

**University of Wisconsin – Milwaukee**  
**College of Engineering and Applied Science**  
**COMPUTER ENGINEERING CURRICULUM**

The typical number of credits required to complete the Bachelor of Science in Engineering with a major in Computer Engineering is 126 credits. Students who need background preparation courses may need additional credits. See information below regarding placement examinations.

<b>Engineering Core Courses (12-13 credits)</b>		<b>Credits</b>	<b>Prerequisite</b>
CompSci 250	Introductory Computer Programming	3	Math 116 or 211
EAS 200	Professional Seminar	1	None
ElecEng 301	Electrical Circuits I	3	Physic 210(C)
Ind Eng 367	Intro Statistics for Physical Sciences & Engineering	3	B- or better Math 211 or 213; C or better Math 221 or 231
MechEng 101	Computational Tools for Engineers	2	Math 221(C) or 231(C)
<b>or</b>			
CompSci 240	Introduction to Engineering Programming	3	Math Placement or Math 116

<b>Computer Engineering Major (54 credits)</b>			
CompSci 251	Intermediate Computer Programming	3	CompSci 250*, Math Placement or Math 116 or 211
CompSci 317	Discrete Information Structures	3	CompSci 250*, Math 221*, 226* or 231*
CompSci 337	Systems Programming	3	CompSci 251*
CompSci 351	Data Structures & Algorithms	3	CompSci 251*, Math Placement or Math 116 or 211
CompSci 361	Introduction to Software Engineering	3	CompSci 351*, GER English
CompSci 395	Social, Professional & Ethical Issues	3	Soph St
CompSci 458	Computer Architecture	3	Jr St, CompSci 315 or ElecEng 367, 354
CompSci 469	Introduction to Computer Security	3	Jr St, CompSci 251*, 317*
CompSci 520	Computer Networks	3	Jr St, CompSci 315 or 458 or ElecEng 367
CompSci 535	Algorithm Design & Analysis	3	Jr St, CompSci 317*, 351*
CompSci 537	Introduction to Operating Systems	3	Jr St, CompSci 337, CompSci 458 or ElecEng 458
ElecEng 305	Electrical Circuits II	4	ElecEng 234*, 301
ElecEng 310	Signals & Systems	3	ElecEng 305(C)
ElecEng 330	Electronics I	4	ElecEng 305(C)
ElecEng 354	Digital Logic	3	CompSci 240 or 250
ElecEng 367	Introduction to Microprocessors	4	CompSci 240 or 250, ElecEng 354*
ElecEng 457	Digital Logic Laboratory	3	Jr St, ElecEng 330, 354

<b>Mathematics (14 - 16 credits)</b>		(16 credits typical: Math 231,232,233, ElecEng 234)	
One of the following Calculus sequences must be completed:			
Math 231-232-233		12	Math placement score, or previous course with at least "C" grade
Or Math 221-222 (Honors)		10	
And ElecEng 234	Analytical Methods in Engineering	4	Math 232*

<b>Biology or Chemistry Requirement (4 - 5 credits)</b>	
One of the following courses must be completed:	
Bio Sci 150 (4cr), Bio Sci 202 (4cr), Chem 102 (5cr) or Chem 105 (5cr)	4-5

<b>Physics (8 credits)</b>		
Physics 209	Physics I	4 Math 232(C)
Physics 210	Physics II	4 Math 233(C)

<b>General Education Requirements</b>			
<i>Distribution Requirements (15 credits)</i>			
<b>Art</b>		3	
<b>Humanities</b>		3	
<b>Social Science</b>		3	
<b>Commun 105</b>	Business & Professional Communication	3	
<b>English 310</b>	Writing, Speaking & Technoscience in the 21st Century	3	English Competency

**Cultural Diversity** - One of the arts, humanities, or social science courses selected must also meet the UWM cultural diversity requirement.

**Free Electives** 0-3

**Competency Requirements**

**English Composition (0-6 credits)**

The English Composition requirement is satisfied by:

- Earning a satisfactory score on the English placement test or
- Earning a grade of C or higher in English 102 or
- Transferring with a grade of C or better in a course (3 credits or more) equivalent to English 102 or higher level expository writing course

**Foreign Language (0-8 credits)** (for new freshman starting fall 1999)

The foreign language requirement can be completed with one of these options:

- Two years of a single foreign language in high school
- Two semesters of a single foreign language in college
- Demonstrate ability by examination

**\*C or better in prerequisite** (C) Concurrent Enrollment in Designated Course

**Admission to Major Requirements** 1. Complete Math 231 (or 221) with a C or higher 2. Complete CompSci 251 with a minimum C grade. 3. Complete the English composition requirement (OWCA). 4. Obtain a minimum GPA as set by the department. A 3.00 GPA guarantees admission to any CEAS major. Courses may be repeated only once. No more than two courses may be repeated.

**The program may impose major status as a prerequisite for courses number 300 or above.**

**Placement Examinations:** Students without previous college level credits in Math, Chemistry or English may be required to take placement exams. The results of these tests determine the appropriate course in which to register. Background prerequisite courses may be required in addition to the courses listed above.

## Technical Electives – Computer Engineering Major

The Computer Engineering program requires a total of 16 credits of technical electives, chosen as follows.

### Group A Technical Elective: Select 9 to 12 credits from the following list

All Electrical Engineering and Computer Science courses numbered 300-699 that are not explicitly listed as Engineering Core, Computer Engineering Major, Group B Technical Elective, or Group C Technical Electives

		<u>Credits</u>	<u>Prerequisites</u>
CompSci 315	Intro to Comp Organization & Assembly Language Programming	3	CompSci 250, Math 116 or 211
CompSci 417	Introduction to the Theory of Computation	3	Jr St, CompSci 317*, Math 221 or 232
CompSci 422	Introduction to Artificial Intelligence	3	Jr St, CompSci 317*, 351*
CompSci 423	Introduction to Natural Language Processing	3	Jr St, CompSci 351*
CompSci 425	Introduction to Data Mining	3	Jr St, CompSci 251, Math 221 or 232
CompSci 431	Programming Languages Concepts	3	Jr St, CompSci 351*
CompSci 438	Software Engineering Lab	1-3	Jr St, CompSci 251*
CompSci 444	Intro to Text Retrieval & Its Applications in Biomedicine	3	Jr St, CompSci 351 or HCA 442
CompSci 459	Fundamentals of Computer Graphics	3	Jr St, CompSci 251, Math 232
CompSci 511	Symbolic Logic	3	Jr St, Phil 212 or 6cr 300 math
CompSci 530	Computer Networks Laboratory	3	Jr St, CompSci 520
CompSci 536	Software Engineering	3	Jr St, CompSci 251*
CompSci 552	Advanced Object Oriented Programming	3	Jr St, CompSci 351*, 361*
CompSci 557	Introduction to Database Systems	3	Jr St, CompSci 251, 315
CompSci 654	Introduction to Compilers	4	Jr St, CompSci 431, 655(C)
CompSci 655	Compiler Implementation Laboratory	3	Jr St, CompSci 431, 654(C) or 754(C)
CompSci 657	Topics in Computer Science	1-4	Variable
CompSci 699	Independent Study	1-3	Variable
ElecEng 335	Electronics II	4	ElecEng 310 (C), 330
ElecEng 361	Electromagnetic Fields	3	ElecEng 234, Math 233*, Physics 210
ElecEng 362	Electromechanical Energy Conversion	3	ElecEng 305, 361
ElecEng 410	Principles of Discrete Systems & Digital Signal Processing	3	Jr St, ElecEng 310
ElecEng 420	Random Signals & Systems	3	Jr St, ElecEng 310
ElecEng 421	Communication Systems	3	Jr St, ElecEng 335(C)
ElecEng 429	Wireless Communication Systems	3	Jr St, ElecEng 234
ElecEng 436	Introduction of Medical Instrumentation	3	Jr St, ElecEng 305
ElecEng 437	Introduction to Biomedical Imaging	3	Sr St, ElecEng 310
ElecEng 438	Bioanalytics & Biomedical Diagnostics	3	Sr St, ElecEng 310, 330
ElecEng 451	Introduction to VLSI Design	3	Jr St, ElecEng 330, 354
ElecEng 461	Microwave Engineering	3	Jr St, ElecEng 361
ElecEng 462	Antenna Theory	3	Jr St, ElecEng 361
ElecEng 464	Fundamentals of Photonics	3	Jr St, ElecEng 361
ElecEng 465	Broadband Optical networks	3	Jr St, ElecEng 305, 361
ElecEng 474	Introduction to Control Systems	4	Jr St, Civ Eng 202, CompSci 240, ElecEng 310
ElecEng 482	Introduction to Nanoelectronics	3	Jr St, ElecEng 330(C), 361(C)
ElecEng 490	Topics in Electrical Engineering	1-3	Jr St
ElecEng 537	Fundamentals of Neuroimaging Technology	3	Sr St, ElecEng 437
ElecEng 539	Introduction to Magnetic Resonance Imaging	3	Jr St, ElecEng 310, 361
ElecEng 541	Integrated Circuits & Systems	3	Jr St, ElecEng 330
ElecEng 561	Microwave Solid State Circuit Design	3	Sr St, ElecEng 330
ElecEng 562	Telecommunication Circuits	3	Sr St, ElecEng 330
ElecEng 563	Compound Semiconductor Devices & Circuits	3	Sr St, ElecEng 335
ElecEng 565	Optical Communication	3	Sr St, ElecEng 330, 361 or 465
ElecEng 572	Power Electronics	3	Sr St, ElecEng 335(C)
ElecEng 574	Intermediate Control Systems	3	Sr St, ElecEng 474 or MechEng 474
ElecEng 575	Analysis of Electric Machines & Motor Drives	3	Jr St, ElecEng 330, 362
ElecEng 588	Fundamentals of Nanotechnology	3	Jr St, ElecEng 361
ElecEng 699	Independent Study	1-3	Variable
Ind Eng 475	Simulation Methodology	3	CompSci 201(C), Ind Eng 467
Ind Eng 572	Reliability Engineering	3	Jr St, Ind Eng 467

### Group B Technical Elective: Choose 4 credits from the following list

CompSci 595	Capstone Design Project	4	Sr St, CompSci 361, 458, 535, 537
ElecEng 595	Capstone Design Project	4	Sr St, ElecEng 335, 367

### Group C Technical Electives: Select 0 to 3 credits from the following list

Bio Sci 150	Foundations of Biology I	4	Chem 100 or 102
Bio Sci 152	Foundations of Biology II	4	C- or better in Bio Sci 150
Bus Adm 292	Intro to Entrepreneurship & Small Business Foundation	3	Soph St
Bus Adm 447	Entrepreneurship	3	Jr St, Bus Adm 350
CompSci 481	Server-Side Internet Programming	3	CompSci 113(C), InfoSt 240(C), or Art 324(C)
CompSci 482	Rich Internet Applications	3	CompSci 361 or 481
CompSci 581	Web Languages & Standards	3	Jr St, CompSci 417, 431
CompSci 658	Topics in Applied Computing	3	Variable
EAS 001 Engineering Co-Op Work Period		3 <sup>1</sup>	Prior Cons Co-Op Dir
EAS 497 Study Abroad		1-3	Acceptance to Study Abroad Program
ElecEng 471	Electrical Power Systems	3	Jr St, ElecEng 362(C)
ElecEng 472	Intro to Wind Energy	3	Jr St
English 206	Technical Writing	3	GER English
Ind Eng 360	Engineering Economic Analysis	3	Jr St
MatlEng 201	Engineering Materials	4	Chem 102 or 105
MatlEng 481	Electronic Materials	3	Jr St, MatlEng 201
MechEng 301	Basic Engineering Thermodynamics	3	Math 233, Physics 209
MechEng 321	Basic Heat Transfer	4	Jr St, MechEng 301
MechEng 542	Introduction to Technology Entrepreneurship	3	Jr St, Admission to Major
MechEng 543	Introduction to Technology Management & Innovation	3	Jr St, Admission to Major

<sup>1</sup>Students who earn 3 or more credits of Co-Op may use 3 of those credits as approved technical electives.

\*C or better in prerequisite

(C) Concurrent Enrollment in Designated Course