

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

**Course Summary**

**2007-2008**

**Required Pre-Engineering<sup>i</sup>**

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

**Required Professional Program<sup>ii</sup>**

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<b><u>ELECTR. &amp; COMP. ENGR. (36)</u></b>			
<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-Specific<sup>iii</sup> (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>
<b><u>MATHEMATICS (28)</u></b>			
(Mth 111 College Algebra	___	___	___
(Mth 112 Elementary Functions	___	___	___
Mth 231 <sup>†</sup> Discrete Math	4	___	___
Mth 251* Diff. Calculus	4	___	___
Mth 252* Int. Calculus	4	___	___
Mth 254* Vector Calculus I	4	___	___
Mth 255 <sup>†</sup> Vector Calculus II	4	___	___
Mth 256* Diff. Equations	4	___	___
Mth 306* Matrix & Power Series	4	___	___

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<b><u>PHYSICAL SCIENCE (15)</u></b>			
Ch 201* Gen. Chemistry <sup>iv</sup>	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>
<b><u>COMMUNICATION SKILLS (9)</u></b>			
WR 121* Engl Comp	3	___	___
WR 327 Tech Writing	3	___	___
Comm 111/114*	3	___	___

**Baccalaureate Core<sup>v</sup>**

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

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

	<u>Grade</u>	<u>Term</u>	<u>(Repeat)</u>
<b><u>SYNTHESIS (6)</u></b>			
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, 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 (*not offered recently*)

### 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 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 499/599 Special Topics/Nanotechnology  
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, Settaluri, 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 or (485/585 - spring 08 only)

### 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.)

**<sup>i</sup> Notes on pre-engineering:**

- Courses marked with (\*) must be taken before the term for which admission is granted to the professional engineering program. Students missing a single (\*) 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 C- or better in each course.*
- Note: Admission to the engineering professional program requires a higher PRE core GPA in (\*) courses than that inferred by the C- or better rule. [See College of Engineering Advising Guide.]

**<sup>ii</sup> 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 engineering program courses must be taken for letter grades. Students must earn C- or better in each course.* In addition, a PRO core GPA of 2.25 or better is required for graduation. Grade substitution is not used for PRO core GPA computation.

**<sup>iii</sup> Notes on Specific Tracks**

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

**<sup>iv</sup> 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. (Excess hours of CH 12X are electives.)
- CH 221 (or CH 224H) may be substituted. (Excess hours are restricted electives.) [CH 221 is recommended for students interested in materials and devices, bioengineering, or medical school.]

**<sup>v</sup> 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; special rules for transfer students)

**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.