

# COMPUTER ENGINEERING, B.S.

## REQUIREMENTS

### UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (<http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext>) section of the *Guide*.

- |                   |  |
|-------------------|--|
| General Education | <ul style="list-style-type: none"> <li>• Breadth–Humanities/Literature/Arts: 6 credits</li> <li>• Breadth–Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits</li> <li>• Breadth–Social Studies: 3 credits</li> <li>• Communication Part A &amp; Part B *</li> <li>• Ethnic Studies *</li> <li>• Quantitative Reasoning Part A &amp; Part B *</li> </ul> |
|-------------------|--|

\* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

### SUMMARY OF REQUIREMENTS

The following curriculum applies to students who were admitted to the computer engineering degree program (classification changed to CMPE) in fall 2017 or later.

Code	Title	Credits
	Mathematics	19
	Science	20–21
	Computer Engineering Core	34
	Computer Engineering Advanced Electives	16
	Professional Electives	9
	Communication Skills	6
	Liberal Studies	15
	Free Elective	1
<b>Total Credits</b>		<b>120–121</b>

### MATHEMATICS

Code	Title	Credits
MATH 221	Calculus and Analytic Geometry I	5
or MATH 217	Calculus with Algebra and Trigonometry II	

	or MATH 275	
MATH 222	Calculus and Analytic Geometry 2	4
	or MATH 276	
MATH 234	Calculus--Functions of Several Variables <sup>1</sup>	4
MATH/COMP SCI 240	Introduction to Discrete Mathematics	3
	or MATH/COMP SCI/STAT 475	
	Introduction to Combinatorics	
<i>Probability/Statistics Elective (select one)</i>		3
STAT 311	Introduction to Theory and Methods of Mathematical Statistics I	
MATH/STAT 431	Introduction to the Theory of Probability	
E C E 331	Introduction to Random Signal Analysis and Statistics	

**Total Credits** 19

1

MATH 375 and MATH 376 taken in sequence will fulfill the requirement for MATH 234.

### SCIENCE

Code	Title	Credits
COMP SCI 300	Programming II	3
COMP SCI 400	Programming III	3
PHYSICS 201	General Physics <sup>1</sup>	5
	or PHYSICS 207	General Physics
	or PHYSICS 247	A Modern Introduction to Physics
PHYSICS 202	General Physics	5
	or PHYSICS 208	General Physics
	or PHYSICS 248	A Modern Introduction to Physics
Select one of the following:		4–5
CHEM 109	Advanced General Chemistry	
CHEM 103	General Chemistry I	
CHEM 104	General Chemistry II	

**Total Credits** 20–21

1

Students may also fulfill this requirement by taking E M A 201 Statics and E M A 202 Dynamics or E M A 201 Statics and M E 240 Dynamics.

### COMPUTER ENGINEERING CORE

Code	Title	Credits
E C E 203	Signals, Information, and Computation	3
E C E 210	Introductory Experience in Electrical Engineering	2
E C E 219	Analytical Methods for Electromagnetics Engineering	2
E C E 220	Electrodynamics I	3
E C E 230	Circuit Analysis	4
E C E/COMP SCI 252	Introduction to Computer Engineering	3
E C E 270	Circuits Laboratory I	1

E C E 315	Introductory Microprocessor Laboratory	1
E C E 340	Electronic Circuits I	3
E C E/ COMP SCI 352	Digital System Fundamentals	3
E C E 353	Introduction to Microprocessor Systems	3
E C E/ COMP SCI 354	Machine Organization and Programming	3
E C E 551	Digital System Design and Synthesis	3
<b>Total Credits</b>		<b>34</b>

## COMPUTER ENGINEERING ADVANCED ELECTIVES

Code	Title	Credits
<i>Electronic Circuits Elective</i>		3
E C E 342	Electronic Circuits II	
E C E 447	Applied Communications Systems	
E C E 541	Analog MOS Integrated Circuit Design	
E C E 542	Introduction to Microelectromechanical Systems	
E C E 548	Integrated Circuit Design	
E C E 555	Digital Circuits and Components	
<i>Systems Software Elective</i>		3-4
E C E/ COMP SCI 506	Software Engineering	
COMP SCI 536	Introduction to Programming Languages and Compilers	
COMP SCI 537	Introduction to Operating Systems	
COMP SCI 564	Database Management Systems: Design and Implementation	
<i>Capstone Design</i>		4
E C E 453	Embedded Microprocessor System Design	
E C E 454	Mobile Computing Laboratory <sup>1</sup>	
E C E 554	Digital Engineering Laboratory	
<i>CMPE Elective I</i>		3
E C E 537	Communication Networks	
E C E/ COMP SCI 552	Introduction to Computer Architecture	
E C E 553	Testing and Testable Design of Digital Systems	
E C E 556	Design Automation of Digital Systems	
<i>CMPE Elective II</i>		3
Select from E C E 399 - E C E 699		
Select from COMP SCI 400 - COMP SCI 699 <sup>1</sup>		
<b>Total Credits</b>		<b>16-17</b>

1

E C E 454 Mobile Computing Laboratory and COMP SCI 407 Foundations of Mobile Systems and Applications cannot both be taken for degree credit.

## PROFESSIONAL ELECTIVES

Code	Title	Credits
<b>Professional Electives</b>		<b>9</b>

*Courses to be taken in an area of professional interest. The following courses are acceptable as professional electives if the courses are not used to meet any other degree requirements.*

E C E 1	Cooperative Education Program (One co-op credit can count towards professional electives.)	
E C E 204	Data Science & Engineering	
E C E/ PHYSICS 235	Introduction to Solid State Electronics	
E C E 320	Electrodynamics II	
E C E 330	Signals and Systems	
E C E 331	Introduction to Random Signal Analysis and Statistics	
E C E 332	Feedback Control Systems	
E C E 334	State Space Systems Analysis	
E C E 335	Microelectronic Devices	
E C E 342	Electronic Circuits II (may be used if not already used as an Electronic Circuits Advanced Elective)	
E C E 355	Electromechanical Energy Conversion	
E C E 356	Electric Power Processing for Alternative Energy Systems	
E C E courses numbered 399 and higher		
COMP SCI courses numbered 400 and higher		
MATH 319	Techniques in Ordinary Differential Equations	
MATH 320	Linear Algebra and Differential Equations <sup>1</sup>	
MATH 321	Applied Mathematical Analysis	
MATH 322	Applied Mathematical Analysis	
MATH 340	Elementary Matrix and Linear Algebra <sup>1</sup>	
MATH 341	Linear Algebra	
MATH courses numbered 400 and higher		
STAT courses numbered 400 and higher		
Any biological sciences course that is designated as intermediate or advanced level		
Any physical science course that is designated as intermediate or advanced level		
Any natural science course that is designated as advanced level, except that math, computer sciences, and statistics courses must follow the above criteria		
Engineering courses numbered 300 and higher that are not E C E or cross-listed with E C E		
Up to six credits of Professional Electives can be taken from School of Business classes numbered 300 and higher.		
DS 501	Special Topics (Wearable Technologies)	

DANCE 560 Current Topics in Dance: Workshop  
(Making Digital Lighting Controls)

1

Students may only earn degree credit for MATH 320 Linear Algebra and Differential Equations or MATH 340 Elementary Matrix and Linear Algebra, not both.

## COMMUNICATION SKILLS

Code	Title	Credits
ENGL 100	Introduction to College Composition	3
or LSC 100	Science and Storytelling	
or COM ARTS 100	Introduction to Speech Composition	
or COM ARTS 181	Elements of Speech-Honors Course	
or ESL 118	Academic Writing II	
INTEREGR 397	Engineering Communication	3
<b>Total Credits</b>		<b>6</b>

## LIBERAL STUDIES ELECTIVES

Code	Title	Credits
<b>College of Engineering Liberal Studies Requirements</b>		
Complete requirements ( <a href="http://guide.wisc.edu/undergraduate/engineering/#requirements">http://guide.wisc.edu/undergraduate/engineering/#requirements</a> ) <sup>1</sup>		15
<b>Total Credits</b>		<b>15</b>

1

All liberal studies credits must be identified with the letter H, S, L, or Z. Language courses are acceptable without the letter and are considered humanities. **Note:** See an E C E advisor and/or the EE Curriculum Guide (<https://www.engr.wisc.edu/department/electrical-computer-engineering/academics/bachelor-of-science-computer-engineering/>) for additional information.

## HONORS IN UNDERGRADUATE RESEARCH PROGRAM

Qualified undergraduates may earn an Honors in Research designation on their transcript and diploma by completing 8 credits of undergraduate honors research, including a senior thesis. Further information is available in the department office.

## NAMED OPTION

View as listView as grid

- **COMPUTER ENGINEERING: MACHINE LEARNING AND DATA SCIENCE, B.S. ([HTTP://GUIDE.WISC.EDU/UNDERGRADUATE/ENGINEERING/ELECTRICAL-COMPUTER-ENGINEERING/COMPUTER-ENGINEERING-BS/COMPUTER-ENGINEERING-MACHINE-LEARNING-DATA-SCIENCE-BS/](http://guide.wisc.edu/undergraduate/engineering/electrical-computer-engineering/computer-engineering-bs/computer-engineering-machine-learning-data-science-bs/))**

## TOTAL DEGREE CREDITS: 120

## UNIVERSITY DEGREE REQUIREMENTS

**Total Degree** To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

**Residency** Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

**Quality of Work** Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.