

Engineering

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The engineering department curricula provide each student with a thorough understanding of why and how things work. They develop the ability to predict the effect on a proposed or existing design of different choices in the use of materials, form, and procedures. The curricula are built on a core of general studies taken from many disciplines and taught by experts in those specific fields of study. They are also firmly based on a study of fundamental concepts in mathematics and physical sciences and taught at a high level of intellectual challenge. The curricula provide exposure to the theory of engineering and design that underlies all engineering specialties, while offering the student the opportunity to explore a particular engineering specialty in depth.

The TCNJ engineering programs provide students with considerable exposure to laboratory experiences and are supported by excellent laboratory resources. Laboratory activities help develop skills in original design and develop a student's confidence in his or her ability to critique and improve a design. The engineering programs at TCNJ are limited to undergraduate studies. Laboratories, therefore, are designed specifically for teaching, are relevant to the course material, and are kept accessible for students.

Mission Statement

The mission of the engineering department is to provide the student with a foundation in engineering and the underlying mathematics and sciences. The graduate of the engineering programs will have a mastery of engineering science and design which will enable him/her to pursue a successful career or continue graduate studies. This mission is achieved within the context of a comprehensive liberal arts college that emphasizes small classes and attention to individual needs.

Academic Policies and Standards

A student may repeat any course without seeking approval. If a student wishes to repeat a course more than once, permission must be obtained from the chair of the engineering department and, if appropriate, the chair of the department offering the course. Permission to repeat a major course more than once will be granted only in cases of extreme extenuating circumstances, i.e., illness, financial, etc. When an engineering course is repeated, only the most recent earned grade is counted in the grade point average, although all grades earned will appear on the student's transcript.

Seniors pursuing Bachelor of Science degrees in an engineering major are required to take the Fundamentals of Engineering Examination for the Professional Engineer's License.

Given the nature of the engineering curricula, it is extremely important to follow the recommended course sequence. Violations of this guideline may result in dismissal from the engineering majors.

Program Entrance, Retention, and Exit Standards

Every major program at The College has set standards for allowing students to remain in that program, to transfer within The College from one program to another, and to graduate from a program. The following are the standards for engineering majors. Minimum grades are noted in parentheses.

- Retention in the program is based on the following performance standards in these "critical content courses": PHYS 201 or PHY 201 (C-); PHYS 202 or PHY 202 (C-)
- Transfer into the program from another program within The College is based upon the following performance standards in these "foundation courses": RHET 101 or WRI 102 (C+)
- Graduation requires a GPA of 2.0 in courses for the program. A student who has received two or more Ds or Fs in major courses will be subject to review by the departmental retention committee.

Degree Programs

The Department of Engineering offers the following academic programs leading to a Bachelor's Degree:

- Bachelor of Arts in Biomedical Engineering
- Bachelor of Science in Computer Engineering
- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Engineering Science (Specialization in Engineering Management)
- Bachelor of Science in Mechanical Engineering

All engineering students are enrolled in a common first year curriculum,* in preparation for their major in one of the five degree programs.

During academic year 2003-2004, The College of New Jersey is in the process of transformative curricular change. Students should consult with their advisors when planning courses beyond the first year of study. Supplements to this online bulletin will be available on an ongoing basis.

Freshmen Year

Fall

| | | |
|------|--|-----|
| IDSC | 151/Athens to New York | 3** |
| MAT | 127/Calculus A | 4 |
| PHY | 201/General Physics I | 4 |
| CHE | 201/General Chemistry I | 4 |
| ENGR | 142/Fundamentals of Engineering Design | 3 |
| ENGR | 095/Introduction to Engineering | 0 |
| ENGR | 091/ Engineering Seminar I | 0 |

**FSP 101//First Year Seminar (4 cr.) may be substituted by advisement

Spring

| | | |
|-----------------------|-----------------------------|-----------|
| MAT | 128/Calculus B | 4 |
| PHY | 202/General Physics II | 4 |
| CSC | 215/Computer Science I* | 4 |
| WRI | 102/Academic Writing | 4 |
| STEC | 161/Creative Design | 3 |
| ENGR | 092/ Engineering Seminar II | 0 |
| Total for year | | 37 |

**Biomedical Engineering students must enroll in CHE 202/General Chemistry II during the Spring of the freshman year instead of CSC215/Computer Science I.*

Bachelor of Arts in Biomedical Engineering

The Biomedical Engineering program is designed to provide students the opportunity to pursue a technical yet broad education that spans engineering, life sciences, physical sciences, and social sciences and humanities. Students who will choose this major value the analytical skills that the study of engineering provides but do not intend to practice as design engineers. The program will be an excellent choice for students who are interested in a "research associate" position or technical management career within the pharmaceutical industry or a hospital setting, a premedical major, or graduate study in biomedical engineering.

The biomedical engineering program is designed to meet medical school admission requirements. Although admission standards vary, most medical schools require:

1. One year of college level calculus
2. One year of general chemistry with lab
3. One year of general physics with lab
4. One year of general biology with lab
5. One year of organic chemistry with lab
6. At least 24 semester hours of humanities and social sciences

The biomedical engineering program meets the above requirements.

Students that enroll in this program will have the opportunity to follow one of two curricula options: electrical engineering or mechanical engineering.

Bachelor of Arts in Biomedical Engineering – Electrical Engineering Option Curriculum

Sophomore Year

Fall

| | | |
|------|---|---|
| MATH | 229/Calculus III | 3 |
| BIO | 185/Themes in Biology | 4 |
| CSC | 215/Computer Science I | 4 |
| ENGR | 212/Circuit Analysis | 3 |
| ENGR | 214/Circuits Lab | 1 |
| | General Education Elective (SS/HUM/ART) | 3 |

Spring

| | | |
|-----------------------|-------------------------------------|-----------|
| MATH | 386/Differential Equations | 3 |
| | Restricted Biology Elective* | 4 |
| ELEC | 321/Systems and Signals | 3 |
| BMED | 251/Intro to Biomedical Engineering | 3 |
| ENGR | 312/Digital Circuits & Microproc. | 3 |
| Total for year | | 35 |

Junior Year**Fall**

| | | |
|------|----------------------------------|---|
| ELEC | 251/Electronics | 3 |
| ELEC | 333/Electrical Engineering Lab I | 1 |
| CHEM | 321/Organic Chemistry I | 4 |
| BMED | 311/Physiological Systems | 4 |
| ENGR | 322/Thermodynamics | 3 |

Spring

| | | |
|-----------------------|---|-----------|
| ENGR | 272/Advanced Engineering Math I | 3 |
| ELEC | 361/Digital Signal Processing | 3 |
| | Science/Math Elective** | 4 |
| ELEC | 363/Electrical Engineering Lab II | 1 |
| | General Education Elective (SS/HUM/ART) | 3 |
| Total for year | | 29 |

Senior Year**Fall**

| | | |
|------|---|---|
| BMED | 423/Introduction to Biomaterials | 3 |
| ENGR | 352/Controls | 3 |
| ENGR | 099/Senior Professional Seminar | 0 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |

Spring

| | | |
|-----------------------|---|-----------|
| BMED | 473/Bioinstrumentation | 4 |
| BMED | 492/Independent Study | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| Total for year | | 25 |

*By advisement only.

** Students must select one course from the following three courses: CHEM 322 Organic Chemistry II, BIOL 211 Cell and Molecular Biology, ENGR 342 Advanced Engineering Mathematics II. Students whose goal is admission to medical school are strongly advised to take CHEM 322/Organic Chemistry II.

Bachelor of Arts in Biomedical Engineering – Mechanical Engineering Option Curriculum**Sophomore Year****Fall**

| | | |
|------|------------------------|---|
| MATH | 229/Calculus III | 3 |
| BIO | 185/Themes in Biology | 4 |
| ENGR | 222/Statics | 3 |
| ENGR | 212/Circuit Analysis | 3 |
| ENGR | 214/Circuits Lab | 1 |
| CSC | 215/Computer Science I | 4 |

Spring

| | | |
|-----------------------|-------------------------------------|-----------|
| MATH | 386/Differential Equations | 3 |
| | Restricted Biology Elective* | 4 |
| MECH | 251/Strength of Materials | 3 |
| MECH | 263/Mechanical Engineering Lab I | 1 |
| BMED | 251/Intro to Biomedical Engineering | 3 |
| Total for year | | 32 |

Junior Year**Fall**

| | | |
|------|---------------------------|---|
| BMED | 343/Biomechanics | 3 |
| ENGR | 322/Thermodynamics | 3 |
| CHEM | 321/Organic Chemistry I | 4 |
| BMED | 311/Physiological Systems | 4 |
| | Elective (SS/HUM/ART) | 3 |

Spring

| | | |
|-----------------------|----------------------------------|-----------|
| ELEC | 251/Electronics | 3 |
| ENGR | 272/Advanced Engineering Math I | 3 |
| ELEC | 333/Electrical Engineering Lab I | 1 |
| | Science/Math Elective** | 4 |
| | Elective (SS/HUM/ART) | 3 |
| Total for year | | 31 |

Senior Year

| | | |
|---------------|----------------------------------|-----------|
| Fall | | |
| MECH | 311/Mechanical Design I | 3 |
| BMED | 423/Introduction to Biomaterials | 3 |
| ENGR | 099/Senior Professional Seminar | 0 |
| | Elective (SS/HUM/ART) | 3 |
| | Elective (SS/HUM/ART) | 3 |
| Spring | | |
| MECH | 361/Fluid Mechanics | 3 |
| BMED | 473/Bioinstrumentation | 4 |
| | Elective (SS/HUM/ART) | 3 |
| | Elective (SS/HUM/ART) | 3 |
| | Total for year | 25 |

**By advisement only.*

*** Students must select one course from the following three courses: CHEM 322 Organic Chemistry II, BIOL 211 Cell and Molecular Biology, ENGR 342 Advanced Engineering Mathematics II. Students whose goal is admission to medical school are strongly advised to take CHEM 322/Organic Chemistry II.*

Bachelor of Science in Computer Engineering

Computer engineering is a discipline that addresses a variety of technological problems associated with the design and application of computers. Computer engineering is concerned with the design and implementation of digital hardware and software.

The curriculum for the computer engineering degree provides breadth and depth across the fields of electrical engineering and computer science. The curriculum structure provides a balanced view of hardware, software, hardware-software trade-offs, and basic modeling techniques used to represent the computing process. The degree requirements include courses from the computer science as well as the engineering department.

The engineering department has established the following educational objectives for the Computer Engineering program:

1. To provide the students with the mathematical, computational, engineering, and communications skills necessary for the pursuit of a successful computer engineering career.
2. To ensure that the students receive a broad engineering education so that they can communicate and interact effectively with engineers in different areas of specialization.
3. To foster the students' abilities to formulate problems, find practical and responsible engineering solutions, and understand the impact of the solutions within a global/societal context in a collaborative environment.
4. To develop the students' ability to design an engineering system, component, or process that meets a desired need while encompassing economic, ethical, environmental, and human issues.
5. To develop the students' ability to design and conduct experiments, to analyze and interpret data, and to communicate the results effectively.
6. To develop the students' ability to use modern engineering tools and techniques and to understand the role that computers play in the design process.
7. To instill in the students a knowledge of diverse cultures, ethical and contemporary issues, and involvement in professional and community activities.
8. To prepare the students for life-long learning and encourage and promote professional registration.

Bachelor of Science in Computer Engineering Curriculum

Sophomore Year

| | | |
|-------------|---|---|
| Fall | | |
| MATH | 229/Calculus III | 3 |
| MATH | 386/Differential Equations | 3 |
| ENGR | 312/Digital Circuits and Microprocessors | 3 |
| CMSC | 210/Discrete Structures of Computer Science | 3 |
| CSC | 250/Accelerated Computer Science I, II | 4 |

| | | |
|---------------|--|-----------|
| Spring | | |
| ENGR | 212/Circuit Analysis | 3 |
| ENGR | 214/Circuit Analysis Laboratory | 1 |
| ENGR | 272/Advanced Engineering Mathematics I | 3 |
| ELEC | 321/Systems and Signals | 3 |
| ECON | 200/Principles of Economics: Micro | 3 |
| | Total for year | 29 |

Junior Year

| | | |
|-------------|---|---|
| Fall | | |
| ELEC | 251/Electronics | 3 |
| ELEC | 333/Electrical Engineering Lab I | 1 |
| ELEC | 443/Microcomputer Systems | 2 |
| ENGR | 093/Engineering Seminar III | 0 |
| ENGR | 222/Statics | 3 |
| CMSC | 340/Computer Science III | 4 |
| | General Education Elective (SS/HUM/ART) | 3 |

| | | |
|-----------------------|--|-----------|
| Spring | | |
| ELEC | 361/Digital Signal Processing | 3 |
| ELEC | 363/Electrical Engineering Lab II | 1 |
| ELEC | 451/Computer Architecture and Organization | 3 |
| ENGR | 094/Engineering Seminar IV | 0 |
| ENGR | 262/Dynamics | 3 |
| ENGR | 372/Engineering Economy | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| Total for year | | 32 |

Senior Year

| | | |
|-------------|---|---|
| Fall | | |
| ELEC | 411/Embedded Systems | 3 |
| ELEC | 495/Senior Project I | 1 |
| ENGR | 099/Senior Professional Seminar | 0 |
| ENGR | 352/Control Systems I | 3 |
| ENGR | 354/Control Systems Laboratory | 1 |
| CMSC | 330/Operating Systems | 3 |
| | Restricted Specialization Elective** | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |

| | | |
|-----------------------|---|-----------|
| Spring | | |
| ELEC | 496/Senior Project II | 3 |
| ENGR | 098/Fundamentals of Engineering Review | 0 |
| ENGR | 322/Thermodynamics I | 3 |
| ENGR | 342/Advanced Engineering Math II | 3 |
| | Restricted Specialization Elective** | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| Total for year | | 35 |

***By advisement only.*

Bachelor of Science in Electrical Engineering

The electrical engineering curriculum allows students to focus on communications, electronic devices, instrumentation, digital signal processing, and automatic control systems.

Electrical engineers are concerned with electrical devices and systems and with the use of electrical energy. Virtually every industry uses electrical engineers, which is the largest of all engineering disciplines. Examples of the products designed by electrical engineers range from the computers used in business, to instruments used in the medical profession, military radar systems, cellular telephones, and video conferencing equipment.

The engineering department has established the following educational objectives for the Electrical Engineering program:

1. To provide the students with the mathematical, computational, engineering, and communications skills necessary for the pursuit of a successful electrical engineering career.
2. To ensure that the students receive a broad engineering education so that they can communicate and interact effectively with engineers in different areas of specialization.
3. To foster the students' abilities to formulate problems, find practical and responsible engineering solutions, and understand the impact of the solutions within a global/societal context in a collaborative environment.
4. To develop the students' ability to design an engineering system, component, or process that meets a desired need while encompassing economic, ethical, environmental, and human issues.
5. To develop the students' ability to design and conduct experiments, to analyze and interpret data, and to communicate the results effectively.
6. To develop the students' ability to use modern engineering tools and techniques and to understand the role that computers play in the design process.
7. To instill in the students a knowledge of diverse cultures, ethical and contemporary issues, and involvement in professional and community activities.
8. To prepare the students for life-long learning and encourage and promote professional registration.

Bachelor of Science in Electrical Engineering Curriculum

Sophomore Year

| | | |
|---------------|---|---|
| Fall | | |
| MATH | 229/Calculus III | 3 |
| MATH | 386/Differential Equations | 3 |
| ENGR | 312/Digital Circuits and Microprocessors | 3 |
| CMSC | 210/Discrete Structures of Computer Science | 3 |
| Spring | | |
| ENGR | 212/Circuit Analysis | 3 |
| ENGR | 214/Circuit Analysis Laboratory | 1 |

| | | |
|-----------------------|--|-----------|
| ENGR | 272/Advanced Engineering Mathematics I | 3 |
| ENGR | 222/Statics | 3 |
| ELEC | 321/Systems and Signals | 3 |
| ECON | 200/Principles of Economics: Micro | 3 |
| Total for year | | 28 |

Junior Year

Fall

| | | |
|------|---|---|
| ELEC | 251/Electronics | 3 |
| ELEC | 333/Electrical Engineering Lab I | 1 |
| ELEC | 443/Microcomputer Systems | 2 |
| ENGR | 093/Engineering Seminar III | 0 |
| ENGR | 262/Dynamics | 3 |
| ENGR | 342/Advanced Engineering Mathematics II | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |

Spring

| | | |
|-----------------------|--|-----------|
| ELEC | 341/Communication Systems | 3 |
| ELEC | 361/Digital Signal Processing | 3 |
| ELEC | 363/Electrical Engineering Lab II | 1 |
| ELEC | 373/Electrical Engineering Lab III | 2 |
| ELEC | 451/Computer Architecture and Organization | 3 |
| ENGR | 094/Engineering Seminar IV | 0 |
| ENGR | 372/Engineering Economy | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| Total for year | | 33 |

Senior Year

Fall

| | | |
|------|--|---|
| ELEC | 411/Embedded Systems | 3 |
| ELEC | 423/Engineering Electromagnetics | 3 |
| ELEC | 495/Senior Project I | 1 |
| ENGR | 099/Senior Professional Seminar | 0 |
| ENGR | 352/Control Systems I | 3 |
| ENGR | 354/Control Systems Laboratory | 1 |
| | Restricted Electrical Engineering Elective** | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |

Spring

| | | |
|-----------------------|--|-----------|
| ELEC | 441/Digital Systems Engineering | 3 |
| ELEC | 496/Senior Project II | 3 |
| ENGR | 098/Fundamentals of Engineering Review | 0 |
| ENGR | 322/Thermodynamics I | 3 |
| | Restricted Electrical Engineering Elective** | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| Total for year | | 35 |

***By advisement only.*

Bachelor of Science in Mechanical Engineering

This program encompasses course work in two areas of study: energy, which includes courses in thermodynamics, fluid mechanics, and heat transfer; and engineering design, with courses in strength of materials and mechanical design. The mechanical engineering degree allows for additional courses in a variety of specialized areas.

Encompassing the broadest of all engineering disciplines, the mechanical engineering program teaches students how to apply the principles of mechanics and energy to design anything from automobile engines to rocket engines and nuclear reactors. Mechanical engineers design and operate power plants and are concerned with the conversion of one form of energy to another. They also design heating, ventilating, and air conditioning systems to provide controlled conditions of temperature and humidity in homes, offices, commercial buildings, and industrial plants. Besides developing equipment and systems for refrigeration of foods and the operation of cold storage facilities, these engineers also are involved with the production of energy from alternative sources such as solar, geothermal, and wind.

The engineering department has established the following educational objectives for the Mechanical Engineering program:

1. To provide the students with the mathematical, computational, engineering, and communications skills necessary for the pursuit of a successful mechanical engineering career.
2. To ensure that the students receive a broad engineering education so that they can communicate and interact effectively with engineers in different areas of specialization.

3. To foster the students' abilities to formulate problems, find practical and responsible engineering solutions, and understand the impact of the solutions within a global/societal context in a collaborative environment.
4. To develop the students' ability to design an engineering system, component, or process that meets a desired need while encompassing economic, ethical, environmental, and human issues.
5. To develop the students' ability to design and conduct experiments, to analyze and interpret data, and to communicate the results effectively.
6. To develop the students' ability to use modern engineering tools and techniques and to understand the role that computers play in the design process.
7. To instill in the students a knowledge of diverse cultures, ethical and contemporary issues, and involvement in professional and community activities.
8. To prepare the students for life-long learning and encourage and promote professional registration.

Bachelor of Science in Mechanical Engineering Curriculum

Sophomore Year

Fall

| | | |
|------|---------------------------------|---|
| MATH | 229/Calculus III | 3 |
| MATH | 386/Differential Equations | 3 |
| ENGR | 232/Manufacturing Processes | 3 |
| ENGR | 212/Circuit Analysis | 3 |
| ENGR | 222/Statics | 3 |
| ENGR | 214/Circuit Analysis Laboratory | 1 |

Spring

| | | |
|-----------------------|--|-----------|
| ENGR | 152/Engineering Materials Science | 3 |
| ENGR | 262/Dynamics | 3 |
| ENGR | 272/Advanced Engineering Mathematics I | 3 |
| MECH | 251/Strength of Materials | 3 |
| MECH | 263/Mechanical Engineering Lab I | 1 |
| Total for year | | 29 |

Junior Year

Fall

| | | |
|------|---|---|
| MECH | 311/Mechanical Design Analysis I | 3 |
| MECH | 321/Numerical Analysis | 3 |
| ENGR | 093/Engineering Seminar III | 0 |
| ENGR | 322/Thermodynamics I | 3 |
| ENGR | 342/Advanced Engineering Mathematics II | 3 |
| ECON | 200/ Principles of Economics: Micro | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |

Spring

| | | |
|-----------------------|--|-----------|
| MECH | 361/Fluid Mechanics | 3 |
| MECH | 363/Mechanical Engineering Laboratory II | 1 |
| MECH | 371/Thermodynamics II | 3 |
| ENGR | 094/Engineering Seminar IV | 0 |
| ENGR | 372/Engineering Economy | 3 |
| | Restricted Mechanical Engineering Elective** | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| Total for year | | 34 |

Senior Year

Fall

| | | |
|------|--|---|
| MECH | 411/Heat Transfer | 3 |
| MECH | 433/Mechanical Engineering Laboratory III | 1 |
| MECH | 495/Senior Project I | 1 |
| ENGR | 099/Senior Professional Seminar | 0 |
| ENGR | 352/Control Systems I | 3 |
| ENGR | 354/Control Systems Laboratory | 1 |
| | Restricted Mechanical Engineering Elective** | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |

Spring

| | | |
|------|--|---|
| MECH | 460/Computer-Aided Mechanical Engr. Design | 3 |
| MECH | 463/Mechanical Engineering Laboratory IV | 1 |

| | | |
|------|--|-----------|
| MECH | 496/Senior Project II | 3 |
| ENGR | 098/Fundamentals of Engineering Review | 0 |
| ENGR | 312/Digital Circuits and Microprocessors | 3 |
| | Restricted Mechanical Engineering Elective** | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | Total for year | 34 |

***By advisement only.*

Bachelor of Science in Engineering Science

This program supports a specialization in Engineering Management. The engineering department has established the following educational objectives for the Engineering Science program:

1. To provide the students with the mathematical, computational, engineering, and communications skills necessary for the pursuit of a successful career.
2. To ensure that the students receive a broad engineering education, so that they can think across disciplines, while being able to specialize in a supported engineering area.
3. To foster the students' abilities to formulate problems, find practical and responsible solutions, understand the impact of solutions within a global/societal context in a collaborative environment.
4. To develop the students' ability to design a system, component, or process that meets a desired need while encompassing economic, ethical, environmental, and human issues.
5. To develop the students' ability to design and conduct experiments, to analyze and interpret data, and to communicate the results effectively.
6. To develop the students' ability to use modern engineering tools and techniques in the design process.
7. To instill in the students a knowledge of diverse cultures, ethical and contemporary issues, and involvement in professional and community activities.
8. To prepare the students for life-long learning and encourage and promote professional registration.

Engineering Management Specialization

The Engineering Management Specialization integrates engineering and management education to prepare students for engineering management. Graduates of this program are prepared to work as first-line supervisors or plant managers. This course of study provides students with the technical knowledge that first-line supervisors need along with expertise in accounting, finance, production, marketing, and personnel. It includes courses from the engineering department as well as the School of Business. Students must select either the Electrical Engineering or Mechanical Engineering Preference for their studies.

Engineering Management – Electrical Engineering Preference Curriculum

Sophomore Year

Fall

| | | |
|------|--|---|
| MATH | 229/Calculus III | 3 |
| MATH | 386/Differential Equations | 3 |
| ENGR | 232/Manufacturing Processes | 3 |
| ENGR | 312/Digital Circuits and Microprocessors | 3 |
| ENGR | 222/Statics | 3 |
| PSY | 101/General Psychology | 4 |

Spring

| | | |
|------|--|-----------|
| ENGR | 152/Engineering Materials Science | 3 |
| ENGR | 212/Circuit Analysis | 3 |
| ENGR | 214/Circuit Analysis Laboratory | 1 |
| ENGR | 272/Advanced Engineering Mathematics I | 3 |
| ACCT | 260/Accounting Principles I | 3 |
| ELEC | 321/Systems and Signals | 3 |
| | Total for year | 35 |

Junior Year

Fall

| | | |
|------|---|---|
| ELEC | 251/Electronics | 3 |
| ELEC | 333/Electrical Engineering Lab I | 1 |
| MECH | 321/Numerical Analysis | 3 |
| ENGR | 093/Engineering Seminar III | 0 |
| ENGR | 262/Dynamics | 3 |
| ENGR | 342/Advanced Engineering Mathematics II | 3 |
| ECON | 200/Principles of Economics: Micro | 3 |

Spring

| | | |
|------|----------------------------|---|
| ELEC | 341/Communication Systems | 3 |
| ENGR | 094/Engineering Seminar IV | 0 |

| | | |
|------|---|-----------|
| ENGR | 372/Engineering Economy | 3 |
| ECON | 201/Principles of Economics: Macro | 3 |
| MGMT | 310/Management of Organizational Behavior | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | Total for year | 31 |

Senior Year

Fall

| | | |
|------|--|---|
| ELEC | 495/Senior Project I | 1 |
| ENGR | 099/Senior Professional Seminar | 0 |
| ENGR | 352/Control Systems I | 3 |
| ENGR | 354/Control Systems Laboratory | 1 |
| BUSN | 217/Legal Environment of Business | 3 |
| MKTG | 340/Marketing Principles | 3 |
| | Restricted Electrical Engineering Elective** | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |

**By advisement only.

Spring

| | | |
|------|---|-----------|
| ELEC | 496/Senior Project II | 3 |
| ENGR | 098/Fundamentals of Engineering Review | 0 |
| ENGR | 322/Thermodynamics I | 3 |
| ENGR | 452/Project Management | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| | Total for year | 32 |

Engineering Management – Mechanical Engineering Preference Curriculum

Sophomore Year

Fall

| | | |
|------|---------------------------------|---|
| MATH | 229/Calculus III | 3 |
| MATH | 386/Differential Equations | 3 |
| ENGR | 232/Manufacturing Processes | 3 |
| ENGR | 212/Circuit Analysis | 3 |
| ENGR | 214/Circuit Analysis Laboratory | 1 |
| ENGR | 222/Statics | 3 |

Spring

| | | |
|------|--|-----------|
| ENGR | 152/Engineering Materials Science | 3 |
| ENGR | 262/Dynamics | 3 |
| ENGR | 272/Advanced Engineering Mathematics I | 3 |
| ACCT | 260/Accounting Principles I | 3 |
| PSY | 101/General Psychology | 4 |
| | Total for year | 32 |

Junior Year

Fall

| | | |
|------|---|---|
| MECH | 321/Numerical Analysis | 3 |
| ENGR | 093/Engineering Seminar III | 0 |
| ENGR | 322/Thermodynamics I | 3 |
| ENGR | 342/Advanced Engineering Mathematics II | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |
| BUSN | 217/Legal Environment of Business | 3 |
| ECON | 200/Principles of Economics: Micro | 3 |

Spring

| | | |
|------|---|---|
| MECH | 251/Strength of Materials | 3 |
| MECH | 263/Mechanical Engineering Lab I | 1 |
| ENGR | 094/Engineering Seminar IV | 0 |
| ENGR | 372/Engineering Economy | 3 |
| ECON | 201/Principles of Economics: Macro | 3 |
| MGMT | 310/Management of Organizational Behavior | 3 |
| | General Education Elective (SS/HUM/ART) | 3 |

- ENGR 212/Circuit Analysis** **3 cr.**
 (3 class hours)
 (every semester)
Prerequisite: PHYS 202 or PHY 202
Corequisite: MATH 386
 Electric circuit concepts, Kirchoff's laws, node and mesh analysis, network theorems, natural and forced response, steady state analysis, phasor notation, balanced 3 phase, Fourier series, and frequency selective networks.
- ENGR 214/Circuit Analysis Laboratory** **1 cr.**
 (3 lab hours)
 (every semester)
Corequisite: ENGR 212
 A practical laboratory experience designing, simulating, breadboarding, and testing electric circuits to complement the theory in ENGR 212.
- ENGR 222/Statics** **3 cr.**
 (3 class hours, 1 design/recitation hour)
 (every semester)
Prerequisite: PHYS 201 or PHY 201
Corequisite: MATH 229
 Analysis of force systems and applications to structural analysis. Force analysis of plane trusses and frames, friction effects, centroids and moments and products of inertia of plane areas and curves.
- ENGR 232/Manufacturing Processes** **3 cr.**
 (2 class hours, 3 lab hours)
 (every semester)
 An introduction to the basic tools, processes, and materials of manufacturing. The manufacturing enterprise is examined with special attention to key organizational systems including production and inventory control, quality control, marketing, and finance. In addition, fundamental processes of the metals and plastics industries are treated in depth.
- ENGR 262/Dynamics** **3 cr.**
 (3 class hours, 1 design/recitation hour)
 (every semester)
Prerequisite: ENGR 222
 Displacement, velocity, and acceleration of a particle. Dynamics of particles and rigid bodies. Work-energy and impulse momentum methods for particles and rigid bodies.
- ENGR 272/Advanced Engineering Mathematics I** **3 cr.**
 (3 class hours)
 (every semester)
Prerequisite: MAT 128
 Introduction to matrix algebra and probability. Topics include: linear systems, basis, vectors, matrices, eigenvalue-eigenvector problems, probability, continuous and discrete distributions, simple and multiple regression and correlation, and experimental design.
- ENGR 312/Digital Circuits and Microprocessors** **3 cr.**
 (3 class hours, 1 design/recitation hour)
 (every semester)
Corequisite: CSC 215 or CSC 220 or permission of the instructor
 Analysis and design of digital systems including Boolean algebra, combinational and sequential circuit designs, programmable logic devices, VHDL, CMOS logic circuits, and computer basics.
- ENGR 322/Thermodynamics I** **3 cr.**
 (3 class hours, 1 design/recitation hour)
 (every semester)
Prerequisites: PHYS 202 or PHY 202, CHEM 201 or CHE 202
Corequisite: ENGR 222
 Study of the thermodynamic properties of pure substances, relationship of pressure and temperature to thermodynamic properties, concepts of work and heat. First and second laws of thermodynamics. Process and cycle analysis.
- ENGR 342/Advanced Engineering Mathematics II** **3 cr.**
 (3 class hours)
 (every semester)
Prerequisites: MATH 229, MATH 386, ENGR 272
 Advanced Vector Calculus, Greens, Stokes, and Divergence theorems. Lagrange multipliers and optimization. Fourier series, periodic functions, functions of arbitrary period, even and odd functions, and half-range expansions. Solutions to second order partial differential equations.

ENGR 352/Control Systems I **3 cr.**
(3 class hours, 1 design/recitation hour)
(every semester)
Prerequisite: ENGR 212
A study of theory and applications of electrical analog and digital control systems. Emphasis is on study of specific applications of such control systems to industrial processes and especially their application to electrical, hydraulic, pneumatic, and mechanical systems.

ENGR 354/Control Systems Laboratory **1 cr.**
(3 lab hours)
(every semester)
Corequisite: ENGR 352
Designing, modeling, and the simulation of analog and digital controllers.

ENGR 372/Engineering Economy **3 cr.**
(3 class hours)
(every semester)
Prerequisites: MAT 128, ECON 200
Economic and financial considerations in engineering decisions. Topics include decision criteria. Also, cost concepts, financial calculations, capital sources, accounting data, depreciation, breakeven analysis, effect of taxes, and intangible factors. Students will also become familiar with the common cost accounting systems and applications, their strengths and weaknesses.

ENGR 412/Process and Quality Control **3 cr.**
(3 class hours, 1 design/recitation hour)
(occasionally)
Prerequisites: ENGR 232, and ENGR 272 or equivalent
Industrial practices with respect to the control of quality of manufactured products including standards, inspection, organization, sampling, and corrective action. The use of inspection instruments and procedures is included.

ENGR 452/Project Management **3 cr.**
(3 class hours)
(spring semester)
Prerequisite: ENGR 272
This course presents the methods of project management at an introductory level. Techniques in project initiation and project implementation are discussed. Topics include project selection, project organization, project planning, budgeting and cost estimation, scheduling, resource allocation, project control, and project auditing.

ENGR 472/Special Topics in Engineering **3 cr.**
(3 class hours)
(occasionally)
Prerequisite: Permission of instructor
Study of advanced topics in engineering chosen by the instructor.

Biomedical Engineering Courses

BMED 251/Introduction to Biomedical Engineering **3 cr.**
(3 class hours)
Introduction to specializations within the field of biomedical engineering. Overview of classical and current trends related to biosensors and instrumentation, physiological models, biomechanics and biomaterials. Consideration of ethical and biosafety issues.

BMED 311/Physiological Systems **4 cr.**
(3 class hours, 3 laboratory hours)
Prerequisites: BIOL 184, CHEM 202
Control and integration of physiological function of the systems of the human body. Study of structure and function of systems, and homeostatic mechanisms in health and disease. Overview of sensory and biological control systems, with an emphasis on integrative function within and between systems.

BMED 343/Biomechanics **3 cr.**
(3 class hours, 1 design/recitation hour)
Prerequisites: MECH 251
(same as MECH 343)
Comprehensive study of structure, function and mechanical properties of biological soft and hard tissues. Topics include application of continuum concepts of mechanics of blood vessels, muscle, skin, bone, tendon, cartilage and ligaments; and constitutive laws for biological materials.

BMED 423/Introduction to Biomaterials **3 cr.**
(3 class hours, 1 design/recitation hour)
Prerequisites: CHEM 201
(same as MECH 423)

Introduction to metal, polymeric, ceramic and biological materials used as surgical implants in humans. Topics include acute and chronic biological response to implants, degradation of artificial materials, artificial organs and medical devices. Consideration of ethical issues.

BMED 472/Special Topics in Biomedical Engineering 3 cr.

(3 class hours, 1 design/recitation hour)

Prerequisites: Permission of instructor and department

Study of advanced topics in biomedical engineering chosen by the instructor.

BMED 473/Bioinstrumentation 4 cr.

(3 class hours, 3 lab hours)

Prerequisite: ENGR 212, ENGR 214

(same as ELEC 473, MECH 473)

Theory and design of biomedical instruments used for measurements on humans and animals. Detailed coverage of sensors and transducers that quantify force, pressure, flow, sound, temperature and displacement. Origin of biopotentials (ECG, EMG, EEG) and biological signal processing. Consideration of noise, interference and electrical safety issues.

BMED 492/Independent Study 1–3 cr.

Prerequisites: Permission of instructor and department

For advanced students wishing to pursue a special area of interest. Topic(s) developed in consultation with a faculty adviser.

Computer and Electrical Engineering Courses

ELEC 251/Electronics 3 cr.

(3 class hours, 1 design/recitation hour)

(fall semester)

Prerequisite: ENGR 212

Introduction to electronic devices and related circuits. Topics include diodes, bipolar junction and field-effect transistors, operational amplifiers, and related integrated circuit components.

ELEC 321/ Systems and Signals 3 cr.

(3 class hours, 1 design/recitation hour)

(spring semester)

Prerequisite: MATH 386

Continuous and discrete signals and systems. Convolution, impulse response, system classifications, differential and difference equations. Fourier series, Fourier transform, Laplace transform, x-transform. Transfer functions and stability.

ELEC 333/Electrical Engineering Lab I 1 cr.

(3 lab hours)

(fall semester)

Corequisite: ELEC 251

A practical laboratory experience designing, simulating, breadboarding and testing electronic circuits to complement the theory in ELEC 251.

ELEC 341/Communication Systems 3 cr.

(3 class hours, 1 design/recitation hour)

(spring semester)

Prerequisites: ELEC 251, ELEC 321

Digital and analog communication systems including baseband, pulse, AM, FM, and digital modulated systems.

ELEC 361/Digital Signal Processing 3 cr.

(3 class hours, 1 design/recitation hour)

(spring semester)

Prerequisites: ENGR 312, ELEC 321

Sampling data systems, z-transform, DFT, FFT, and digital filter design with applications to digital signal processing.

ELEC 363/Electrical Engineering Lab II 1 cr.

(3 lab hours)

(spring semester)

Corequisite: ELEC 361

The integration of theory, computer simulation, and experimental laboratory work as applied to digital filters.

ELEC 373/Electrical Engineering Lab III 2 cr.

(1 class hour, 3 lab hours)

(spring semester)

Corequisite: ELEC 341

Design issues and modeling techniques in communication transmission systems. Experiments include linear, nonlinear, and digital modulation/demodulation and computer-aided design.

ELEC 411/Embedded Systems **3 cr.**

(3 class hours, 1 design/recitation hour)
(fall semester)

Prerequisites: ELEC 251, ELEC 361, ELEC 443

This course deals with embedded systems and their interactions with their physical environments. It focuses on embedded system design issues such as limited memory, cost, performance guarantees, real-time operations, power and reliability.

ELEC 423/Engineering Electromagnetics **3 cr.**

(3 class hours)
(fall semester)

Prerequisites: ENGR 342, PHYS 202 or PHY 202

An integration of theory and practical applications in electromagnetics, transmission lines, and electromagnetic fields and waves. Includes impedance matching, Smith Chart, CAD tools and waveguides.

ELEC 431/RF/Microwave Engineering **3 cr.**

(3 class hours, 1 design/recitation hour)
(occasionally)

Prerequisite: ELEC 423

Extension of Engineering Electromagnetics. Additional topics in RF transmission systems, active devices, amplifier design using scattering parameters and modern filter design.

ELEC 441/Digital Systems Engineering **3 cr.**

(3 class hours, 1 design/recitation hour)
(spring semester)

Prerequisites: ENGR 312, ELEC 251

Treatment of digital system engineering problems: power, noise, signaling, and timing.

ELEC 443/Microcomputer Systems **2 cr.**

(1 class hour, 3 lab hours)
(fall semester)

Prerequisite: ENGR 312

An introductory course in microcontrollers, microprocessors and embedded control architecture assembly language programming, and interfacing of external devices with microcontrollers is emphasized.

ELEC 451/Computer Architecture and Organization **3 cr.**

(3 class hours, 1 design/recitation hour)
(spring semester)

Prerequisites: ENGR 312, ELEC 443

Microprocessor design philosophy, data typing and addressing modes, multi-processors, multi-tasking, process communications, memory management, and virtual memory.

ELEC 453/Control Systems II **3 cr.**

(3 class hours, 1 design/recitation hour)
(occasionally)

Prerequisites: ENGR 352

(same as MECH 453)

Analog and digital control systems, dynamic response modeling, design, and compensation techniques.

ELEC 471/VLSI Design **3 cr.**

(3 class hours, 1 design/recitation hour)
(occasionally)

Prerequisites: ENGR 312, ELEC 251 ELEC 451

Structured design methodologies for VLSI systems. Topics include switching models, device equations, combinational and sequential systems design, simulation, timing, verification and tools for computer-aided design.

ELEC 473/Bioinstrumentation **4 cr.**

(3 class hours, 3 lab hours)
(occasionally)

(same as BMED 473, MECH 473)

Prerequisites: ENGR 212, ENGR 214

Theory and design of biomedical instruments used for measurements on humans and animals. Detailed coverage of sensors and transducers that quantify force, pressure, flow, sound, temperature and displacement. Origin of biopotentials (ECG, EMG, EEG) and biological signal processing. Consideration of noise, interference and electrical safety issues.

ELEC 483/Robotics **3 cr.**

(3 class hours, 1 design/recitation hour)
(occasionally)

Prerequisite: ENGR 352
(same as MECH 483)

Introduction to all aspects of robotics with emphasis on industrial applications; study of different methods of robot actuation and feedback control mechanism; analysis of robot operation along with associated control languages and student design projects related to robotic technology.

ELEC 492/Independent Study **1–3 cr.**

(occasionally)

Prerequisites: Permission of instructor and department, senior status required

For advanced students wishing to pursue a special area of interest. Topic(s) developed in consultation with a faculty adviser.

ELEC 495, 496/Senior Project I, II **1, 3 cr.**

(3 class hours, 1 design/recitation hour)
(every semester)

Prerequisites: Senior standing and approved project proposal

Senior project focuses students' previous experience upon a specific technical project. Library research, design, cost analysis, construction, testing, and project management. Students work closely with a faculty adviser.

Mechanical Engineering Courses

MECH 251/Strength of Materials **3 cr.**

(3 class hours, 1 design/recitation hour)
(spring semester)

Prerequisites: ENGR 222, Computer Programming

Topics include axial, lateral, and torsional loading of shafts and beams; statically indeterminate structures; temperature and prestrain effects; shear force and bending moment in beams; axial, shear, bearing and bending stresses; deflection of beams; buckling of columns.

MECH 263/Mechanical Engineering Laboratory I **1 cr.**

(3 laboratory hours)
(spring semester)

Corequisite: MECH 251

Experiments related to strength of materials and basic stress analysis and material science. Computer data acquisition and data analysis.

MECH 311/Mechanical Design Analysis I **3 cr.**

(3 class hours, 1 design/recitation hour)
(fall semester)

Prerequisite: MECH 251

Combined stresses, failure theories for static failure of ductile and brittle materials, low- and high-cycle fatigue, bolted connections with symmetric and eccentric loading.

MECH 321/Numerical Methods for Engineers **3 cr.**

(3 class hours, 1 recitation hour)
(fall semester)

Prerequisites: ENGR 272, MATH 386, computer programming

Numerical solutions to linear and non-linear systems of equations; root finding methods; numerical integration; numerical methods for finding eigenvalues and eigenvectors; numerical integration of ordinary and partial differential equations.

MECH 343/Biomechanics **3 cr.**

(same as BMED 343)
(3 class hours, 1 design/recitation hour)
(occasionally)

Prerequisite: MECH 251

Comprehensive study of structure, function and mechanical properties of biological soft and hard tissues. Topics include application of continuum concepts of mechanics of blood vessels, muscle, skin, bone, tendon, cartilage and ligaments; and constitutive laws for biological materials.

MECH 361/Fluid Mechanics **3 cr.**

(3 class hours, 1 design/recitation hour)
(spring semester)

Prerequisites: MATH 229, MATH 386, ENGR 262

Topics include hydrostatics; kinematics of fluid motion; conservation equations in integral and differential form; dimensional analysis; laminar and turbulent viscous incompressible flow; boundary layer theory; lift and drag.

MECH 363/Mechanical Engineering Laboratory II 1 cr.

(3 laboratory hours)

(spring semester)

Prerequisite: MECH 263

Corequisites: MECH 361, MECH 371

Experiments related to fluid mechanics and thermodynamics. Calibration and uncertainty. Performance testing of an internal combustion engine.

MECH 371/Thermodynamics II 3 cr.

(3 class hours, 1 design/recitation hour)

(spring semester)

Prerequisite: ENGR 322

Topics include availability and irreversibility; power and refrigeration cycles; mixtures and solutions; chemical reactions; Maxwell relations and one-dimensional flow through nozzles and diffusers.

MECH 411/Heat Transfer 3 cr.

(3 class hours, 1 design/recitation hour)

(fall semester)

Prerequisites: ENGR 322, ENGR 342, MECH 321, MECH 361

Multi-dimensional steady state and transient conduction. Internal and external convection, blackbody and graybody thermal radiation, numerical methods for heat transfer. Design and analysis of heat exchangers.

MECH 421/Kinematics and Mechanisms 3 cr.

(3 class hours, 1 design/recitation hour)

(occasionally)

Prerequisites: ENGR 262, CMSC 215, junior status required

Analysis of displacement, velocity, and acceleration in mechanical linkages, cams, gears and mechanisms; synthesis of linkages, analytical, graphical and computer-generated solutions.

MECH 423/Introduction to Biomaterials 3 cr.

(same as BMED 423)

(3 class hours, 1 design/recitation hour)

(occasionally)

Prerequisite: CHEM 201

Introduction to metal, polymeric, ceramic and biological materials used as surgical implants in humans. Topics include acute and chronic biological response to implants, degradation of artificial materials, artificial organs and medical devices. Consideration of ethical issues.

MECH 431/Mechanical Design Analysis II 3 cr.

(3 class hours, 1 design/recitation hour)

(occasionally)

Prerequisites: MECH 311, senior status required

Welded connections; mechanical springs; rolling and journal bearings; spur, helical, bevel, and worm gears; clutches, brakes, and flexible mechanical elements; safety, economic, reliability, and design considerations.

MECH 433/Mechanical Engineering Laboratory III 1 cr.

(3 laboratory hours)

(fall semester)

Prerequisite: MECH 363

Corequisite: MECH 411

Experiments related to heat transfer in forced and natural convection. Computer data acquisition and data analysis.

MECH 441/Vibration Analysis 3 cr.

(3 class hours, 1 design/recitation hour)

(occasionally)

Prerequisites: ENGR 262, MECH 321

Response of first-, second-, and multi-degree of freedom mechanical systems to periodic inputs. Energy principles to obtain natural frequencies, viscous and coulomb damping effects. Formulation of the problem of vibration of continuous bodies, non-periodic forcing effects.

MECH 451/Heating, Ventilating, and Air Conditioning 3 cr.

(3 class hours, 1 design/recitation hour)

(occasionally)

Prerequisites: MECH 361, MECH 371

Corequisite: MECH 411

Heating and cooling loads; principles of psychrometrics; air, electric, hydronic and steam heating systems; absorption; evaporation and vapor compression air conditioning system. Design and analysis of residential, commercial, and industrial HVAC systems.

MECH 453/Control Systems II **3 cr.**

(3 class hours, 1 design/recitation hour)
(occasionally)

Prerequisites: ENGR 352

(same as ELEC 453)

Analog and digital control systems, dynamic response modeling, design, and compensation techniques.

MECH 460/Computer-Aided Mechanical Engineering Design **3 cr.**

(3 class hours, 1 design/recitation hour)

(spring semester)

Prerequisites: MECH 311, MECH 411

Introduction to finite element analysis. Application of modern engineering tools in the design of mechanical and thermal systems.

MECH 461/Thermal Systems Design **3 cr.**

(3 class hours, 1 design/recitation hour)

(occasionally)

Prerequisites: MECH 361, MECH 411

Workable and optimum systems, modeling of thermal systems, system simulation, and optimization.

MECH 463/Mechanical Engineering Laboratory IV **1 cr.**

(3 laboratory hours)

(spring semester)

Prerequisite: MECH 433

Experiments related to advanced mechanical engineering topics including free and forced vibrations for first- and multi-degree of freedom systems. Measurements on elements experiencing combined stresses.

MECH 471/Compressible Fluid Mechanics **3 cr.**

(3 class hours, 1 design/recitation hour)

(occasionally)

Prerequisites: ENGR 322, MECH 361

Study of physical acoustics, one-dimensional compressible flow, normal and oblique shock waves. Design of ducts and nozzles for compressible flow.

MECH 473/Bioinstrumentation **4 cr.**

(same as BMED 473, ELEC 473)

(3 class hours, 3 lab hours)

(occasionally)

Prerequisite: ENGR 212, ENGR 214

Theory and design of biomedical instruments used for measurements on humans and animals. Detailed coverage of sensors and transducers that quantify force, pressure, flow, sound, temperature and displacement. Origin of biopotentials (ECG, EMG, EEG) and biological signal processing. Consideration of noise, interference and electrical safety issues.

MECH 481/Advanced Strength of Materials **3 cr.**

(3 class hours, 1 recitation hour)

(occasionally)

Prerequisite: MECH 311

Beams on elastic foundations, rotating discs, membrane stresses in shells, Castigliano's principles, torsional bucking of beams and shafts.

MECH 483/Robotics **3 cr.**

(3 class hours, 1 design/recitation hour)

(occasionally)

Prerequisite: ENGR 352

(same as ELEC 483)

Introduction to all aspects of robotics with emphasis on industrial applications; study of different methods of robot actuation and feedback control mechanism; analysis of robot operation along with associated control languages and student design projects related to robotic technology.

MECH 492/Independent Study **1–3 cr.**

(occasionally)

Prerequisites: Permission of instructor, senior status required

For students wishing to study an advanced area of interest. Topic(s) developed in consultation with a faculty member.

MECH 495, 496/Senior Project I, II **1–3 cr.**

(2 recitation hours)

(every semester)

Prerequisites: Senior standing and approved project proposal

Senior project focuses students' previous experience upon a specific technical project. Library research, design, cost analysis, construction, testing, and project management. Students work closely with a faculty adviser.