

MILWAUKEE SCHOOL OF ENGINEERING

COMPUTER ENGINEERING

What is Computer Engineering?

As the name implies, Computer Engineering is the engineering discipline that deals with the design and application of computer systems. These computer systems range in size from tiny embedded processors to massive database and network servers. The desktop personal computer is a familiar example, but computer systems are also found in consumer appliances, industrial equipment, medical devices, cellular phones, automobiles, avionics, financial trading systems and even “smart” credit cards.

Computer Engineers have a broad technical background, covering both hardware (equipment) and software (programs). These two aspects of computer systems are inseparable: software cannot operate without hardware; without software, computer hardware can perform no useful function. In system design, it is often necessary to assign functions to hardware and software components, based on cost and performance criteria. When things go wrong, the origin of a problem may be in hardware, software or some complex interaction between the two. The Computer Engineer, with knowledge and experience in both hardware and software, is in a unique position to contribute to the design, implementation, testing, maintenance and application of computer-based systems.

What do Computer Engineers do?

Computer Engineers are the people who put computers in things. “Computers”, you may be thinking, can they play World of Warcraft? No, they are not that kind of computer. But, think about what has happened in audio electronics, video recording, autos, cell phones; all of these have at least one built-in computer. It is not a conventional notebook or desktop computer, but there is a processor, memory, inputs and outputs.

In audio electronics, you have devices like the iPod, which connects to a conventional computer to download MP3 encoded music, allows you to control what you are listening to, and may play videos...it is an embedded computer. In video recorders, you have the TiVo, ReplayTV, and the set-top satellite or cable tuners and recorders. They all have an embedded computer. A modern car has upwards of 70 processors, controlling everything from the antilock brakes, to the traction control, to the satellite radio receiver, and so on. Your cell phone may have Bluetooth for a headset and to communicate with your PC to synchronize your address book.

All of these have a computer built in, and all were designed by Computer Engineers. Computer Engineers deal with both the hardware of the system, and the software. They work in a variety of areas and companies. MSOE Computer Engineering graduates are employed at many different companies, ranging from Caterpillar (think big earth movers), Hewlett-Packard, Engage Networks, Motorola, Plexus, GE Medical Systems, and Expedia (this is a partial list).

The Bachelor of Science degree program in Computer Engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

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Program director

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MSOE Web pages

MSOE home page: <http://www.msoe.edu/>
MSOE EECS department home page: <http://www.msoe.edu/eecs/>
MSOE Computer Engineering home page: <http://www.msoe.edu/eecs/ce/>

Curriculum note

When reading the curriculum track listing, you will see numbers like “3-3-4” as in the following example:

CE-2800 Embedded Systems Software I 3-3-4

This means that this course has three (3) hours of lecture per week, three (3) hours of lab per week, and carries a total of four (4) hours of academic credit. Thus, any course that has a “middle” number that is not zero has a lab.

BACHELOR OF SCIENCE
COMPUTER ENGINEERING
 Model Full-Time Track

		----- QUARTER -----		
		1	2	3
FRESHMAN YEAR				
EN-131	Composition	3-0-3		
SE-1010	Software Development I	2-2-3		
MA-136	Calculus for Engineers I	4-0-4		
HU-100	Contemporary Issues in the Humanities	3-0-3		
OR-100	Freshman Orientation ¹	1-0-0		
MS-221	Microeconomics	3-0-3		
CE-1900	Digital Logic I: Combinational Systems		2-2-3	
SE-1020	Software Development II		2-2-3	
EN-132	Technical Composition		3-0-3	
MA-137	Calculus for Engineers II		4-0-4	
PH-110	Physics of Mechanics		3-2-4	
CE-1910	Digital Logic II: Sequential Systems			2-2-3
CS-2851	Data Structures			2-2-3
EE-2050	Linear Circuits – Steady State I			3-2-4
EN-241	Speech			2-2-3
MA-231	Calculus for Engineers III			4-0-4
	TOTALS	16-2-16	14-6-17	13-8-17
		4	5	6
SOPHOMORE YEAR				
CE-2800	Embedded Systems Software I	3-3-4		
EE-2060	Linear Circuits – Steady State II	3-3-4		
PH-230	Physics of Electricity & Magnetism	3-3-4		
MA-235	Differential Equations for Engineers	4-0-4		
CE-2810	Embedded System Software II		2-2-3	
EE-2070	Linear Circuits - Transients		3-0-3	
EE-210	Electronic Devices and Computer Interfacing		3-3-4	
MA-230	Discrete Mathematics		4-0-4	
OR-2000	Leadership and Teaming		0-2-1	
CE-2930	Computer Architecture			3-2-4
SE-2890	Software Engineering Practices			2-2-3
PH-220	Physics of Heat, Wave Motion & Optics			3-3-4
MA-232	Calculus for Engineers IV			3-0-3
	Elective (HU/SS) ²			3-0-3
	TOTALS	13-9-16	12-7-15	14-7-17

		----- QUARTER -----		
		7	8	9
JUNIOR YEAR				
CS-3841	Design of Operating Systems	3-2-4		
EE-3050	Dynamic Systems	3-0-3		
MA-383	Linear Algebra	3-0-3		
SS-461	Organizational Psychology	3-0-3		
PH-250	Modern Physics	3-3-4		
CS-3212	Computer Graphics		2-3-3	
EE-3720	Control Systems		3-3-4	
MA-262	Probability and Statistics		3-0-3	
OR-402	Professional Guidance		1-0-1	
PH-360	Physics of Electronics		3-3-4	
OR-3000	Applied Servant Leadership		0-2-1	
CE-3910	Embedded Systems Design I			3-2-4
EE-3220	Digital Signal Processing			3-2-4
ME-354	Thermodynamics & Heat Transfer			3-0-3
HU-432	Ethics for Professional Managers and Engineers			3-0-3
IE-423	Engineering Economy			3-0-3
	TOTALS	15-5-17	12-11-16	15-4-17
SENIOR YEAR				
		10	11	12
CE-4000	Senior Design Project I	2-2-3		
CS-409	Ethical and Professional Issues in Computing	1-0-1		
CE-4920	Embedded Systems Design II	2-2-3		
	Elective (Program) ²	3-0-3		
	Elective (HU/SS) ²	3-0-3		
	Elective (Free) ²	3-0-3		
CE-4010	Senior Design Project II		2-2-3	
CE-4950	Networking I		2-2-3	
	Elective (Program) ²		3-0-3	
	Elective (HU/SS) ²		3-0-3	
	Elective (HU/SS) ²		3-0-3	
CE-4020	Senior Design Project III			2-2-3
CE-4960	Networking II			2-2-3
	Elective (Program) ²			3-0-3
	Elective (Math/Science) ²			3-0-3
	Elective (HU/SS) ²			3-0-3
	TOTALS	14-4-16	13-4-15	13-4-15

¹ Transfer students who have completed 36 quarter or 24 semester credits will be waived from OR-100, but will be required to complete OR-301 Transfer Student Orientation.

² There are 30 credits of elective subjects in the Computer Engineering program which must be taken as follows:

- 15 credits of humanities and social sciences: 6 credits of humanities (HU), 6 credits of social science (SS), and 3 credits of humanities or social science
- 9 credits of approved program electives
- 3 credits of approved math/science elective
- 3 credits of an upper-division course from any area

Engineering technology courses may not be used to satisfy requirements of the computer engineering curriculum.

Students enrolled in Air Force ROTC must complete AF-100, AF-200, AF-202, AF-300, AF-301, AF-302, AF-400, AF-401, and AF-402. Upon completion of these courses credit will be given for SS-455 (a social science elective) and the free elective.

Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone: (410) 347-7700)