Electrical and Computer Engineering
Undergraduate Advising Handbook
for
ECE Undergraduate Students

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Introduction

The School of Electrical and Computer Engineering (ECE) has compiled this advising manual for undergraduate students to assist them with the selection of their courses. Students will receive advice throughout their stay at OSU from both faculty and staff. Pre-professional School students will receive advice from CEAT Student Services. Professional School students will receive advice from the ECE Advising Coordinator and from ECE faculty. That advice along with this manual will help students to complete their degree in a timely and orderly fashion. This manual is not intended to replace or supersede the official degree sheets for the BS in Electrical Engineering (BSEE) or the BS in Computer Engineering (BSCpE) degree programs. The student is expected to meet all requirements listed on the official Degree Requirement Sheet.

Each Professional School student is assigned to an ECE faculty member. That assignment can be found using Banner. Students are strongly encouraged to discuss all aspects of the curriculum, career, and technologies of electrical engineering or computer engineering with their faculty adviser. The ECE Advising Coordinator will assist students with non-ECE course selections, prerequisite compliance, degree checking, and other nuances associated with the ECE programs.

Students pursuing the B.S. degree in Electrical Engineering are required, prior to graduation, to have taken a set of area courses in a single sub-discipline in ECE. Sub-disciplines include a) communications (Com), controls systems, and digital signal processing (DSP), b) power and energy, c) computer and digital, and d) electronics and solid state. The set of courses is listed in this manual and include one 3000 level prerequisite course and three 4000 level depth courses. Students are encouraged to select an area that is closely aligned with their career goals. Faculty can provide advice about the alignment of goals with any given area.

Students pursuing the B.S. degree in Computer Engineering are by default taking a set of area courses in computer engineering along with additional courses in computer science.

For both electrical engineering students and computer engineering students, course advising sheets are provided in this manual to describe the flow of courses within the ECE School. Flow charts are also provided to show the flow of all courses for the BS degrees in electrical engineering or computer engineering.

This manual also lists the 2000, 3000, and 4000 level courses offered by the School along with their corresponding course catalog entries. A list of the ECE faculty is also provided in this manual along with their general area of specialization. In general, all faculty will be able to advise any undergraduate student, irrespective of the area of specialization selected by the student. However, students are encouraged to contact any faculty member to get detailed information about any area.
Electrical Engineering: Course Advising Sheet

I. Pre-Professional School Core Requirement (4 CH): ECEN 2011, ECEN 3233.

II. Junior Breadth Requirement (14 CH): ECEN 3314, ECEN 3513, ECEN 3613, ECEN 3714.

III. Area Requirement (9 CH): Choose a set of area courses from columns A, B, C, OR, D in the table below. Substitutions are allowed with ECE approval.

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</table>

IV. Senior Breadth Requirement (6 CH): Choose any two ECEN 4000 level courses. Exclusions or with ECE approval: ECEN 4010, ECEN 4030. (Other courses, 3000 level or above, in engineering, engineering science, math, physics, chemistry, computer science, or statistics may be allowed with ECE approval.)

V. Controlled Elective (3 CH): Choose a) ENSC 2123, ENSC 2143, or ENSC 2213, b) any ENSC or ENGR course that is 3000 level or above, OR, c) choose any course, 3000 level or above, from ECEN, BAE, MAE, CIVE, IEM, PHYS, MATH, CHEM, STAT, or CS. Exclusions or with ECE approval (and in some cases, approval from other departments):

- ECEN 4030
- BAE 4001, BAE 4012, BAE 4400
- CHEM 4990
- CIVE 4010, CIVE 4041, CIVE 4043
- CS 3570, CS 4570, CS 4993
- IEM 4010, IEM 4020, IEM 4913, IEM 4931
- MAE 4010, MAE 4342, MAE 4344, MAE 4353, MAE 4354, MAE 4363, MAE 4374
- MATH 3403, MATH 3603, MATH 3910, MATH 3933, MATH 4033, MATH 4590, MATH 4900, MATH 4910
- PHYS 4010, PHYS 4712, PHYS 4993
- STAT 4053, STAT 4063, STAT 4910, STAT 4981, STAT 4991, STAT 4993

VI. EE Professional School Advanced Engineering Math and Design Requirements (10 CH): ECEN 4503, ECEN 4013, ECEN 4024.
Suggested Course Plan

The anticipation at OSU and most institutions of higher education is that for one semester credit hour (SCH) the student spends one hour per week in lecture (two for lab courses) and two hours studying outside of class (one for lab courses). A three credit hour class requires, on average, about nine hours per week. This study plan is recommended for students who will devote full time to university studies and do not have excessive extracurricular activities or other obligations.

**NOTES:**
1) CHEM 1515 may be substituted for CHEM 1414 and should be taken by all students considering medical school.
2) Students with less than a “B” in ENGL 1113 or 1313 must take ENGL 1213 or 1413 prior to ENGL 3323.
3) A total of at least 6 hours designated “H” and 6 hours designated “S” is required. Of these, 3 hrs must meet the International Dimension “I” component and 3 hrs must meet the Diversity “D” component.
4) (blank)
5) CS 2433 may be taken instead of CS 2133.
6) General Physics I and II are key prerequisites and should be taken at the earliest possible time.
7) Must be at least 3 SCH.
8) 3 SCH chosen from the Area (Prereq) Requirement on the EE Course Advising Sheet.
9) 9 SCH during the senior year to meet Area (Depth) Requirement on the EE Course Advising Sheet.
10) 6 SCH during the senior year to meet the Senior Breadth requirement on the EE Course Advising Sheet.
11) 3 SCH during the senior year to meet the Controlled Elective requirement on the EE Course Advising Sheet.
Professional School Entry Requirements:

- Completion of at least 60 college level semester credit hours (SCH).
- Completion of at least 12 SCH from OSU.
- Completion of MATH 2144, 2153, 2163, 2233; PHYS 2014 and 2114; CHEM 1414; ENGR 1111; ENSC 2113, 3213; ECEN 2714, 3233; ENGL 1113 or 1313; CS 1113, 2133 or 2433.
- A grade of "C" or better in each of those courses listed above.
- An overall GPA of 2.6 or better at OSU.
- A GPA of 2.7, or better, in all of the college-level math, science and engineering courses required for the B.S. in Electrical Engineering.

- This flowchart is only an advising instrument. When conflicts occur, the official 2017-2018 Degree Requirement Sheet takes precedence. Always check for the most current version of this flowchart.
- Admission to Professional School is required to take upper level ECEN-prefix courses. Please refer to the OSU Catalog corresponding to your matriculation date for detailed admission requirements.

The Electrical Engineering Course Plan (EE) for the Professional School includes the following semesters:

**Semester 5**
- 16 Credit Hours
  - ENGL 3323: Technical Writing (3)
  - MATH2153: Linear Algebra (3)
  - ECEN2714: Network Analysis (3)
  - ECEN3714: Electr Dev & Appl (3)
  - MATH2163: EM Fields (3)
  - "H" Elective (3)
  - "S/I/D" Elective (3)

**Semester 6**
- 16 Credit Hours
  - IEM 3503: Engr Economics (3)
  - ECEN 3513: Signal Analysis (3)
  - ECEN 3314: Electr Dev & Appl (3)
  - ECEN Area Prereq (3)
  - ECEN Area Prereq (3)
  - "S/I/D" Elective (3)

**Semester 7**
- 15 Credit Hours
  - ECEN 4013: Design Engr Sys (1)
  - ECEN 4503: Random Signals (3)
  - ECEN Area Depth (3)
  - ECEN Area Depth (3)
  - ECEN Sen Breadth (3)

**Semester 8**
- 13 Credit Hours
  - ECEN 4024: Capstone Design (1)
  - ECEN Area Depth (3)
  - ECEN Area Depth (3)
  - Controlled Elective (3)

Diagram indications:
- No prerequisites, not prerequisite for another class
- Has prerequisites, is prerequisite for another class
I. Pre-Professional School Core Requirement (4 CH): ECEN 2011, ECEN 3233.

II. Junior Breadth Requirement (14 CH): ECEN 3314, ECEN 3513, ECEN 3613, ECEN 3714.

III. Area Requirement (18 CH): ECEN 4213, ECEN 4243, ECEN 4303, CS 3653, CS 4323, CS 4343.

IV. Senior Breadth Requirement (3 CH): Choose one of the following courses: ECEN 4233, ECEN 4273, ECEN 4283.

V. Controlled Elective (3 CH): Choose a) ENSC 2113, ENSC 2123, ENSC 2143, or ENSC 2213, b) any ENSC or ENGR course that is 3000 level or above, OR, c) choose any course, 3000 level or above, from ECEN, BAE, MAE, CIVE, IEM, PHYS, MATH, CHEM, STAT, or CS. Exclusions or with ECE approval (and in some cases, approval from other departments):

- ECEN 4030
- BAE 4001, BAE 4012, BAE 4400
- CHEM 4990
- CIVE 4010, CIVE 4041, CIVE 4043
- CS 3570, CS 4570, CS 4993
- IEM 4010, IEM 4020, IEM 4913, IEM 4931
- MAE 4010, MAE 4342, MAE 4344, MAE 4353, MAE 4354, MAE 4363, MAE 4374
- MATH 3403, MATH 3603, MATH 3910, MATH 3933, MATH 4033, MATH 4590, MATH 4900, MATH 4910
- PHYS 4010, PHYS 4712, PHYS 4993
- STAT 4053, STAT 4063, STAT 4910, STAT 4981, STAT 4991, STAT 4993

VI. EE Professional School Advanced Engineering Math and Design Requirements (10 CH): ECEN 4503, ECEN 4013, ECEN 4024.
The anticipation at OSU and most institutions of higher education is that for one semester credit hour (SCH) the student spends one hour per week in lecture (two for lab courses) and two hours studying outside of class (one for lab courses). A three credit hour class requires, on average, about nine hours per week. This study plan is recommended for students who will devote full time to university studies and do not have excessive extracurricular activities or other obligations.

**Semester 1**
- **15 Credit Hours**
  - CS 1113: Comp. Science I (2/2)
  - ENGR 1111: Intro to Engr (1/1)
  - MATH 2144: Calculus I (4/0)
  - CHEM 1414: Gen Chemistry (3/2, Note 1)
  - ENGL 1113: Freshman Comp I (3/0, Note 2)

**Semester 2**
- **17 Credit Hours**
  - CS 2133: Comp. Science II (3/0)
  - PHYS 2014: General Physics I (3/2, Note 5)
  - MATH 2153: Calculus II (3/0)
  - MATH 2144: Calculus III (3/0)
  - ENGL 3323: Freshman Comp II (3/0)

**Semester 3**
- **16 Credit Hours**
  - MATH 2153: Calculus II (4/0)
  - MATH 2163: Calculus III (3/0)
  - ENGL 1113: Freshman Comp I (3/0, Note 2)

**Semester 4**
- **16 Credit Hours**
  - CS 3653: Discrete Math (3/0)

**NOTES:**
1) CHE 1515 may be substituted for CHEM 1414 and should be taken by all students considering medical school.
2) Students with less than a “B” in ENGL 1113 or 1313 must take ENGL 1213 or 1413 prior to ENGL 3323.
3) A total of at least 6 hours designated “H” and 6 hours designated “S” are required. Of these, 3 hrs must meet the International Dimension “I” component and 3 hrs must meet the Diversity “D” component.
4) (blank)
5) General Physics I and II are key prerequisites and should be taken at the earliest possible time.
6) Choose from courses specified on the CpE Course Advising Sheet, section IV.
7) Must be at least 3 SCH.
8) 3 SCH during the senior year to meet the Controlled Elective requirement on the CpE Course Advising Sheet, section V.
### Professional School Entry Requirements:
- Completion of at least 60 college level semester credit hours (SCH).
- Completion of at least 12 SCH from OSU.
- Completion of MATH 2144, 2153, 2163, 2233; PHYS 2014 and 2114; CHEM 1414; ENGR 1111; ENSC 3213; ECEN 2714, 3233; ENGL 1113 or 1313; CS 1113, 2133, 2351.
- A grade of "C" or better in each of those courses listed above.
- An overall GPA of 2.6 or better at OSU.
- A GPA of 2.7, or better, in all of the college-level math, science and engineering courses required for the B.S. in Electrical/Computer Engineering.

This flowchart is only an advising instrument. When conflicts occur, the official 2017-2018 Degree Requirement Sheet takes precedence. Always check for the most current version of this flowchart.

Admission to Professional School is required to take upper level ECEN-prefix courses. Please refer to the OSU Catalog corresponding to your matriculation date for detailed admission requirements.

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**Computer Engineering Course Plan (CpE)**

#### Semester 5
16 Credit Hours

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>ENGL 3323</td>
<td>Technical Writing</td>
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<td>ENGL 1113</td>
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<tr>
<td>ECEN2714</td>
<td>Network Analysis</td>
<td>3/2</td>
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<tr>
<td>MATH 2153</td>
<td>Linear Algebra</td>
<td>3/0</td>
</tr>
<tr>
<td>CS 4343</td>
<td>Data Structures</td>
<td>3/0</td>
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<tr>
<td>CS 2133</td>
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<td>CS 3653</td>
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<tr>
<td>ECEN 3613</td>
<td>EM Fields</td>
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#### Semester 6
16 Credit Hours

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<tr>
<td>MATH 2153</td>
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<td>ECEN 3714</td>
<td>Network Analysis</td>
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</tr>
<tr>
<td>ECEN 3513</td>
<td>Signal Analysis</td>
<td>3/0</td>
</tr>
<tr>
<td>ECEN 3314</td>
<td>Electr Dev &amp; Appl</td>
<td>3/2</td>
</tr>
<tr>
<td>CS 4323</td>
<td>Op Systems</td>
<td>3/0</td>
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#### Semester 7
15 Credit Hours

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<tr>
<td>ECEN 4013</td>
<td>Design Engr Sys</td>
<td>1/4</td>
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<tr>
<td>ECEN 4503</td>
<td>Random Signals</td>
<td>3/0</td>
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<tr>
<td>ECEN 4303</td>
<td>Dig Elec Ckt Des</td>
<td>2/2</td>
</tr>
<tr>
<td>ECEN 4213</td>
<td>Emb Comp Sys</td>
<td>2/2</td>
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#### Semester 8
13 Credit Hours

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<tr>
<td>ECEN 4024</td>
<td>Capstone Design</td>
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<tr>
<td>ENSC 3213</td>
<td>Comp Arch</td>
<td>3/0</td>
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<td>&quot;S&quot; Elective (3)</td>
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<tr>
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</table>

No prerequisites, not prerequisite for another class
Has prerequisites, is prerequisite for another class
No prerequisites, is prerequisite for another class
Has prerequisites, not prerequisite for another class

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Rev. 1.0 6_2_2017
ECEN Courses for the BSEE and BSCpE Degrees

- ECEN 2011 - Experimental Methods I
- ECEN 3113 - Energy, Environment and Economics
- ECEN 3233 - Digital Logic Design
- ECEN 3314 - Electronic Devices and Applications
- ECEN 3513 - Signal Analysis
- ECEN 3613 - Electromagnetic Fields
- ECEN 3623 - Mathematical Foundations of Electromagnetics and Photonics
- ECEN 3714 - Network Analysis
- ECEN 3723 - Systems I
- ECEN 3903 - Introduction to Semiconductor Devices
- ECEN 3913 - Solid State Electronic Devices
- ECEN 4013 - Design of Engineering Systems
- ECEN 4024 - Capstone Design
- ECEN 4133 - Power Electronics
- ECEN 4153 - Power System Analysis and Design
- ECEN 4213 - Embedded Computer Systems Design
- ECEN 4233 - High Speed Computer Arithmetic
- ECEN 4243 - Computer Architecture
- ECEN 4273 - Software Engineering
- ECEN 4283 - Computer Networks
- ECEN 4303 - Digital Integrated Circuit Design
- ECEN 4313 - Linear Electronics Circuit Design
- ECEN 4353 - Communication Electronics
- ECEN 4413 - Automatic Control Systems
- ECEN 4503 - Random Signals and Noise
- ECEN 4523 - Communication Theory
- ECEN 4533 - Data Communications
- ECEN 4613 - Microwave Engineering
- ECEN 4703 - Active Filter Design
- ECEN 4743 - Introduction to Biomedical Engineering Modeling and Systems
- ECEN 4763 - Introduction to Digital Signal Processing
- ECEN 4773 - Real Time Digital Signal Processing
- ECEN 4823 - Design of Optical Systems
- ECEN 4843 - Design of Lasers and Systems
Catalog Entries

Spring 2017
Feb 04, 2017
Your current Institution is OSU

Select the Course Number to get further detail on the course. Select the desired Schedule Type to find available classes for the course.

**ECEN 3020 - Supervised Research Project**

Supervised research project for qualified students. May be repeated no more than three times for a total of three credit hours.

Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.

Prerequisite(s): Consent of instructor and ECEN department head.

1.000 Credit hours
1.000 Other hours

**Levels:** Undergraduate

**Schedule Types:** Independent Study

Elec & Computer Engr Department

**Course Attributes:**
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 3113 - Energy, Environment and Economics**

Topics relevant to understanding the close relationship between energy use, its impact on the environment, and overall economic implications. Green energy technologies (wind, solar, hydro) will be considered along with conventional techniques. Both conventional and non-conventional energy technologies will be discussed.

Prerequisite(s): ECEN 3513 and admission to Professional School.

3.000 Credit hours
3.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 3233 - Digital Logic Design**

3.000 Credit hours
2.000 Lecture hours
2.000 Lab hours

Levels: Undergraduate
Schedule Types: Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

ECEN 3314 - Electronic Devices and Applications

Semiconductor electronic components including MOSFETs, BJTs, JFETs, and OpAmps. Emphasis on device models and use of solid state electronic devices to analyze, synthesize and design amplifiers and switching circuits. SPICE simulations are extensively utilized. Basic building blocks for analog and digital applications. Theoretical concepts and methods are demonstrated and reinforced through laboratory exercises. Course previously offered as ECEN 3313.

Prerequisite(s): ECEN 2011, ECEN 3714; degree program requires admission to Professional School prior to enrollment.

4.000 Credit hours
3.000 Lecture hours
2.000 Lab hours

Levels: Undergraduate
Schedule Types: Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

ECEN 3513 - Signal Analysis


Prerequisite(s): ECEN 3714

3.000 Credit hours
3.000 Lecture hours

Levels: Undergraduate
Schedule Types: Lecture

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

ECEN 3613 - Electromagnetic Fields

Time-harmonic and transient response of transmission lines. Maxwell’s equations and their applications to engineering problems in electrostatics, magnetostatics, time-harmonic fields and plane wave propagation.

Prerequisite(s): ENSC 2613, MATH 2163 and MATH 2233

3.000 Credit hours
3.000 Lecture hours

Levels: Undergraduate
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 3623 - Mathematical Foundations of Electromagnetics and Photonics**

Mathematical and computational treatment of fundamental electromagnetic theory, with applications to microwave engineering, photonics and semiconductor design. Energy and power; Laplace and Poisson equations; wave equation, including reflection, refraction, and diffraction; and classical electromagnetic radiation at macroscopic and microscopic levels.

Prerequisite(s): ECEN 3613; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
2.000 Lecture hours
2.000 Lab hours

**Levels:** Undergraduate

**Schedule Types:** Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

**Course Attributes:**
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 3714 - Network Analysis**

Laplace transform, transfer functions, magnetically coupled circuits and two-port networks. Theoretical concepts and methods are demonstrated and reinforced through laboratory exercises. Course previously offered as ECEN 3713.

Prerequisite(s): ECEN 2011, ENSC 2613, MATH 2233

4.000 Credit hours
3.000 Lecture hours
2.000 Lab hours

**Levels:** Undergraduate

**Schedule Types:** Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

**Course Attributes:**
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 3723 - Systems I**

Physical and mathematical modeling of electrical and mechanical dynamic systems. Transient response of first and second order systems. Laplace transform techniques for solving differential equations, transfer functions, frequency response and resonance. Course previously offered as ECEN 3413.

Prerequisite(s): ENSC 2113, ENSC 2613, MATH 2233

3.000 Credit hours
3.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 3903 - Introduction to Semiconductor Devices**

Crystal structure, the quantum theory of solids. The physics of semiconductor materials and the junction, with an emphasis on applications to semiconductor devices. Same course as PHYS 3313.

Prerequisite(s): PHYS 2114 or equivalent.

3.000 Credit hours
3.000 Lecture hours

**Levels:** Undergraduate  
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 3913 - Solid State Electronic Devices**


Prerequisite(s): PHYS 3313 or ECEN 3903

3.000 Credit hours
3.000 Lecture hours

**Levels:** Undergraduate  
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4010 - Technical Problems and Engineering Design**

Individual independent study projects selected in consultation with the instructor; analysis or design problems, literature searches and computer simulations may be involved.

Offered for variable credit, 1-12 credit hours, maximum of 12 credit hours.

Prerequisite(s): Consent of instructor.

1.000 TO 12.000 Credit hours
1.000 TO 12.000 Other hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Independent Study

Elec & Computer Engr Department

**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4013 - Design of Engineering Systems**

Complete design cycle for several small design projects, each including establishing objectives, synthesis, analysis, construction, testing and evaluation. Use of modern lab equipment and fabrication techniques. Development of communication skills.
Prerequisite(s): ECEN 2011, ECEN 3714, ECEN 3314, ECEN 3233 and ENSC 3323 and ENGL 3323 as a co-requisite.

3.000 Credit hours
1.000 Lecture hours
4.000 Lab hours

Levels: Undergraduate
Schedule Types: Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4024 - Capstone Design**

Continuation of ECEN 4013. Student project teams design, build, test and present results for realistic projects from university and industrial sponsors. Formulation of specifications, consideration of alternative solutions, feasibility considerations, detailed system descriptions, economic factors, safety, reliability, aesthetics, ethics and social impact. Course previously offered as ECEN 4023.

Prerequisite(s): ECEN 4013; degree program requires admission to Professional School prior to enrollment.

4.000 Credit hours
3.000 Lecture hours
2.000 Lab hours

Levels: Undergraduate
Schedule Types: Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4030 - Undergraduate Professional Practice**

Experience in application of electrical engineering principles to typical problems encountered in industry. Solutions to the problems by student participation in the role of engineer or engineering intern.

Offered for variable credit, 1-8 credit hours, maximum of 8 credit hours.

Prerequisite(s): Approval of ECEN department head.

1.000 TO 8.000 Credit hours
1.000 TO 8.000 Other hours

Levels: Undergraduate
Schedule Types: Independent Study

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Internship or Practicum, Eligible for SAFW, Upper Division Requirement

**ECEN 4133 - Power Electronics**

Power electronic devices, components, and their characteristics; DC to AC conversion; fundamentals of inverters and waveshaping devices; application aspects; control aspects; characteristics and state-of-the-art of advanced power inverter and power conditioning topologies.

Prerequisite(s): Degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours
Levels: Graduate, Undergraduate
Schedule Types: Lecture

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4153 - Power System Analysis and Design**

Power system component models from circuit theory. Formulation and design of the load flow model and the optimum economic generator allocation problem utilizing computer methods.

Prerequisite(s): Degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

Levels: Graduate, Undergraduate
Schedule Types: Lecture

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4213 - Embedded Computer Systems Design**

Degree program requires admission to Professional School prior to enrollment. Design of microprocessor-based systems through proper integration of hardware and software. Serial and parallel communications, sensor interfacing, computer control of external devices, and color graphics hardware. Design of PASCAL and assembly language modules for optimum real-time system performance.

Prerequisite(s): ENSC 3213 and CS 1113

3.000 Credit hours
2.000 Lecture hours
2.000 Lab hours

Levels: Graduate, Undergraduate
Schedule Types: Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4233 - High Speed Computer Arithmetic**

Course covers computer arithmetic as applied to general purpose and application-specific processors. Focus is on developing high-speed arithmetic algorithms and understanding their implementation in VLSI technology at the gate level.

Prerequisite(s): ECEN 3233; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

Levels: Graduate, Undergraduate
Schedule Types: Lecture

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4243 - Computer Architecture**

Degree program requires admission to Professional School prior to enrollment. Functional organization and hardware design of digital computer systems with emphasis on microprocessor-based systems. CPU organization, features of microprocessors including advanced 32-bit CPUs, memory system design including cache, virtual memory, error detection and correction, I/O operations, including direct memory access and peripheral interface design.

Prerequisite(s): ENSC 3213 and ECEN 3233.

3.000 Credit hours  
2.000 Lecture hours  
2.000 Lab hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4273 - Software Engineering**

Degree program requires admission to Professional School prior to enrollment. Functional organization and hardware design of digital computer systems with emphasis on microprocessor-based systems. CPU organization, features of microprocessors including advanced 32 bit CPU's memory system design including cache, virtual memory, error detection and correction, I/O operations, including direct memory access and peripheral interface design. Same course as CS 4273.

Prerequisite(s): ENSC 3213 or CS 1113, CS 3443.

3.000 Credit hours  
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**  
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**ECEN 4283 - Computer Networks**

Degree program requires admission to Professional School prior to enrollment. Computer networks, distributed systems and their systematic design. Introduction to the use, structure, and architecture of computer networks. Networking experiments to describe network topology. ISO reference model. Same course as CS 4283.

Prerequisite(s): ENSC 3213 or CS 3443.

3.000 Credit hours  
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement
ECEN 4303 - Digital Integrated Circuit Design

Theory of digital and electronics circuits. Digital logic families TTL, IIL, ECL, NMOS, CMOS, GaAs. Large signal models for transistors. Implementation at RAM and ROM. Circuit design for LSI and VLSI.

Prerequisite(s): ECEN 3233 and ECEN 3314; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

Levels: Graduate, Undergraduate
Schedule Types: Lecture

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Course Attributes:
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ECEN 4313 - Linear Electronics Circuit Design

Class A and B small-signal, push-pull power, complementary symmetry, differential and operational amplifiers, utilizing field-effect transistors, bipolar transistors, tunnel diodes and integrated circuits. Emphasis on amplification in electronic devices, design and analysis of wide-band amplifier circuitry.

Prerequisite(s): ECEN 3314; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

Levels: Graduate, Undergraduate
Schedule Types: Lecture

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

ECEN 4353 - Communication Electronics

Design of tuned voltage and power amplifiers, oscillators and mixers, modulation and detection, and parametric amplifiers.

Prerequisite(s): ECEN 3314; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

Levels: Graduate, Undergraduate
Schedule Types: Lecture

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement

ECEN 4413 - Automatic Control Systems

Properties of feedback control systems, mathematical models of basic components, state-variable models of feedback systems, time-domain analysis, stability, transform analysis, frequency domain techniques, root-locus design of single input single output systems and simple compensation techniques. Same course as MAE 4053.

Prerequisite(s): ECEN 3723 or MAE 3723; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4503 - Random Signals and Noise**


Prerequisite(s): ECEN 3513, ECEN 3714; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours  
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

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**Course Attributes:**  
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**ECEN 4523 - Communication Theory**

Noise in modulation systems. Digital data transmission. Design of optimal receivers. Introduction to information theory.

Prerequisite(s): ECEN 3513 and ECEN 4503. Degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours  
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

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**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4533 - Data Communications**


Prerequisite(s): ECEN 4503 as co-requisite.

3.000 Credit hours  
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4613 - Microwave Engineering**


Prerequisite(s): ECEN 3613; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

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**Course Attributes:**  
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**ECEN 4703 - Active Filter Design**

Introduction to passive filters; operational amplifiers as network elements; filter specifications; design of active filters. Laboratory design projects and computer simulations.

Prerequisite(s): ECEN 3613; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

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**Course Attributes:**  
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**ECEN 4743 - Introduction to Biomedical Engineering Modeling and Systems**

An overview of the field of biomedical engineering and an introduction of the modeling approaches implemented in biomedical engineering. Topics include bio-electronics, biomechanics, compartmental modeling, bio-signal processing, biomedical optics, etc. The course will demonstrate a few of major fields of activity in which biomedical engineers are engaged and modeling approaches are implemented.

Prerequisite(s): ECEN 3714, ECEN 4763; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

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**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

**ECEN 4763 - Introduction to Digital Signal Processing**

Prerequisite(s): ECEN 3513; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**  
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**ECEN 4773 - Real Time Digital Signal Processing**

DSP Processor architectures and programming, A/D, D/A, polled and interrupt-driven I/O. Realtime implementation of FIR/IIR filters, the FFT, and other DSP algorithms on special purpose DSP hardware from Motorola, Texas Instruments and others. Link between DSP theory and practical implementation.

Prerequisite(s): ECEN 4763 or equivalent; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
3.000 Lecture hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lecture

Elec & Computer Engr Department

**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

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**ECEN 4823 - Design of Optical Systems**

Introduction to optics through the design, construction, and characterization of optical systems. Emphasis on geometrical optics and spectroscopy. Course previously offered as ECEN 3813.

Prerequisite(s): PHYS 2114; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
2.000 Lecture hours
2.000 Lab hours

**Levels:** Graduate, Undergraduate  
**Schedule Types:** Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

**Course Attributes:**  
College of Eng Arch & Tech, Upper Division Requirement

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**ECEN 4843 - Design of Lasers and Systems**

Introduction of the design of lasers and optical systems based on lasers including the design, construction, and characterization of lasers. Gaussian beams and optics, laser gain materials, laser cavities, advanced topics. Course previously offered as ECEN 4813.

Prerequisite(s): ECEN 3613; degree program requires admission to Professional School prior to enrollment.

3.000 Credit hours
2.000 Lecture hours
2.000 Lab hours

Levels: Graduate, Undergraduate
Schedule Types: Lab, Lecture, Combined lecture and lab

Elec & Computer Engr Department

Course Attributes:
College of Eng Arch & Tech, Upper Division Requirement
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