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Computer Engineering B.S. Degree Requirements

The Bachelor of Science (B.S.) in Computer Engineering is made up of 125 or 126 credits, depending on the track. The major offers two tracks: (1) Systems Architecture (SA) and (2) Communications (COM). These tracks share twenty-six common courses as detailed below. In addition, students must take two specialized courses for their track, and all Computer Engineering students must complete three technical electives.

I. Required Common Core Courses (88 credits):

Computer Science	**CMSC 201/202H*:** Introduction to Computer Science **CMSC 202/202H:** Computer Science II for Majors **CMSC 203:** Discrete Structures **CMSC 341/341H:** Data Structures **CMSC 411:** Computer Architecture **CMSC 421:** Principles of Operating Systems
Computer Engineering	**CMPE 212*:** Principles of Digital Design **CMPE 306:** Introductory Circuit Theory **CMPE 310:** Systems Design and Programming **CMPE 311:** C Programming and Embedded Systems **CMPE 314:** Principles of Electronic Circuits **CMPE 320:** Probability, Statistics, and Random Processes **CMPE 450:** Capstone I **CMPE 451:** Capstone II
Engineering	**ENES 101:** Introductory Engineering Science
Science	**CHEM 101:** The Chemical World **PHYS 121:** Introductory Physics I **PHYS 122*:** Introductory Physics II
Mathematics	**MATH 151:** Calculus and Analytical Geometry I **MATH 152*:** Calculus and Analytical Geometry II **MATH 221:** Introduction to Linear Algebra **MATH 225:** Introduction to Differential Equations **MATH 251:** Multivariable Calculus
English	**ENGL 100*:** Composition **ENG 393:** Technical Communication
Philosophy	**PHIL 251:** Ethical Issues in Science and Engineering

**These courses must be completed with a 3.0 GPA. CMPE 212 requires a grade of "B" or better.*

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II. Computer Engineering Gateway

Each student who wishes to earn a B. S. in Computer Engineering must meet the following two Gateway requirements:

1) A grade of "B" or better in CMPE 212

2) GPA of at least 3.0 in the following five courses:
   a) CMSC 201
   b) CMPE 212
   c) MATH 152
   d) ENGL 100
   e) PHYS 122

Students must pass the gateway before taking any 300- or 400- level Computer Engineering or Computer Science Course, with the exception of CMSC341. Registration for CMSC341 does not require completion of the Computer Engineering Gateway.

III. Computer Engineering Tracks

Systems Architecture (SA) Track Requirements (7 credits):

In addition to the required common core courses, students in the Systems Architecture Track must complete:

- **CMPE 315:** Principles of VLSI Design
- **CMPE 415:** Programmable Logic Devices

Communications (COM) Track Requirements (6 credits):

In addition to the required common core courses, students in the Communication Engineering Track must complete:

- **CMPE 323:** Signal and Systems Theory
- **CMPE 330:** Electromagnetic Waves and Transmission

IV. Technical Electives (9 credits):

Students in both the SA and COM tracks must complete three technical electives. Two of those three courses must be upper-level Computer Engineering courses (List A), and the final course, if approved by an advisor, may be an upper-level Computer Science course (List B) or a CMPE course (List A). With the approval of the student's faculty advisor, graduate courses in Computer Engineering or Electrical Engineering may be substituted for undergraduate technical electives.

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Computer Engineering Electives (A)	Computer Science Electives (B)
CMPE 315: Principles of VLSI Design	**CMSC 345:** Software Design and Development
CMPE 321: Communications Laboratory	**CMSC 422:** Operating Systems Design
CMPE 323: Signals and Systems	**CMSC 425:** Performance Analysis of Computer Systems
CMPE 330: Electromagnetic Wave and Signal Transmission	**CMSC 431:** Compiler Design Principles
CMPE 415: FPGA Architectures and Applications	**CMSC 435:** Computer Graphics
CMPE 419: Arithmetic Algorithms	**CMSC 441:** Design and Analysis of Algorithms
CMPE 422: Digital Signal Processing	**CMSC 442:** Information and Coding Theory
CMPE 423: Principles of Communication Engineering	**CMSC 443:** Cryptology
CMPE 440: Mixed Signal Design	**CMSC 455:** Numerical Computations
CMPE 447: Analog Integrated Circuit Design	**CMSC 482:** Computer Systems Security
CMPE 491: Special Topics in Computer Engineering	**CMSC 483:** Parallel and Distributed Processing
CMSC 426: Principles of Computer Security	**CMSC 486:** Mobile Radio Communications
CMSC 479: Introduction to Robotics	**ENME 403:** Automatic Controls
CMSC 481: Computer Networks	

V. University General Education Program (GEP) Requirements (22 credits):

Remaining credits are comprised of GEP courses. For more information about GEP courses, see UMBC's Undergraduate Catalog at www.umbc.edu/catalog

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