Specialization Area Courses 2012-2013

ECE undergraduate degrees are organized around a core of required courses and a selection of elective courses from three Specialization Areas: Computer Engineering, Photonics and Nanoengineering, and Systems: control, communication, networks and signal processing. The Computer Engineering area provides a broad background in computer systems engineering, including computer architecture, digital hardware engineering, software engineering, and computer systems performance analysis. The Systems area focuses on wireless communication systems, digital signal processing, image processing and networking. The Photonics and Nanoengineering area encompasses studies of electronic materials, including nanomaterials, semiconductor and optoelectronic devices, lasers and their applications. The specialization electives provide the flexibility to create a focus that crosses traditional areas.

The BSEE requires six specialization courses from at least two areas, (in addition to the Design Lab choice of ELEC 327, 332, or 364), including at least three courses in one area. The BA program requires four courses, including at least two courses in one area, and courses from at least two areas.

The department may add or delete courses from the areas. In addition, ELEC graduate courses in the 500 level series and equivalent courses from other departments may be used to satisfy specialization area requirements with permission. Consult departmental Advisors and the ECE website: www.ece.rice.edu for the latest information.

**Computer Engineering**
ELEC 323† Principles of Parallel Programming
ELEC 342 Electronic Circuits
ELEC 345 Introduction to Computer Vision
ELEC 420† Design and Analysis of Algorithms
ELEC 421† Operating Systems and Concurrent Programs
ELEC 424 High-Speed Embedded Systems Design
ELEC 425 Computer Systems Architecture
ELEC 429† Introduction to Computer Networks
ELEC 446 Mobile Wireless Services Project
COMP 221† Introduction to Computer Systems
COMP 430† Introduction to Database Systems

**Photonics and Nanoengineering**
ELEC 262 Introduction to Waves and Photonics
ELEC 306 Applied Electromagnetics
ELEC 342 Electronic Circuits
ELEC 361 Quantum Mechanics For Engineers
ELEC 462 Optoelectronic Devices
PHYS 302 Intermediate Electrodynamics
PHYS 311 Introduction to Quantum Physics I

**Systems: Communications, Control, Networks and Signal Processing**
ELEC 302 Introduction to Systems
ELEC 306 Applied Electromagnetics
ELEC 345 Introduction to Computer Vision
ELEC 381 Fundamentals of Electrophysiology
ELEC 430 Communication Theory and Systems
ELEC 431 Digital Signal Processing
ELEC 433 Architecture for Wireless Communications
ELEC 434 Digital Signal Processing Lab
ELEC 435 Electromechanical Devices and Systems
ELEC 436 Fundamentals of Control Systems
ELEC 437 Intro to Communication Network
ELEC 438 Wireless Networking for Under-Resourced Urban Communities
ELEC 439 Digital Image Processing
ELEC 446 Mobile Wireless Services Project
ELEC 481 Computational Neuroscience
ELEC 482 Physiological Control Systems
ELEC 485 Fundamentals of Medical Imaging I
ELEC 486 Fundamental of Medical Imaging II

**Note:** ELEC 323/COMP 322, ELEC 420/COMP 482, ELEC 421/COMP 421, ELEC 429/COMP 429, COMP 221 and COMP 430 are courses listed or crosslisted with Computer Science. Additional prerequisites have been added for 2012-2013.

COMP 211 or the sequence of COMP 182 with COMP 215 are recommended in addition for the Computer Engineering Area

**Note:**
- ELEC 301 is a required course for the BSEE degree; however ELEC 301 can count as a specialization course for the BA degree.
- If the Design Laboratory requirement (ELEC 327, 332, or 364) is satisfied with the lab in their chosen Major Specialization Area, then the student takes 3 of 6 courses in their chosen Major Specialization Area. However, if the Design Laboratory requirement is satisfied with the lab in their Minor Area, then it is recommended that the student takes 4 (four) of 6 courses in their chosen Major Specialization Area. It is important to consult a departmental advisor in this situation or if interested in taking a second Design Laboratory course.

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