

**OREGON STATE UNIVERSITY
ELECTRICAL & COMPUTER ENGINEERING B.S. DEGREE PROGRAM**

Course Summary

2008-2009

Required Pre-Engineeringⁱ

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<u>ELECTRICAL & COMP. ENGR. (10)</u>			
ECE 111 ECE Tools	3	___	___
ECE 112* ECE Concepts	3	___	___
ECE 271 [†] Digital Logic Design	3	___	___
ECE 272 [†] Digital Lab	1	___	___
<u>ENGINEERING SCIENCE (12)</u>			
ENGR 201* Elect. Fundamentals I	3	___	___
ENGR 202* Elect. Fundamentals II	3	___	___
ENGR 203 [†] Elect. Fundamentals III	3	___	___
ENGR 390 Engineering Economy	3	___	___
<u>COMPUTER SCIENCE (12)</u>			
CS 161 [†] Computer Science I	4	___	___
CS 162 [†] Computer Science II	4	___	___
CS 261 [†] Data Structures ('C' starting Sp06)	4	___	___

Required Professional Programⁱⁱ

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<u>ELECTR. & COMP. ENGR. (36)</u>			
<i>Junior-Level ECE Courses</i>			
ECE 322 Electronics I	4	___	___
ECE 323 Electronics II	4	___	___
ECE 351 Signals & Systems I	3	___	___
ECE 352 Signals & Systems II	4	___	___
ECE 353 Intro Prob & Random Signals	3	___	___
ECE/CS 372 Intro Computer Networks	4	___	___
ECE 375 Comp Org, & Assembly Lang	4	___	___
ECE 391 Transmission Lines (ECE 391X)	4	___	___
<i>Senior-Level ECE Courses</i>			
ECE 441,442,443 Engr Design Project	6	___	___

Track-Specificⁱⁱⁱ (30) Student Track: _____

The ECE advising guide lists approved tracks and their requirements:

- Required courses (15-18)
- Restricted electives credits and choices

All approved tracks include a minimum of 16 credit hours of additional 300- and 400-level ECE courses.

Students may design their own track. Self-designed tracks must include 30 credits of restricted electives, of which a minimum of 16 credits must be additional ECE 300-level or ECE 400-level courses. Self-designed tracks must be approved by the ECE Head Advisor.

Restricted electives in tracks are selected from 300- and 400-level College of Engineering or College of Science courses (but not BacCore perspective or synthesis courses), and ENGR 211, 212, 213 (if not required for track). Restricted electives *must* have technical prerequisites.

Name: _____
Email: _____

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<u>MATHEMATICS (28)</u>			
(Mth 111 College Algebra	___	___	___
(Mth 112 Elementary Functions	___	___	___
Mth 231 [†] Discrete Math	4	___	___
Mth 251* Diff. Calculus	4	___	___
Mth 252* Int. Calculus	4	___	___
Mth 254* Vector Calculus I	4	___	___
Mth 255 [†] Vector Calculus II	4	___	___
Mth 256* Diff. Equations	4	___	___
Mth 306* Matrix & Power Series	4	___	___

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<u>PHYSICAL SCIENCE (15)</u>			
Ch 201* Gen. Chemistry ^{iv}	3	___	___
Ph 211* Gen. Physics	4	___	___
Ph 212* Gen. Physics	4	___	___
Ph 213* Gen. Physics	4	___	___

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<u>COMMUNICATION SKILLS (9)</u>			
WR 121* Engl Comp	3	___	___
WR 327 Tech Writing	3	___	___
Comm 111/114*	3	___	___

Baccalaureate Core^v

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<u>SKILLS (3)</u>			
Lifetime Fitness Lecture _____	2	___	___
Lifetime Fitness Lab _____	1	___	___
<u>PERSPECTIVES (16)</u>			
Bio + Lab _____	4	___	___
West Culture _____	3	___	___
Cult. Diversity _____	3	___	___
Lit. & Arts _____	3	___	___
Soc. Proc. _____	3	___	___

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<u>DPD (3)</u>			
Diff, Pow.& Dis. _____	3	___	___

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<u>SYNTHESIS (6)</u>			
Contemp. Global _____	3	___	___
Science & Soc. _____	3	___	___

(*) Required before admission to the professional engineering program

(†) Prerequisite for Jr. ECE Courses



Tracks Leading to OSU ECE Graduate Programs

Computer & Network (includes a CS minor)
Bose, Chiang, Hamdaoui, Koç, Lee, Nguyen

Required (16)

CS 311 Operating Systems I
ECE 476/576 Advanced Computer Networks
ECE/CS 472/572 Computer Architecture
ECE 473/573 Microproc. System Design

Restricted Electives (14); Select at least three from:

CS 411 Operating Systems II
ECE 464/564 Digital Signal Processing
ECE 471/571 Advanced Digital Logic
ECE 474/574 VLSI System Design
ECE 477/577 Multimedia Systems
ECE 478/578 Computer Network Security (*occasionally offered*)

Systems, Signals, and Communications

Hamdaoui, Liu, Lucchese, Marple, Magaña, Nguyen, Raich, Shor

Required (16)

ECE 464/564 Digital Signal Processing
ECE 468 Digital Image Processing
ECE 461/561 Intro to Analog & Digital Communications
ECE 462/562 Digital Communications & Channel Coding

Restricted Electives (14); Select at least three from:

ECE 390 Electric & Magnetic Fields
ECE 451/ME 430 Systems Dynamics and Control
ECE 473/573 Microproc Syst. Design;
ECE 422/522 & 423/523 CMOS IC's; ECE 474 VLSI Syst Design
ECE 463/563 Wireless Communication Networks
CS 450/550 Intro to Computer Graphics
ECE 567 Digital Signal Processing
ECE 568 Advanced Digital Image Processing; CS 556 Computer Vision
ECE 499/599 Special Topics/Sensors
CS 331 Intro to Artificial Intelligence
CS 434 Machine Learning and Data Mining

Energy Systems

Brekken, von Jouanne

Required (18)

ENGR 211, 212 Statics, Dynamics
ECE 331 Electro-Mechanical Energy Conversion
ECE 390 Electric & Magnetic Fields
ECE 431/531 Power Electronics

Restricted Electives (12); Select at least three from:

ECE 432/532 Dyn of Electromech Energy Conv
ECE 433/533 Power System Analysis
ECE 499/599 (438/538) Special Topics/Hybrid Electric Vehicles
ECE 451/ME 430 Systems Dynamics and Control
ECE 464/564 Digital Signal Processing (*modified*)
ECE 473/573 Microprocessor System Design
ECE 530 Contemp Energy Applications
ECE 550 Linear Systems; ME grad control courses

Integrated Circuits

Chiang, Hanumolu, Fiez, Forbes, Mayaram, Moon, Temes

Required (15)

ECE 390 Electric & Magnetic Fields
ECE 317/416 Basic Semiconductor Devices I
ECE 422/522, 423/523 CMOS Integrated Circuits I, II

Restricted Electives (15); Select at least three from:

ECE 418/518 Semiconductor Processing
ECE 461/561 Intro to Analog & Digital Communications
ECE 462/562 Digital Communications & Channel Coding
ECE 464/564 Digital Signal Processing
ECE 473/573 Microprocessor System Design
ECE 474/574 VLSI System Design
ECE 485/585 Microwave Design Techniques

Materials and Devices

Conley, Dhagat, Forbes, Jander, Plant, Wager

Required (18)

ECE 390 Electric & Magnetic Fields
PH 314 Intro to Modern Physics
ECE 317/416 Basic Semiconductor Devices I
ECE 417/517 Basic Semiconductor Devices II
ECE 418/518 Semiconductor Processing

Restricted Electives (12); Select at least three from:

ECE 422/522 CMOS Integrated Circuits I
ECE 423/523 CMOS Integrated Circuits II
ECE 499/599 Special Topics/Sensors
ECE 499/599 Special Topics/Engineering Magnetism
ECE 482/582 Optical Electronic Systems
ECE 483/583 Guided Wave Optics
PH 481/581 Physical Optics
CH 411/511 Inorganic Chemistry (extra chem. prereq – CH 202 & 205)
IE 432/532 Microfabrication Technology
CHE 444/544 Thin Film Materials Processing
PH 475/575 Introduction to Solid State Physics (extra prereq – PH 314)

Note:

CH 221, or CH 201 & CH 202 & CH 205, recommended for this track

High Frequency Systems & Applied Electromagnetics

Magaña, Plant, Weisshaar

Required (15)

ECE 390 Electric & Magnetic Fields
ECE 317/416 Basic Semiconductor Devices I
ECE 485/585 Microwave Design Techniques
ECE 482/582 or ECE 483/583 or ECE 484/584 or ECE 487/587

Restricted Electives (15); Select at least three courses from:

ECE 331 Electromech Energy Conv
ECE 418/518 Semiconductor Processing
ECE 422/522, 423/523 CMOS Integrated Circuits I, II
ECE 461/561 Intro to Analog & Digital Communications
ECE 462/562 Digital Communications & Channel Coding
ECE 464/564 Digital Signal Processing
ECE 474/574 VLSI System Design
ECE 482/582 Optical Electronic Systems
ECE 483/583 Guided Wave Optics
ECE 484/584 Antennas and Propagation
ECE 499/599 Special Topics/Engineering Magnetism
ECE 499/599 Special Topics/Sensors
PH 314 Modern Physics
ECE 487/587 Electronic Packaging (*to be introduced later*)

RF Communications

Liu, Magaña, Weisshaar

Required (16)

ECE 390 Electric & Magnetic Fields
ECE 461/561 Intro to Analog & Digital Communications
ECE 462/562 Digital Communications & Channel Coding
ECE 463/563 or ECE 464/564

Restricted Electives (14); Select at least three from:

ECE 422/522, 423/523 CMOS Integrated Circuits I, II
ECE 463/563 Wireless Communication Networks
ECE 464/564 Digital Signal Processing
ECE 473/573 Microprocessor System Design
ECE 474/574 VLSI System Design
ECE 482/582 Optical Electronic Systems
ECE 483/583 Guided Wave Optics
ECE 484/584 Antennas & Propagation
ECE 485/585 Microwave Design Technique

Optoelectronics

Dhagat, Jander, Plant

Required (19)

ECE 390 Electric & Magnetic Fields
PH 314 Intro to Modern Physics
ECE 317/416 Basic Semiconductor Devices I
ECE 482/582 Optical Electronic Systems
ECE 483/583 Guided Wave Optics

Restricted Electives (11); Select at least three from:

PH 481/581 Physical Optics
ECE 417/517 Semiconductor Devices II
ECE 418/518 Semiconductor Processing
ECE 422/522 CMOS Integrated Circuits I
ECE 423/523 CMOS Integrated Circuits II
ECE 499/599 Special Topics/Sensors
ECE 499/599 Special Topics/Engineering Magnetism
CH 411/511 Inorganic Chemistry (extra chemistry prereq – CH 202 & 205)
IE 432/532 Microfabrication Technology
CHE 444/544 Thin Film Materials Processing
PH 475/575 Introduction to Solid State Physics (extra prereq – PH 314)

Other Possible Tracks - Examples

Self-Designed Track

Restricted Electives (30)

- To include at least 16 additional ECE 300- and 400-level credits
- ECE 390 strongly encouraged

Students must take 16 additional ECE 300/400-level credits in tracks:

Robotics & Control – Mechanical

Batten (ME), Schmitt (ME), Shor, K. Tumer (ME)

Required (18)

ENGR 211, 212 Statics, Dynamics
ECE 390 Electric & Magnetic Fields
ME 317 Intermediate Dynamics
ECE 451/ME 430 Systems Dynamics and Control

Restricted Electives (12); Select at least three from:

ECE 331 Electro-Mechanical Energy Conversion
ECE 432/532 Dyn. of Electromech Energy Conversion
ECE 431/531 Power Electronics
ECE 464/564 Digital Signal Processing
CS/ECE 476/576 Advanced Computer Networks
ECE 473/573 Microproc System Design
ECE 499/599 Special Topics/Sensors
ECE 550 Linear Systems; ME grad control courses
CS 331 Intro to Artificial Intelligence
CS 434 Machine Learning and Data Mining
ME 311 Intro to Thermo, Fluids, and Heat Transfer

Generalist, Jack/Jill of all Trades, Industry Collaborator, FE Prep

ECE Breadth and Troubleshooting (16)

ECE 317/416 Basic Semiconductor Devices I (*to be revised later*)
ECE 331 Electro-Mechanical Energy Conversion
ECE 390 Electric & Magnetic Fields
ECE 473/573 Microprocessor System Design
ECE 406/506 Engineering Projects

FE Preparation (14)

ENGR 211 Statics
ENGR 212 Dynamics
ME 311 Intro to Thermo, Fluids and Heat Transfer
ECE 451/ME 430 Systems Dynamics and Control

Pre-Medical [Review plan with Science pre-medical advisor] **DRAFT**

Typical admission requirements for US medical schools (specific schools may vary): <http://www.aamc.org/students/applying/about/start.htm>

1 Year of biology, 1 Year of physics, 1 Year of English
2 Years of Chemistry (through organic chemistry)

Minimum course requirements for admission to OHSU medical school:

<http://www.ohsu.edu/som/dean/md/admissions/requirements.shtml>

1 year of biology (including genetics), 1 Year of physics

2 Years of humanities/social science

(including one course in English composition).

One course each of general chemistry, organic chemistry, biochemistry (& prerequisites), mathematics

Basic ECE Requirements Related to Medical School:

WR 121, WR 327, COMM 111/114 for 1 Year of English

OSU BacCore for humanities/social science

CH 201 for first term of General Chemistry

MTH 251 for mathematics course

PH 211, 212, 213 for 1 Year of physics

BacCore Specifications for Medical School:

BI 211 for BI+Lab requirement

BB331 or PHL444 suggested for ST&S requirement

Required for ECE Track: 30 restricted elective credits, including 16 credits ECE 3xx & 4xx; suggested to include:

ECE 390 Electric and Magnetic Fields
ECE 464/564 Digital Signal Processing
ECE 468/568 Digital Image Processing

Restricted Electives in Track (for Medical School Requirements):

CH 331 Organic Chemistry (4)

CH 332 Organic Chemistry (4)

BB 450 Biochemistry (4)

and one of these other courses of possible interest:

Z 331/332/333/341/342/343 Human anatomy and physiology + labs

BB451 Biochemistry, BI 311 Genetics, BI 314 Cell and molecular biology,

Extra Courses Needed for Medical School (18 cr over the 180 cr BS):

BB 109 Health Professions: Medical (1)

CH 202 General Chemistry (3) & CH 205 Chemistry Lab (1)

CH 223 General Chemistry (5)

BI 212 Biology (4)

BI 213 Biology (4)

Accreditation (ABET) program requirements:

- Mathematics & Basic Sciences must add to at least 45 hours (1 year).
 - Engineering Science and Design (ECE, CS & Engr. Science) must add to at least 67.5 hours (1-1/2 years).
 - Upper Division credits must add to at least 60 hours.
- This must hold even if courses are waived.*

Notes on course waivers and electives:

- If a required course is waived, then excess elective hours must be earned to satisfy the university's requirement of completion of 180 hours of university-level coursework for a Baccalaureate degree. (Program requirements are only waived when a student has advanced standing in an area – AP/IB credit, coursework at unaccredited institutions, etc.)

ⁱ Notes on pre-engineering:

- Courses marked with * (PRE core courses) must be taken before the term for which admission is granted to the professional engineering program. Students missing a single Pre Core course may apply and be considered for admission.
- Courses marked with (†) are required prerequisites for professional program courses at the junior level.

All pre-engineering courses must be taken for letter grades. Students must earn a C or better grade (or C- if earned before Fall 2008) in each course.

- Note: Admission to the engineering professional program requires a higher PRE core GPA than that inferred by the C or better rule. [See College of Engineering Advising Guide.]

ⁱⁱ Students admitted to the professional program may take these courses.

- Students may petition to take these courses before admission. Petitions will be granted only if all prerequisites are satisfied, space is available, and student's grades will likely result in admission to professional program.

All professional program courses must be taken for letter grades. Students must earn a C or better grade (or C- if earned before Fall 2008) in each course. In addition, a PRO core GPA of 2.25 or better is required for graduation.

ⁱⁱⁱ Notes on Specific Tracks

- Must include at least 11 upper division credits to meet Oregon State Univ. BS degree requirements.

^{iv} Alternatives to CH 201

- CH 121 & 122 may be substituted for the CH 201 requirement. CH 201 has a MTH 111 co-requisite. CH 121 does not.
- CH 221 (or CH 224H) may be substituted. [CH 221 is recommended for students interested in materials and devices, bioengineering, or medical school.]

^v The OSU BacCore is required by the university for graduation & by ABET for general education.University BacCore requirement:

- AAOT block transfers (Associate of Arts Oregon Transfer) satisfy the OSU BacCore requirements listed in this section *except synthesis courses*.
- Award of a baccalaureate degree from another institution satisfies the university's BacCore requirements.

Grading:

- BAC Core courses listed in this section may be taken for S/U grading, up the university limit (36 hours S/U)

Limits:

- No more than two Perspective courses may be taken from the same department.
- The two Synthesis courses must be taken from two different departments.