

## Computer Engineering (CpE) Technical Elective course suggestions

Course number	Course Title	Credits	Requirements
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### Chip Design and Electronics:

EE 2230	Printed Circuit Seminar Series	3	CH 1150 and CH 1151; EE 2231(C)
EE 2231	Printed Circuit Fabrication	1	EE 2230(C)
EE 4271	VLSI Design	4	EE 2174 and EE 3131
EE 4231	Physical Electronics	3	EE 3131
EE 4232	Electronic Applications	3	EE 3131
EE 4252	Digital Signal Processing and It's Applications	4	EE 3160
EE 4240	Introduction to MEMS	4	SR standing
EE 4227	Power Electronics (lab EE 4228 optional)	3	EE3120 and EE3131
EE 4228	Power Electronics Lab	1	EE4227 co-req

### Artificial Intelligence:

CS 3311	Formal Models	3	CS 2311 or MA 3210
CS 4811	Artificial Intelligence	3	CS 2321 and CS 3311
CS 5811	Advanced Artificial Intelligence	3	CS 4811
EE5821/CS5821	Computational Intelligence – Theory and application	3	Instructor permission; Level Waiver
EE5841/CS5841	Machine Learning	3	SR; Instructor permission

### Computer Networks:

EE4723/CS4723	Network Security	3	EE 4272 or CS 4461 or SAT 4812
EE 4370	IoT Application and Design	3	EE 4272 and SR standing
CS 5751	Dependable and Secure CPS-IoT	3	CS 2311 and (JR or SR) standing
MA 3202	Introduction to Coding Theory	3	MA 2320 or MA 2321 or MA 2330

### Cyber Security:

CS 4471	Computer Security	3	CS 3411 or CS 4411
EE4723/CS4723	Network Security	3	EE 4272 or CS 4461 or SAT 4812
MA 3203	Introduction to Cryptography	3	MA 2320 or MA 2321 or MA 2330
CS 4710	Model-driven Software Development	3	CS 3311 and CS 3141(C)
CS 4711	Software Processes and Management	3	CS 3141

### Robotics, Embedded Systems and Control:

EE 3280	Robot Operating Systems	3	SAT 2711 and EE 2180
EE 3261	Control Systems	3	EE 3160
EE 4262	Digital and Non-linear Control	3	EE 3261
EE 4737	Embedded Systems Interfacing	4	C programming and (EE3173 or EE3171)
EE 4219	Electric Machinery and Drives (EE 4220 is optional lab, 1 cr.)	3	EE 3120 and (EE2112 or EE3010)
EE 4235	Sensing and Processing in Robotics	3	EE 2180 and ENG 1101; JR or SR standing

### Computer Science:

CS 3331	Concurrent Programming	3	CS 1142 and CS 2321 and (CS 2311 or MA3210)
CS 3311	Formal Models of Computation	3	CS 2311 or MA 3210
CS 4411	Operating Systems	3	CS 3331 and (CS 3421 or EE 3172)
CS 3425	Intro to Database Systems	3	CS 2321 and (CS 2311 or MA 3210)
CS 4121	Programming Languages	3	CS 2321 and CS 3311 and (CS 3421 or EE 3172)
CS 4130	Compiler Design and Optimization	3	CS 4121
CS 4821	Data Mining	3	(CS 3425 or MIS 3100) and (MA 2321 or MA2320 or MA2330) and (MA 2710 or MA 2720 or MA 3710)
EE 5300	Math and Computational Models in Engineering	3	SR Standing

### Game Development:

CS 3141	Team Software Project	3	CS 2321 and (CS 2311 or MA 3210)
CS 4760	User Interface & Design Implementation	3	CS 3141
CS 4611	Computer Graphics	3	CS 1142 & CS 2321 & (MA 2330 or MA 2320 or MA 2321)
CS 3425	Introduction to Database Systems	3	CS 2321 and (CS 2311 or MA 3210)
CS 4425	Database Management System Design	3	CS 3425

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### Software Application Development:

CS 3141	Team Software Project	3	CS 2321 and (CS 2311 or MA 3210)
CS 3311	Formal Models	3	CS 2311 or MA 3210
CS 3712	Software Quality Assurance	3	CS 3141
CS 4121	Programming Languages	3	CS 2321 and CS 3311 and (CS 3421 or EE3172)
CS 4711	Software Processes and Management	3	CS 3141
CS 4710	Model-Driven Software Development	3	CS 3311 and CS 3141(C)
CS 3425	Introduction to Database Systems	3	CS 2321 and (CS 2311 or MA 3210)
CS 4425	Database Management System Design	3	CS 3425
CS 3331	Concurrent Programming	3	CS 1142 and CS 2321 and (CS 2311 or MA 3210)
CS 4411	Operating Systems	3	CS 3331 and (CS 3421 or EE 3172)

### Electric Power and Energy Systems:

EE 4221	Power System Analysis 1	3	EE 3120 and (EE 2112 or EE 3010)
EE 4222	Power System Analysis 2	3	EE 4221
EE 4226	Power Engineering Laboratory	1	EE 4221
EE 4219	Introduction to Electric Machinery and Drives	3	EE 2112 or EE 3010
EE 4220	Introduction to Electric Machinery and Drives Laboratory	1	EE 4219 (C)
EE 4227	Power Electronics	3	EE 3120 and EE 3131
EE 4228	Power Electronics Lab	1	EE 4227 (C)
EE 5223	Power System Protection	3	EE 4221 and EE 4222(C)
EE 5224	Power System Protection Lab	1	EE 5223 (C)
EE 5250	Distribution Engineering	3	EE 4221

### Communication:

EE 3180	Introduction to Probability and Random Signal Analysis	3	EE 3160
EE 4250	Modern Communication Systems	3	EE 3180 and EE 3131
EE 4252	Digital Signal Processing and It's Applications	4	EE 3160
EE 4253	Real Time Signal Processing	3	EE 4252
EE 5365	In-Vehicle Communication Networks	3	EE 4250
EE 5527	Digital Communications	3	EE 4250

### Electro-physics and Optics:

EE 3140	Electromagnetics	3	PH 2200 and MA 3160 and (EE 2112 or EE 3010)
EE 3190	Optical Sensing and Imaging	3	JR or SR; MA 3520 or MA 3521 or MA 3530 or MA 3560
EE 3290	Photonic Material, Devices and Applications	4	JR or SR; EE 3140 or PH 2400 or EE 2190
EE 4490	Laser Systems and Applications	4	EE 3140
EE 4231	Physical Electronics	3	EE 3131
EE 4232	Electronic Applications	3	EE 3131
EE 4411	Engineering Electromagnetics	3	EE 3140

### Notes:

- CpE technical electives give the student more in-depth knowledge and skills in a familiar area, or in a new topic.
- Many elective courses are offered once per academic year, either in fall or spring. Some are offered on-demand or in alternating years.
- Special Topics (EE 4800) courses required approval from the ECE Department to be used in technical electives.
- Project-work, independent study and research/team credits may not count in technical electives, however approval may be sought from the ECE Department. (Advisor – refer to the “Appendix B” form.)