Minimum number of units required for degree: 379 units.

In addition to the Carnegie Institute of Technology general education and freshman year requirements (143 units), the B.S. in Electrical and Computer Engineering requires 15-122 Principles of Imperative Computation (10 units), Physics II (12 units), two math or science electives (18 units), a Probability and Statistics course (9 units), 109 units of Electrical and Computer Engineering coursework, and 2 math co-requisites (21 units). The remaining units needed to reach the 379 required to graduate are Free Electives (57 units).

The Electrical and Computer Engineering coursework is divided into the categories of Core, Area Courses, Coverage, and Capstone Design. The Core consists of five courses (18-100 Introduction to Electrical and Computer Engineering, 18-220 Electronic Devices and Analog Circuits, 18-240 Structure and Design of Digital Systems, 18-213 Introduction to Computer Systems, and 18-290 Signals and Systems). There are also two math co-requisites (18-202 and 21-127) and Physics II that are required co-requisites for the core. These courses provide the fundamental knowledge-base upon which all other electrical and computer engineering courses are built. 18-100 is generally taken during the freshman year, while the remaining courses in the Core are started in the sophomore year. The core courses are ideally completed by the end of the junior year (The department strongly recommends that students not take more than two core courses in the same semester). Although the core courses (and their co-requisites) may be taken in any order, students generally first take the course in their primary area of interest. This gives added flexibility to later course selection in related areas.

Students are also required to complete a seminar course during the fall semester of the sophomore year. This course, 18-200 Emerging Trends in Electrical and Computer Engineering, introduces students to the many areas within ECE and helps them decide which areas are of primary interest to them.

To satisfy the ECE Area Courses Requirement, at least two Area courses must be completed from one of the following five principal areas in ECE (24 units):

- **Device Sciences and Nanofabrication**: Solid State Physics, Semiconductors, Electromagnetic Fields and Waves, Magnetics, Optics, etc.;
- **Signals and Systems**: Digital Signal Processing, Communication Systems, Control Systems, Power Systems, etc.;
- **Circuits**: Analog and Digital Circuits, Integrated Circuit Design, etc.;
- **Hardware Systems**: Logic Design, Computer Architecture, etc.;
- **Software Systems**: Programming, Embedded Systems, Data Structures, Compilers, Networks, Operating Systems, etc.

One additional course from a second Area must be taken (12 units).

The Coverage Requirement states that any additional ECE course or an approved Computer Science course (see the ECE website for the list of approved Computer Science courses) may be taken, totaling at least 12 units.

Finally, all students are required to take a Capstone Design course. In the Capstone Design courses, numbered 18-5XX, students participate in a semester-long design project with teams of other students. Students learn project management skills, make oral presentations, write reports, and discuss the broader social and ethical dimensions of ECE. Current Capstone Design courses are listed on the [ECE Department website](http://example.com).
Device Sciences and Nanofabrication
18-300 Fundamentals of Electromagnetics [18-220]
18-310 Fundamentals of Semiconductor Devices [18-220]
18-401 Electromechanics [18-300]
18-402 Applied Electrodynamics [18-300]
18-419 Semiconductor Device Applications - Optoelectronics and Nanoelectronics [18-310]

Circuits
18-320 Microelectronic Circuits [18-220]
18-415 From Design to the Market for Deep Submicron ICs [18-320]
18-421 Analysis and Design of Analog Circuits [18-290, 18-320]
18-422 Analysis and Design of Digital Circuits [18-240, 18-320]

Signals and Systems
18-370 Fundamentals of Control [18-290]
18-491 Fundamentals of Signal Processing [18-290]
18-496 Introduction to Biomedical Imaging and Image Analysis [18-290]

Area courses for Hardware Systems [w/ pre-reqs]
18-340 Digital Computation [18-240]
18-341 Logic Design Verification [18-240]
18-447 Introduction to Computer Architecture [18-240 and 18-213 and (340 or 341 or 348 or 349 or 320)]

Area courses for Software Systems [w/ pre-reqs]
18-348: Embedded Sys Eng [18-213, 18-240]
18-349: Embedded Real-time Systems [18-213, 18-240]
18-345: Telecomm Networks [18-240, 36-217, 15-122]
15-410: Operating Systems [18-213]
15-411: Compilers [18-213]
15-415: Database Applications [15-210]
15-418: Parallel Comp Arch and Programming [18-213]
15-437: Web Applications [15-214]
15-440: Distributed Systems [18-213]
15-441: Computer Networks [18-213]