

COLLEGE OF ENGINEERING

UNIVERSITY OF SOUTH FLORIDA 2023-2024 UNDERGRADUATE CATALOG

COMPUTER ENGINEERING B.S.C.P.

TOTAL DEGREE HOURS: 120

The Computer Engineering program emphasizes the application of engineering principles to the design of computer hardware and software, and devotes additional time to computer architecture and advanced topics in hardware design, including extensive laboratory work. Students in this program also acquire a broad background in engineering topics through related coursework in the College.

MISSION STATEMENT

In keeping with the mission of the College of Engineering, the Department of Computer Science and Engineering strives for excellence in teaching, research, and public service. Specifically, the Department aspires to:

- Lead the advancement of computer science, computer engineering, information technology, and cybersecurity through internationally recognized research and education, as well as technology transfer.
- Prepare students for full and ethical participation in a diverse society and encourage lifelong learning.
- Educate students in the best practices of the field as well as integrate the latest research into the curriculum.
- Foster the development of problem solving and communication skills as an integral component of the profession.
- Provide quality learning experiences through effective classroom practices, active learning styles of teaching, and opportunities for meaningful interactions between students and faculty.

Program Educational Objectives and Student Outcomes

The Department has established the following program educational objectives for Computer Engineering graduates.

Objective 1: Our graduates will apply their knowledge and skills to succeed in their careers and/or obtain advanced degrees.

Objective 2: Our graduates will function ethically and responsibly, and will remain informed and involved as full participants in our profession and society.

Objective 3: Our graduates will creatively solve problems, communicate effectively, and successfully function in multi-disciplinary teams.

Objective 4: Our graduates will apply principles and practices of computing grounded in mathematics and science to successfully complete hardware and/or software-related engineering projects to meet customer business objectives and/or productively engage in research

The following are the Student Outcomes. Graduates of the program will have an ability to:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

Student enrollment data is posted on the Department website.

UNIVERSITY ADMISSIONS - COLLEGE OF ENGINEERING

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Admission to the University is based on the University's Undergraduate Admission Requirements that may be found by clicking on the following urls:

Freshman: <https://www.usf.edu/admissions/freshmen/admission-information/requirements-deadlines.aspx>

Transfer: <https://www.usf.edu/admissions/transfer/admission-information/index.aspx>

International: <https://www.usf.edu/admissions/international/admission-information/index.aspx>

For Admission information specific to the College of Engineering, see the information at College of Engineering.

PROGRESSION REQUIREMENTS IN THE UPPER DIVISION - COMPUTER ENGINEERING B.S.C.P.

Computer Engineering students who have fully met the below requirements and are in good academic standing, may progress into the upper level of the major. Prior to progression into the upper level, a student may take no more than two Departmental courses. The department may have continuation requirements, which specify minimum performance standards in core major courses which must be met before further registration in the department is granted.

1. Completion of:

MAC 2311 - Calculus I **Credit(s): 4** OR MAC 2281 - Engineering Calculus I **Credit(s): 4** AND MAC 2312 -

Calculus II **Credit(s): 4** OR MAC 2282 - Engineering Calculus II **Credit(s): 4**

PHY 2048 - General Physics I - Calculus Based **Credit(s): 3** AND PHY 2048L - General Physics I

Laboratory **Credit(s): 1**

All students must complete the equivalent of USF Engineering Calculus I & II, and Calculus-based General Physics I (with lab) with minimum grades of C in each course (grades of C- are insufficient). The minimum overall grade average in these three courses required for progression to the upper level is between 3.0 and 3.8 for any given year. The minimum acceptable grade average will be posted on the Department's website one year prior to the fall semester that the revised grade average is applicable. The computed grade average is based on the best attempts in these courses. These requirements must be met with a maximum of two attempts allowed for each course.

2. Completion of COP 2510 - Programming Concepts **Credit(s): 3** with a minimum grade of B (grade of B- is insufficient) or another introductory programming course covering a modern programming language, with an emphasis on programming concepts and design methodology with a minimum grade of B (grade of B- is insufficient).

3. A minimum overall GPA of 2.0

4. A minimum USF GPA of 2.0

MINIMUM CONTINUATION REQUIREMENTS - COMPUTER ENGINEERING B.S.C.P.

Students meeting the above requirements may progress to either of the Computer Engineering or Computer Science degree tracks; however, continuation in the major will be allowed only for students who complete CDA 3103 - Computer Organization **Credit(s): 3** and COP 3514 - Program Design **Credit(s): 3** with minimum grades of B, based on best attempts in each course (grades of B- are insufficient). These requirements must be met with a maximum of two attempts allowed for each course.

DEPARTMENTAL POLICIES

In addition to the College's graduation requirements, the Department has the following policies:

Mandatory academic advising and/or mentoring of students.

Exit interview and/or survey as a graduation requirement

STATE MANDATED COMMON COURSE PREREQUISITES - COMPUTER ENGINEERING B.S.C.P.

Following Florida BOG Regulation 8.010, state mandated common course prerequisites are lower-division courses that are required for progression into the upper-division of a particular baccalaureate degree program.

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Transfer students should complete the following prerequisite courses at the lower-level prior to entering the university. If these courses are not taken at a Florida College System institution, they must be completed before the degree is granted. Successful completion of common prerequisites alone does not guarantee a student admission into the degree program.

Unless stated otherwise, a grade of C is the minimum acceptable grade in prerequisite courses.

Students qualify for direct entry to the Department if they have completed the following courses at a Florida College System institution or University in the Florida State University System (SUS) and meet all other admissions requirements of the University and College.

Mathematics:

Courses at USF

MAC 2281 - Engineering Calculus I **Credit(s): 4** OR MAC 2311 - Calculus I **Credit(s): 4**
MAC 2282 - Engineering Calculus II **Credit(s): 4** OR MAC 2312 - Calculus II **Credit(s): 4**
MAC 2283 - Engineering Calculus III **Credit(s): 4** OR MAC 2313 - Calculus III **Credit(s): 4**
MAP 2302 - Differential Equations **Credit(s): 3**

Courses at a Florida College System Institution

MAC X311 **OR** MAC X281 - 4 credit hours
MAC X312 **OR** MAC X282 - 4 credit hours
MAC X313 **OR** MAC X283 - 4 credit hours
MAP X302 Differential Equations - 3 credit hours

Natural Sciences:

Courses at USF

CHM 2045 - General Chemistry I **Credit(s): 3** AND CHM 2045L - General Chemistry I Laboratory **Credit(s): 1**
OR CHS 2440 - General Chemistry for Engineers **Credit(s): 3** AND CHS 2440L - General Chemistry for Engineers Lab **Credit(s): 1**
PHY 2048 - General Physics I - Calculus Based **Credit(s): 3** AND PHY 2048L - General Physics I Laboratory **Credit(s): 1**
PHY 2049 - General Physics II - Calculus Based **Credit(s): 3** AND PHY 2049L - General Physics II Laboratory **Credit(s): 1**
COP XXXX - Introduction Programming in C, C++, JAVA or equivalent language

Courses at a Florida College System Institution

(CHM X045 and CHM X045L) **OR** CHM X045C **OR** CHM X440C - 4 credit hours
(PHY X048 and PHY X048L) **OR** PHY X048C - 5 credit hours
(PHY X049 and PHY X049L) **OR** PHY X049C - 5 credit hours
COP XXXX Intro Programming in C, C++, JAVA **OR** equivalent Language

Note: Introductory Programming in C, C++, Java, **OR** equivalent language. Choose programming language required by the university to which the student wishes to transfer.

REQUIRED COURSES: (108 CREDIT HOURS)

MAJOR CORE COURSES: 37 COURSES; 96 CREDIT HOURS

Math and Science Courses: 11 courses; 30 credit hours

MAC 2281 - Engineering Calculus I **Credit(s): 4**
OR
MAC 2311 - Calculus I **Credit(s): 4**
MAC 2282 - Engineering Calculus II **Credit(s): 4**
OR
MAC 2312 - Calculus II **Credit(s): 4**
MAC 2283 - Engineering Calculus III **Credit(s): 4**

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OR

MAC 2313 - Calculus III **Credit(s): 4**

MAP 2302 - Differential Equations **Credit(s): 3**

OR

EGN 3433 - Modeling and Analysis of Engineering Systems **Credit(s): 3**

CHM 2045 - General Chemistry I **Credit(s): 3**

OR

CHS 2440 - General Chemistry for Engineers **Credit(s): 3**

CHM 2045L - General Chemistry I Laboratory **Credit(s): 1**

OR

CHS 2440L - General Chemistry for Engineers Lab **Credit(s): 1**

COT 3100 - Introduction to Discrete Structures **Credit(s): 3**

PHY 2048 - General Physics I - Calculus Based **Credit(s): 3**

PHY 2048L - General Physics I Laboratory **Credit(s): 1**

PHY 2049 - General Physics II - Calculus Based **Credit(s): 3**

PHY 2049L - General Physics II Laboratory **Credit(s): 1**

BASIC ENGINEERING COURSES: 7 COURSES; 17 CREDIT HOURS

EGN 3000 - Foundations of Engineering **Credit(s): 0-3**

EGN 3000L - Foundations of Engineering Lab **Credit(s): 3**

EGN 3373 - Electrical Systems I **Credit(s): 3**

EGN 3443 - Probability and Statistics for Engineers **Credit(s): 3**

EGN 3615 - Engineering Economics with Social and Global Implications **Credit(s): 3**

EGN 4450 - Introduction to Linear Systems **Credit(s): 2**

EEE 3394 - Electrical Engineering Science I - Electronic Materials **Credit(s): 3**

SPECIALIZATION COURSES: 16 COURSES; 40 CREDIT HOURS

COP 2510 - Programming Concepts **Credit(s): 3**

COP 3514 - Program Design **Credit(s): 3**

COP 4530 - Data Structures **Credit(s): 3**

COP 4600 - Operating Systems **Credit(s): 3**

CDA 3103 - Computer Organization **Credit(s): 3**

CDA 3201 - Computer Logic and Design **Credit(s): 3**

CDA 3201L - Computer Logic and Design Lab **Credit(s): 1**

CDA 4203 - Computer System Design **Credit(s): 3**

CDA 4203L - Computer System Design Lab **Credit(s): 1**

CDA 4205 - Computer Architecture **Credit(s): 3**

CDA 4205L - Computer Architecture Lab **Credit(s): 1**

CDA 4213 - CMOS-VLSI Design **Credit(s): 3**

CDA 4213L - CMOS-VLSI Design Lab **Credit(s): 1**

COT 4400 - Analysis of Algorithms **Credit(s): 3**

CIS 4250 - Ethical Issues and Professional Conduct **Credit(s): 3**

CIS 4910 - Computer Science and Engineering Project **Credit(s): 3**

COMPOSITION AND TECHNICAL WRITING COURSES: 3 COURSES; 9 CREDIT HOURS

ENC 1101 - Composition I **Credit(s): 3**

ENC 1102 - Composition II **Credit(s): 3**

ENC 3246 - Communication for Engineers **Credit(s): 3**

MAJOR ELECTIVES: 4 COURSES; 12 CREDIT HOURS

Computer Engineering students must choose 6 hours of hardware electives and an additional, non-overlapping 6 hours of CSE technical electives ("software", "hardware", or "theory") in the Department.

Note: The Department website undergraduate section contains the most up to date list of Departmental upper-level technical electives. Additional electives may be available with a special topics course number (typically, CIS 4930). The prerequisite for Departmental upper-level technical electives is CDA 3201 Computer Logic and Design and COP

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4530 Data Structures. Consult with the Department Undergraduate Advisor to learn more about available electives. A maximum of six (6) hours of CIS 4900 and/or any other supervised individual study (including CIS 4915 and CIS 4940) are allowed as Department major elective credit.

HARDWARE ELECTIVES

- CDA 4253 - Field Programmable Gate Array System Design and Analysis **Credit(s): 3**
- CDA 4321 - Cryptographic Hardware and Embedded Systems **Credit(s): 3**
- CDA 4322 - Principles of Secure Hardware Design **Credit(s): 3**
- CDA 4323 - Practical Hardware Security **Credit(s): 3**

CSE ELECTIVES: 6 CREDIT HOURS

- CAP 4034 - Computer Animation Fundamentals **Credit(s): 3**
- CAP 4103 - Mobile Biometrics **Credit(s): 3**
- CAP 4111 - Introduction to Augmented and Virtual Reality **Credit(s): 3**
- CAP 4160 - Brain-Computer Interfaces **Credit(s): 3**
- CAP 4401 - Image Processing Fundamentals **Credit(s): 3**
- CAP 4410 - Computer Vision **Credit(s): 3**
- CAP 4621 - Introduction to Artificial Intelligence **Credit(s): 3**
- CAP 4628 - Affective Computing **Credit(s): 3**
- CAP 4641 - Natural Language Processing **Credit(s): 3**
- CAP 4662 - Introduction to Robotics **Credit(s): 3**
- CAP 4744 - Interactive Data Visualization **Credit(s): 3**
- CDA 4253 - Field Programmable Gate Array System Design and Analysis **Credit(s): 3**
- CDA 4321 - Cryptographic Hardware and Embedded Systems **Credit(s): 3**
- CDA 4322 - Principles of Secure Hardware Design **Credit(s): 3**
- CDA 4323 - Practical Hardware Security **Credit(s): 3**
- CDA 4621 - Control of Mobile Robots **Credit(s): 3**
- CEN 4020 - Software Engineering **Credit(s): 3**
- CEN 4072 - Software Testing **Credit(s): 3**
- CIS 4212 - Privacy-Preserving and Trustworthy Cyber-Infrastructures **Credit(s): 3**
- CIS 4345 - Big Data Storage and Analysis with Hadoop **Credit(s): 3**
- CIS 4900 - Independent Study in Computer Science **Credit(s): 1-5**
- CIS 4915 - Supervised Research in Computer Science **Credit(s): 1-5**
- CIS 4930 - Special Topics in Computer Science I **Credit(s): 1-3**
 - (See department website for list of approved topics)
- CIS 4940 - Industry Internship **Credit(s): 0-6**
- CNT 4004 - Computer Networks I **Credit(s): 3**
- CNT 4411 - Computing and Network Security **Credit(s): 3**
- CNT 4419 - Secure Coding **Credit(s): 3**
- COP 4020 - Programming Languages **Credit(s): 3**
- COP 4365 - Software System Development **Credit(s): 3**
- COP 4520 - Computing in Massively Parallel Systems **Credit(s): 3**
- COP 4620 - Compilers **Credit(s): 3**
- COP 4656 - Software Development for Mobile Devices **Credit(s): 3**
- COP 4710 - Database Design **Credit(s): 3**
- COT 4210 - Automata Theory and Formal Languages **Credit(s): 3**
- COT 4521 - Computational Geometry **Credit(s): 3**
- COT 4601 - Quantum Computing and Quantum Algorithms **Credit(s): 3**

ADDITIONAL INFORMATION - COMPUTER ENGINEERING B.S.C.P.

GPA REQUIREMENTS

Students must have and maintain a minimum 2.0 semester GPA, 2.0 Math and Science GPA, 2.0 Engineering GPA, 2.0 Specialization GPA, 2.0 USF GPA, and 2.0 overall GPA.

GRADING REQUIREMENTS

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Unless otherwise stated, the minimum acceptable grade in all BSCP required math, science, and engineering courses is a C or higher (C- is insufficient). The minimum acceptable grade in specialization courses is a C-, except as stated in the major progression and continuation requirements.

RESIDENCY REQUIREMENTS

Transfer students must complete a minimum number of approved specialization courses in the major at USF. The minimum number of USF specialization credit hours required is established by the respective academic department. In no case will this be less than 18 hours. Basic engineering courses are not considered specialization courses. The University residency requirement must also be met.

A dual degree student must meet the requirements of each major and have a minimum of 18 approved specialization hours taken in the degree granting department beyond those specialization hours required for the first degree.

INTERNSHIP OPPORTUNITIES

The College of Engineering and USF's Career Services Cooperative Education (Co-Op) program provides services for students interested in experiential educational experiences. A wide variety of industries and government agencies offer internships and cooperative education employment opportunities for engineering students. Participants gain valuable expertise in practical applications and other aspects of operations and development in a professional engineering environment. Students normally apply for participation in this program during their first year in the College of Engineering and pursue actual internships during their sophomore, junior and senior years. **See the Department Undergraduate Advisor for more information on earning academic credit for internships.**

ACCREDITATION INFORMATION - COLLEGE OF ENGINEERING

This Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

RESEARCH OPPORTUNITIES - COLLEGE OF ENGINEERING

Undergraduate students in any degree program are able to participate in undergraduate research. Several options exist to show mentored undergraduate research activity on a student's official transcript. Those who wish to enroll in an undergraduate research course should consult with their academic advisor to understand how the credit will apply towards the degree requirements. If no credit is needed, students may be eligible to enroll in the 0-credit IDS 4914 - Advanced Undergraduate Research Experience course. This course will not impact degree credits or GPA but will show on an official transcript and document the experience. The Office of High Impact Practices and Undergraduate Research (HIPUR) is able to assist with further inquiries.

ADVISING INFORMATION - COMPUTER ENGINEERING B.S.C.P.

Department Undergraduate Advisor: <http://www.usf.edu/engineering/cse/undergraduate/contacts.aspx>

Plans of Study - Computer Engineering B.S.C.P.

NOTES:

SCIV - Civics Literacy needs to be completed prior to graduation. For more information, see <https://www.usf.edu/undergrad/students/civics-literacy.aspx> or talk with your academic advisor.

Items that are critical are marked with a and are included in the plan for a student to stay on track.

Potential Entry Level Job Titles:

- Hardware Developer
- Hardware Tester
- Software Developer
- Software Tester

Potential Entry Level Salary Range:

\$55,000 - \$85,000

Computer Engineering B.S.C.P. - 2 Year Plan of Study

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YEAR 1

SEMESTER 1 (FALL)

- CDA 3103 - Computer Organization **Credit(s): 3**
COP 3514 - Program Design **Credit(s): 3**
COT 3100 - Introduction to Discrete Structures **Credit(s): 3**
EGN 3000 - Foundations of Engineering **Credit(s): 0-3**
EGN 3373 - Electrical Systems I **Credit(s): 3**
ENC 3246 - Communication for Engineers **Credit(s): 3**

NOTE: SCIV - Civics Literacy requirement needs to be fulfilled prior to graduation. See advisor.

Total Credit Hours: 15

SEMESTER 2 (SPRING)

- CDA 3201 - Computer Logic and Design **Credit(s): 3**
CDA 3201L - Computer Logic and Design Lab **Credit(s): 1**
COP 4530 - Data Structures **Credit(s): 3**
EEE 3394 - Electrical Engineering Science I - Electronic Materials **Credit(s): 3**
CSE Elective **Credit(s): 3**
CSE Elective **Credit(s): 3**

Total Credit Hours: 16

SEMESTER 3 (SUMMER)

Internship/Co-op Participation (see advisor for credit options- CIS 4940 - Industry Internship)
Total Credit Hours: 0

YEAR 2

SEMESTER 4 (FALL)

- CDA 4205 - Computer Architecture **Credit(s): 3**
CDA 4205L - Computer Architecture Lab **Credit(s): 1**
CDA 4213 - CMOS-VLSI Design **Credit(s): 3**
CDA 4213L - CMOS-VLSI Design Lab **Credit(s): 1**
COT 4400 - Analysis of Algorithms **Credit(s): 3**
CSE Hardware Elective **Credit(s): 3**

Total Credit Hours: 14

SEMESTER 5 (SPRING)

- CDA 4203 - Computer System Design **Credit(s): 3**
CDA 4203L - Computer System Design Lab **Credit(s): 1**
CIS 4250 - Ethical Issues and Professional Conduct **Credit(s): 3**
CIS 4910 - Computer Science and Engineering Project **Credit(s): 3**
COP 4600 - Operating Systems **Credit(s): 3**
CSE Hardware Elective **Credit(s): 3**

NOTE: TGEE - Ethical Reasoning & Civic Engagement requirement is met with CIS 4250

NOTE: TGEH - High Impact Practice requirement is met with CIS 4910

Total Credit Hours: 16

Computer Engineering B.S.C.P. - 4 Year Plan of Study

YEAR 1

SEMESTER 1 (FALL)

- CHM 2045 - General Chemistry I **Credit(s): 3**
OR CHS 2440 - General Chemistry for Engineers **Credit(s): 3**
CHM 2045L - General Chemistry I Laboratory **Credit(s): 1**

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OR CHS 2440L - General Chemistry for Engineers Lab **Credit(s): 1**
EGN 3000 - Foundations of Engineering **Credit(s): 0-3**
EGN 3000L - Foundations of Engineering Lab **Credit(s): 3**
ENC 1101 - Composition I **Credit(s): 3**
MAC 2281 - Engineering Calculus I **Credit(s): 4**
OR MAC 2311 - Calculus I **Credit(s): 4**

NOTE: TGEC - Creative Thinking is met with EGN 3000L

NOTE: SCIV - Civics Literacy requirement needs to be fulfilled prior to graduation. See advisor.

Total Credit Hours: 14

SEMESTER 2 (SPRING)

COP 2510 - Programming Concepts **Credit(s): 3**
COT 3100 - Introduction to Discrete Structures **Credit(s): 3**
MAC 2282 - Engineering Calculus II **Credit(s): 4**
OR MAC 2312 - Calculus II **Credit(s): 4**
PHY 2048 - General Physics I - Calculus Based **Credit(s): 3**
PHY 2048L - General Physics I Laboratory **Credit(s): 1**

Total Credit Hours: 14

SEMESTER 3 (SUMMER)

Please consider pursing High Impact Practice opportunities this semester such as Education Abroad, Internship Opportunities, Community Engagement, or Research Opportunities.

Questions about opportunities? Schedule an appointment with your academic advisor.

YEAR 2

SEMESTER 4 (FALL)

CDA 3103 - Computer Organization **Credit(s): 3**
COP 3514 - Program Design **Credit(s): 3**
MAC 2283 - Engineering Calculus III **Credit(s): 4**
OR MAC 2313 - Calculus III **Credit(s): 4**
PHY 2049 - General Physics II - Calculus Based **Credit(s): 3**
PHY 2049L - General Physics II Laboratory **Credit(s): 1**

Total Credit Hours: 14

SEMESTER 5 (SPRING)

CDA 3201 - Computer Logic and Design **Credit(s): 3**
CDA 3201L - Computer Logic and Design Lab **Credit(s): 1**
COP 4530 - Data Structures **Credit(s): 3**
EGN 3433 - Modeling and Analysis of Engineering Systems **Credit(s): 3**
OR MAP 2302 - Differential Equations **Credit(s): 3**
ENC 1102 - Composition II **Credit(s): 3**
SGEH - General Education Core Humanities **Credit(s): 3**

Total Credit Hours: 16

SEMESTER 6 (SUMMER)

EGN 3443 - Probability and Statistics for Engineers **Credit(s): 3**
SGES - General Education Core Social Sciences **Credit(s): 3**
Natural Science Elective (Life or Physical) **Credit(s): 3**
NOTE: TGEI - Information and Data Literacy is met with EGN 3443
Total Credit Hours: 9

YEAR 3

SEMESTER 7 (FALL)

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CDA 4205 - Computer Architecture **Credit(s): 3**

CDA 4205L - Computer Architecture Lab **Credit(s): 1**

EEE 3394 - Electrical Engineering Science I - Electronic Materials **Credit(s): 3**

EGN 3373 - Electrical Systems I **Credit(s): 3**

EGN 3615 - Engineering Economics with Social and Global Implications **Credit(s): 3**

EGN 4450 - Introduction to Linear Systems **Credit(s): 2**

NOTE: TGED - Human & Cultural Diversity is met with EGN 3615

Total Credit Hours: 15

SEMESTER 8 (SPRING)

CDA 4203 - Computer System Design **Credit(s): 3**

CDA 4203L - Computer System Design Lab **Credit(s): 1**

COT 4400 - Analysis of Algorithms **Credit(s): 3**

CSE Hardware Elective **Credit(s): 3**

General Elective **Credit(s): 3**

Total Credit Hours: 13

SEMESTER 9 (SUMMER)

Internship/Co-op Participation (see advisor for credit options - CIS 4940)

Total Credit Hours: 0

YEAR 4

SEMESTER 10 (FALL)

CDA 4213 - CMOS-VLSI Design **Credit(s): 3**

CDA 4213L - CMOS-VLSI Design Lab **Credit(s): 1**

COP 4600 - Operating Systems **Credit(s): 3**

ENC 3246 - Communication for Engineers **Credit(s): 3**

CSE Elective **Credit(s): 3**

Total Credit Hours: 13

SEMESTER 11 (SPRING)

CIS 4250 - Ethical Issues and Professional Conduct **Credit(s): 3**

CIS 4910 - Computer Science and Engineering Project **Credit(s): 3**

CSE Elective **Credit(s): 3**

CSE Hardware Elective **Credit(s): 3**

NOTE: TGEE - Ethical Reasoning & Civic Engagement is met with CIS 4250

NOTE: TGEH - High Impact Practice is met with CIS 4910

Total Credit Hours: 12