly with AutoForm
- saving and renaming a form
- creating a form using a form wizard

Customising forms
- opening form design view
- showing or hiding field list
- showing or hiding toolbox
- resizing control
- moving both control and label
- moving control and label separately
- add and/or delete a field control

Creating useful reports

Creating reports
- creating a report using AutoReport
- creating mailing labels
- setting page margins
- changing page orientation
- numbering pages

12.5 Computers and Employment

Term 4: 3 weeks

This unit helps prepare students for the workforce after Grade 12. Students learn to format an electronic curriculum vitae (CV) and job application letters.

Learning outcomes

Students can:

4. apply basic skills and concepts in creating documents using word processing
5. demonstrate understanding of the internet and e-mail and related issues
6. apply knowledge and skills in creating solutions to information problems using a range of software.

To achieve the learning outcomes, students:
• use a range of computer skills to prepare CVs and job application letters
• do job search on the internet
• identify possible careers in ICT.

Content

Students acquire knowledge and skills through the learning and teaching of this content, using a range of computer skills to prepare CVs and job application letters.

Career options in ICT
• examples of careers, such as data entry

Job search on the internet and in other media
• using search engines to find employment websites
• searching government department websites for career opportunities

Formatting résumés or CVs
• word processing using appropriate format for CVs

Formatting job application letters
• word processing using appropriate format for job applications

Assessment components, weighting and tasks

The internal assessment mark for Computer Studies is to be based on the Grade 11–12 syllabus only. Final assessment should be based on a range and balance of assessment instruments. One task may be used to assess several components. The components, weightings and tasks for Grade 11 and 12 units are detailed below.

Components, weightings and tasks for Grade 11 units

Component	Weighting	Tasks
Tests and examinations	100	These may include multiple-choice items, short answers and extended responses
Research, investigation and communication (including group work)	50	These tasks can include elements within class, particularly in the presentation phase. Tasks may be undertaken over a period of time. The communication may be oral, written or electronic
Practical work	150	Use a variety of application software to create solutions to information problems to meet the needs of users
Marks	**300**	

Components, weightings and tasks for Grade 12 units

Component	Weighting	Tasks
Tests and examinations	100	These may include multiple-choice items, short answers and extended responses
Research, investigation and communication	50	These tasks can include elements within class, particularly in the presentation phase. Tasks may be undertaken over a period of time. The communication may be oral, written or electronic
Practical work	150	Use a variety of application software to create solutions to information problems to meet the needs of users
Marks	**300**	

Assessment and certification

Assessment and reporting practices described here are detailed further in the *National Assessment and Reporting Policy for Papua New Guinea* (2003) and in other support materials produced by the Department of Education.

Assessment is an important component of teaching for learning and is integrated into the learning and teaching activities of Computer Studies. Continuous assessment in Computer Studies provides feedback to students and the teacher on students' progress towards achievement of the learning outcomes. It helps students improve their standards of achievement by knowing what they need to do well and where they need to improve. In Computer Studies, teachers will gather evidence from students' work during the course of the term and use those continuous assessments to improve their teaching and students' learning.

Assessment

The main purpose of assessment is to improve student learning.

Assessment needs to be *for* learning as well as *of* learning. It is used to evaluate and improve learning and teaching, report achievement and provide feedback to students on their progress.

Assessment measures students' achievement of learning outcomes as described in the syllabus. It is the ongoing process of identifying, gathering and interpreting information about students' achievement of the learning outcomes.

Learning and teaching using an outcomes approach requires teachers to plan their teaching and assess learner performance in relation to outcomes, using criteria derived from those outcomes. Assessment involves focusing less on whether a learner has 'passed' or 'failed' and more on what outcomes a learner has achieved and in which areas further support is required.

Assessment in Computer Studies

A student's achievement in Computer Studies at the end of Grade 12 will be assessed against the learning outcomes. Assessment of student progress towards achieving these learning outcomes is cumulative throughout Grades 11 and 12.

It is important that teachers plan the learning and teaching sequence so that there is a balanced spread of assessment during the year. Some tasks, such as research or practical applications, can be designed so that they are completed over a period of time rather than at the end of the unit. Other tasks can be done immediately the relevant section of the unit or topic has been covered.

Assessment for certification

A student's overall achievement in Computer Studies will be internally assessed. Successful completion of the subject will be recorded on the national certificate.

Internal assessment

Internal assessment provides a measure of a student's achievement based on a wide range of syllabus content and outcomes. For Computer Studies, the internal assessment marks provide a summation of each student's achievements in Grades 11 and 12. The assessment tasks used to determine the internal assessment mark must comply with the components, weightings and types of tasks specified in the table on page 43. A variety of tasks gives students the opportunity to demonstrate all the learning outcomes in different ways to improve the validity and reliability of the assessment.

All schools must meet the requirements for internal assessment as specified in the Grade 12 *Assessment, Examination and Certification Handbook.*

Recording

All schools must meet the requirements for maintaining and submitting student records as specified in the Grade 12 *Assessment, Examination and Certification Handbook.*

Certification

Students will be awarded the national certificate only if they meet all requirements for internal assessment. Eligibility rules for the award of certificates are specified in the Grade 12 *Assessment, Examination and Certification Handbook.*