Undergraduate studies

Computer Engineering (Bachelor of Applied Science – Honours)

Systems of Study

Co-operative

Minimum Average(s) Required

- A minimum cumulative overall average of 60.0%.
- A minimum term average of 60.0%. See promotion rules.

Graduation Requirements

- Complete a total of 21.25 units (excluding COOP, PD):
    - Complete all the required courses listed below.
    - Complete 13 approved electives:
        - Complete three Complementary Studies Electives (CSEs) from the Complementary Studies Course Lists for Engineering:
            - Two courses from List C.
            - One course from List A, C, or D.
        - Complete two courses from the Natural Science list.
        - Complete eight courses from the Technical Electives (TEs) lists.
- Complete one course from the Ethics list (see Additional Constraints).
- Complete all co-operative education program requirements listed below.

Co-operative Education Program Requirements

- Complete a total of five PD courses: PD19, PD20, and three additional PD courses.
- Complete a total of five credited work terms.
- See Bachelor of Applied Science co-operative education program requirements.

Course Requirements

1A Term

- Complete all of the following
  - Complete all the following:
    - ECE105 - Classical Mechanics (0.50)
    - ECE150 - Fundamentals of Programming (0.50)
    - ECE190 - Engineering Profession and Practice (0.25)
    - ECE198 - Project Studio (0.25)
    - MATH115 - Linear Algebra for Engineering (0.50)
    - MATH117 - Calculus 1 for Engineering (0.50)
  - Complete 1 of the following:
    - COMMST192 - Communication in the Engineering Profession (COMPE, ELE, MGTE) (0.50)
    - ENGL192 - Communication in the Engineering Profession (COMPE, ELE, MGTE) (0.50)

1B Term

- Complete all the following:
  - ECE102 - Information Session (0.00)
  - ECE106 - Electricity and Magnetism (0.50)
  - ECE108 - Discrete Mathematics and Logic 1 (0.50)
  - ECE124 - Digital Circuits and Systems (0.50)
  - ECE140 - Linear Circuits (0.50)
  - ECE192 - Engineering Economics and Impact on Society (0.25)
  - MATH119 - Calculus 2 for Engineering (0.50)

2A Term

- Complete all of the following
  - Complete all the following:
    - ECE109 - Materials Chemistry for Engineers (0.25)
    - ECE201 - Information Session (0.00)
    - ECE204 - Numerical Methods (0.50)
    - ECE222 - Digital Computers (0.50)
    - ECE240 - Electronic Circuits 1 (0.50)
    - ECE250 - Algorithms and Data Structures (0.50)
  - Complete 1 of the following:
    - ECE205 - Advanced Calculus 1 for Electrical and Computer Engineers (0.50)
    - MATH211 - Advanced Calculus 1 for Electrical and Computer Engineers (0.50)

2B Term

- Complete all the following:
  - ECE202 - Information Session (0.00)
  - ECE203 - Probability Theory and Statistics 1 (0.50)
  - ECE207 - Signals and Systems (0.50)
  - ECE208 - Discrete Mathematics and Logic 2 (0.50)
  - ECE224 - Embedded Microprocessor Systems (0.50)
  - ECE252 - Systems Programming and Concurrency (0.50)
  - ECE298 - Instrumentation and Prototyping Laboratory (0.25)

3A Term

- Complete all of the following
  - Complete all the following:
    - ECE301 - Information Session (0.00)
    - ECE318 - Communication Systems (0.50)
    - ECE327 - Digital Hardware Systems (0.50)
    - ECE350 - Real-Time Operating Systems (0.50)
    - ECE380 - Analog Control Systems (0.50)
  - Complete 1 approved elective

3B Term

- Complete all of the following
  - Complete all the following:
    - ECE302 - Information Session (0.00)
    - ECE307 - Probability Theory and Statistics 2 (0.50)
  - Complete 2 Technical Electives from List 1
  - Complete 1 Technical Elective from List 1 or List 2
  - Complete 1 approved elective

4A Term

- Complete all of the following
  - Complete all the following:
    - ECE401 - Information Session (0.00)
  - Complete 1 of the following:
    - ECE498A - Engineering Design Project (0.50)
    - GENE403 - Interdisciplinary Design Project 1 (0.50)
  - Complete 4 approved electives

4B Term

- Complete all of the following
  - Complete all the following:
    - ECE402 - Information Session (0.00)
  - Complete 1 of the following:
    - ECE498B - Engineering Design Project (0.50)
    - GENE404 - Interdisciplinary Design Project 2 (0.50)
  - Complete 4 approved electives

Course Lists

Ethics List

- Complete 1 of the following:
  - ARBUS202 - Professional and Business Ethics (0.50)
  - PD22 - Professionalism and Ethics in Engineering Practice (0.50)
  - PHIL215 - Professional and Business Ethics (0.50)
  - PHIL219J - Practical Ethics (0.50)
  - PHIL315 - Ethics and the Engineering Profession (0.50)

Natural Science List

- Complete all of the following
  - Complete a total of 2 lecture courses (see Additional Constraints)

- Choose any of the following:
  - BIOL110 - Biodiversity, Biomes, and Evolution (0.50)
  - BIOL130 - Introductory Cell Biology (0.50)
  - BIOL130L - Cell Biology Laboratory (0.25)
  - BIOL150 - Organismal and Evolutionary Ecology (0.50)
  - BIOL165 - Diversity of Life (0.50)
  - BIOL211 - Introductory Vertebrate Zoology (0.50)
  - BIOL220 - Introduction to Plant Structure and Function (0.50)
  - BIOL239 - Genetics (0.50)
  - BIOL240 - Fundamentals of Microbiology (0.50)
  - BIOL240L - Microbiology Laboratory (0.25)
  - BIOL241 - Introduction to Applied Microbiology (0.50)
  - BIOL273 - Principles of Human Physiology 1 (0.50)
  - BIOL280 - Introduction to Biophysics (0.50)
  - BIOL373 - Principles of Human Physiology 2 (0.50)
  - BIOL373L - Human Physiology Laboratory (0.25)
  - CHE102 - Chemistry for Engineers (0.50)
  - CHE161 - Engineering Biology (0.50)
  - CHEM123 - General Chemistry 2 (0.50)
  - CHEM123L - General Chemistry Laboratory 2 (0.25)
  - CHEM209 - Introductory Spectroscopy and Structure (0.50)
  - CHEM237 - Introductory Biochemistry (0.50)
  - CHEM237L - Introductory Biochemistry Laboratory (0.25)
  - CHEM254 - Introductory Chemical Thermodynamics (0.50)
  - CHEM262 - Organic Chemistry for Engineering (0.50)
  - CHEM262L - Organic Chemistry Laboratory for Engineering Students (0.25)
  - CHEM266 - Basic Organic Chemistry 1 (0.50)
  - CHEM356 - Introductory Quantum Mechanics (0.50)
  - EARTH121 - Introductory Earth Sciences (0.50)
  - EARTH122 - Introductory Environmental Sciences (0.50)
  - EARTH123 - Introductory Hydrology (0.50)
  - EARTH221 - Introductory Geochemistry (0.50)
  - EARTH270 - Disasters and Natural Hazards (0.50)
  - EARTH281 - Geological Impacts on Human Health (0.50)
  - ECE231 - Semiconductor Physics and Devices (0.50)
  - ECE305 - Introduction to Quantum Mechanics (0.50)
  - ECE403 - Thermal Physics (0.50)
  - ECE404 - Geometrical and Physical Optics (0.50)
  - ENVE275 - Aquatic Chemistry (0.50)
  - ENVS200 - Field Ecology (0.50)
  - NE222 - Organic Chemistry for Nanotechnology Engineers (0.50)
  - PHYS124 - Modern Physics (0.50)
  - PHYS233 - Introduction to Quantum Mechanics (0.50)
  - PHYS234 - Quantum Physics 1 (0.50)
  - PHYS263 - Classical Mechanics and Special Relativity (0.50)
  - PHYS275 - Planets (0.50)
  - PHYS280 - Introduction to Biophysics (0.50)

- PHYS334 - Quantum Physics 2 (0.50)
- PHYS335 - Condensed Matter Physics (0.50)
- PHYS375 - Stars (0.50)
- PHYS380 - Molecular and Cellular Biophysics (0.50)
- PSYCH207 - Cognitive Processes (0.50)
- PSYCH261 - Physiological Psychology (0.50)
- PSYCH306 - Perception (0.50)
- SCI238 - Introductory Astronomy (0.50)
- SCI250 - Environmental Geology (0.50)

Technical Electives List

- Complete a total of 8 Technical Electives. At least one TE, to a maximum of two, must be from an engineering plan other than Computer Engineering or Electrical Engineering (see Additional Constraints)

List 1

- Complete 2 of the following:
  - ECE320 - Computer Architecture (0.50)
  - ECE351 - Compilers (0.50)
  - ECE356 - Database Systems (0.50)
  - ECE358 - Computer Networks (0.50)

List 2

- Complete all of the following
  - Complete one course from this list or an additional course from List 1
  - Choose any of the following:
    - ECE313 - Digital Signal Processing (0.50)
    - ECE331 - Electronic Devices (0.50)
    - ECE360 - Power Systems and Smart Grids (0.50)
    - ECE373 - Radio Frequency and Microwave Circuits (0.50)

List 3

- Complete 3 of the following:
  - ECE406 - Algorithm Design and Analysis (0.50)
  - ECE409 - Cryptography and System Security (0.50)
  - ECE414 - Wireless Communications (0.50)
  - ECE416 - Advanced Topics in Networking (0.50)
  - ECE417 - Image Processing (0.50)
  - ECE423 - Embedded Computer Systems (0.50)
  - ECE432 - Radio Frequency Integrated Devices and Circuits (0.50)
  - ECE433 - Fabrication Technologies for Micro and Nano Devices (0.50)
  - ECE444 - Integrated Analog Electronics (0.50)
  - ECE445 - Integrated Digital Electronics (0.50)
  - ECE451 - Software Requirements Specification and Analysis (0.50)
  - ECE452 - Software Design and Architectures (0.50)
  - ECE453 - Software Testing, Quality Assurance, and Maintenance (0.50)
  - ECE454 - Distributed Computing (0.50)
  - ECE455 - Embedded Software (0.50)
  - ECE457A - Co-operative and Adaptive Algorithms (0.50)
  - ECE457B - Fundamentals of Computational Intelligence (0.50)
  - ECE457C - Reinforcement Learning (0.50)
  - ECE458 - Computer Security (0.50)
  - ECE459 - Programming for Performance (0.50)
  - ECE462 - Electrical Distribution Systems (0.50)
  - ECE463 - Design and Applications of Power Electronic Converters (0.50)
  - ECE464 - High Voltage Engineering and Power System Protection (0.50)
  - ECE467 - Power Systems Analysis, Operations, and Markets (0.50)
  - ECE474 - Radio and Wireless Systems (0.50)
  - ECE475 - Radio-Wave Systems (0.50)
  - ECE477 - Photonic Devices and Systems (0.50)
  - ECE481 - Digital Control Systems (0.50)
  - ECE486 - Robot Dynamics and Control (0.50)
  - ECE488 - Multivariable Control Systems (0.50)
  - ECE493 - Special Topics in Electrical and Computer Engineering (0.50)
  - ECE495 - Autonomous Vehicles (0.50)
  - ECE499 - Engineering Project (0.50)

List 4

- Complete 1 of the following:
  - BME411 - Optimization and Numerical Methods (0.50)
  - BME581 - Ultrasound in Medicine and Biology (0.50)
  - CHE522 - Advanced Process Dynamics and Control (0.50)
  - CHE524 - Process Control Laboratory (0.50)
  - ME351 - Fluid Mechanics 1 (0.50)
  - ME459 - Energy Conversion (0.50)
  - ME547 - Robot Manipulators: Kinematics, Dynamics, Control (0.50)
  - MSE331 - Introduction to Optimization (0.50)
  - MSE431 - Stochastic Models and Methods (0.50)
  - MSE432 - Production and Service Operations Management (0.50)
  - MSE435 - Advanced Optimization Techniques (0.50)
  - MSE446 - Introduction to Machine Learning (0.50)
  - MSE452 - Decision Making Under Uncertainty (0.50)
  - MSE541 - Search Engines (0.50)
  - MSE546 - Advanced Machine Learning (0.50)
  - MTE544 - Autonomous Mobile Robots (0.50)
  - NE345 - Photonic Materials and Devices (0.50)
  - SYDE411 - Optimization and Numerical Methods (0.50)
  - SYDE522 - Foundations of Artificial Intelligence (0.50)
  - SYDE531 - Design Optimization Under Probabilistic Uncertainty (0.50)
  - SYDE542 - Interface Design (0.50)
  - SYDE544 - Biomedical Measurement and Signal Processing (0.50)
  - SYDE552 - Computational Neuroscience (0.50)
  - SYDE556 - Simulating Neurobiological Systems (0.50)
  - SYDE572 - Introduction to Pattern Recognition (0.50)
  - SYDE575 - Image Processing (0.50)

List 5

- Complete all of the following
  - Complete one course from this list or any additional course from List 1, 2, 3, or 4
  - Choose any of the following:
    - ACTSC446 - Mathematics of Financial Markets (0.50)
    - CO250 - Introduction to Optimization (0.50)
    - CO342 - Introduction to Graph Theory (0.50)
    - CO456 - Introduction to Game Theory (0.50)
    - CO463 - Convex Optimization and Analysis (0.50)
    - CO466 - Continuous Optimization (0.50)
    - CS349 - User Interfaces (0.50)
    - CS442 - Principles of Programming Languages (0.50)
    - CS448 - Database Systems Implementation (0.50)
    - CS452 - Real-Time Programming (0.50)
    - CS480 - Introduction to Machine Learning (0.50)
    - CS484 - Computational Vision (0.50)
    - CS485 - Statistical and Computational Foundations of Machine Learning (0.50)
    - CS486 - Introduction to Artificial Intelligence (0.50)
    - CS488 - Introduction to Computer Graphics (0.50)
    - ECE260 - Electromechanical Energy Conversion (0.50)
    - ECE340 - Electronic Circuits 2 (0.50)
    - ECE375 - Electromagnetic Fields and Waves (0.50)
    - STAT340 - Stochastic Simulation Methods (0.50)
    - STAT341 - Computational Statistics and Data Analysis (0.50)
    - STAT440 - Computational Inference (0.50)
    - STAT441 - Statistical Learning - Classification (0.50)
    - STAT444 - Statistical Learning - Advanced Regression (0.50)

Additional Constraints

1. The course taken in the Ethics List can also be used towards the CSE or the PD requirements.
2. For the Natural Science requirement, if a 0.25-laboratory course accompanies a lecture course, the laboratory course must also be taken and the pair together count as one course towards the two-course requirement (e.g., BIOL130 with BIOL130L).
3. At least one TE, to a maximum of two, must be from another engineering (other than Computer Engineering or Electrical Engineering) plan; such courses must have sufficiently advanced engineering science or engineering design content to be allowed, and must be approved by the Electrical and Computer Engineering Undergraduate Office.
4. Exceptions to the requirements and electives listed above require prior approval of the Electrical and Computer Engineering Associate Chair, Undergraduate Studies.

Specializations

Students may choose to focus their elective choices by completing one (or more) of two available specializations.

Specializations List

- CE-Communications & Signal Processing Specialization, or CE-Quantum Engineering Specialization

Offered by Faculty(ies)

Faculty of Engineering

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