**Electrical Engineering (EE)**

**MINIMUM 40 CU’S TOTAL**

**Course Planning Guide (Class of 2018 and later)**

### 1. MATHEMATICS AND NATURAL SCIENCE (MINIMUM 10 CU’s)
- MATH 104
- MATH 114
- MATH 240
- ESE 301
- M __________________

(see guidance on back)
- PHYS 140 or PHYS 150 or PHYS 170
- PHYS 151 or PHYS 171
- CHEM 101 or BIOL 101 or BIOL 121
- 0.5 CU Natural Science Lab (PHYS 150/170, BIOL 101/121, CHEM 53 each count 0.5 CU to this requirement)
- M or NS ______________

**LEGEND:**
- M Mathematics
- NS Natural Science
- E Engineering
- SS Social Science
- H Humanities
- TBS Technology in Business & Society
- F Free

See the SEAS UG Student Handbook for approved courses in these categories.

Any required course in any category may be replaced by a higher-level version of that course.

### 2. MAJOR SPECIFIC ENGINEERING (MINIMUM 16 CU’s)
#### 2.1 CORE COURSES
- CIS 110 or ENGR 105
- ESE 111
- ESE 215
- ESE 218
- ESE 224
- Advanced Computing
- CIS __________

(see CIS120, CIS240)

**INTERMEDIATE OR ADVANCED COURSE**
- Any ESE Course
- ESE ______________

**ADVANCED COURSES**

Take any combination of 4 CUs from:
- Circuits and computer engineering ESE 319, 350, 370, 419, 570, 578
- Nanodevices and nanosystems ESE 310, 321, 460, 509, 521, 525, 529
- Information and decision systems ESE 303, 313, 325, 406, 407, 500, 504, 512, 531, 539, 590
- ESE ______________
- ESE ______________
- ESE ______________
- ESE ______________

**DESIGN AND PROJECT COURSES**
- ESE Lab

Select from ESE 319, ESE 350, MEAM 410, BE 470
(separate from courses used above)
- ESE 450
- ESE 451

### 3. PROFESSIONAL ELECTIVES2 (NOMINALLY 4 CU’s)
- E ______________
- M, NS, or E ______________
- M, NS, or E* ______________

**TECHNOLOGY MANAGEMENT ELECTIVE**

One of ESE400, EAS545, EAS595

*Dual-degree or dual-major students with a second major outside Engineering, Mathematics, or Natural Science may use up to three Professional Electives to satisfy requirements for their second major.

**EXPLANATORY NOTES:**
- At most one freshman level E course outside the major may be used as a Professional Elective.
- Students may opt to take one fewer M, NS, or E course in the Professional Elective column for each full course unit in excess of 26 CU's accumulated in the MNS and E columns combined. However, engineering courses must account for at least 18 CU’s of all courses taken.
- Two of the courses in the SSH column must satisfy the depth and writing requirements. See the SEAS UG Student Handbook for details.

### 4. SOCIAL SCIENCE AND HUMANITIES3 (MINIMUM 7 CU’s)
- SS _________
- SS _________
- H _________
- H _________
- SS or H _________
- SS, H, or TBS _________
- EAS203

**Depth Requirement**

**Writing Requirement**

### 5. FREE ELECTIVES (3 CU’s)
- F _________
- F _________
- F _________

**SEMESTER PLANNING**

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Recommended Course Selection by Area of Interest: The advanced course and lab selection is very flexible to allow students to craft a suitable program within the large body-of-knowledge that constitutes modern Electrical Engineering. We recommend students identify a focus area and use this flexibility to gain expertise in their area of interest. Following are recommended sets of courses for students with interests in particular areas.

**Devices:** How do we design, optimize, and manufacture the basic elements from which circuits, sensors, and actuators are constructed? ESE310, ESE321, ESE3xx-devices-lab, ESE521

**Circuits:** How do we engineer desired functionality (storage, signal transformation, sensing, actuation, logic, power) from collections of primitive devices? ESE319, ESE370, ESE350, ESE406, CIS240

**Embedded Systems:** How do we design software and hardware to interface with the physical world and integrate “smarts” into systems and products including vehicles, toys, robots, appliances, and buildings? ESE350, ESE406, CIS120, CIS240 (3), CIS441 (3)

**Communications and Networking:** How do we transmit data between machines (voice and data, wired and wireless, time and space switching)? ESE325, ESE407, ESE501, ESE575, ESE576, MATH312 (1)

**RF Electronics:** How do we engineer circuits, antennas and waveguides for high-frequency communications? ESE310, ESE319, ESE419, ESE578

**Robotics:** How do we design and control autonomous agents that operate in the physical world? ESE210, ESE304, ESE406, ESE350, MATH312 (1), CIS240, MEAM101 (3), MEAM410

**Math selection:** we leave one math and one M/NS selection in column 1 flexible so that students can select the appropriate math courses suitable to their area of interest. Students interested in the information and decision systems area are strongly encourage to take linear algebra (MATH 312, ENM 205, or MATH 370) no later than sophomore year. MATH 370 may be preferable for students with a stronger interest in theory. Students interested in communications or machine learning should also consider analysis (MATH 360). Students interested in computing, embedded systems, and digital circuits should consider discrete math (CIS 160). Students interested in electromagnetics, photonics, analog circuits, and mechanics should consider courses on partial differential equations (MATH 241, MATH425), ordinary differential equations (MATH 420), or complex analysis (MATH 410).