

APPROVED TECHNICAL ELECTIVES FOR ELECTRICAL ENGINEERS

Nineteen-Twenty (19-20) semester credit hours of Technical Electives are required. You need 20 credits if you CORE Electives total 6 credits (EE 3210 & EE 3320). **Courses not on these lists may be counted as Technical Electives only if they are approved by the Curriculum Committee.** A written request must be submitted and approved **before** the course is taken. **NO Graduate or Undergraduate Seminars** are allowed for Technical Elective credit. Graduate Special Topics courses require ECpE Curriculum Committee review.

- Twelve (12 or 13) credits of electives must be from the lists of EE/CprE electives below, **including one approved sequence.**
- The remaining seven (7) credits required can be chosen from the lists of EE/CprE or Non-EE/CprE technical electives.

IMPORTANT NOTATIONS (Please Read):

1. If you take both EE 3240 & EE 3210 or EE 3300 & EE 3320, 1 will count as a core elective and one will count as a tech elective. Your Core Elective will be fulfilled first.
2. * Course is cross-listed (same course). Can only apply one towards graduation EE, CprE, SE, ComS, BME, ME, etc.
3. Math 4890 & ME 4840 are not allowed as EE or Non-EE Technical Electives - They can be used as a general education course.
4. ENGR/EE/CprE 4670, EE 4420 & EE 4480 **cannot** be used to fulfill any elective requirements.
5. EE 3510 and EE 3880 may be used to fulfill International Perspective requirements - You must choose if you want the course applied to either a general education OR technical elective requirement but not both
6. Only one course of the following sets of courses may be applied as a technical elective: either MATE 2730 or MATE 3920; either COMS 2070 or COMS 2270; either COMS 2080 or COMS 2280.
7. COMS 2270 may be used either to fulfill the EE 2805 course requirement OR applied as tech elective credit, but not both.
8. ENVS 3240 (cross-listed with ENSCI, GEOL, MTEOR) -You must choose if you want the course applied to either a general education OR technical elective requirement but not both
9. A maximum of 2 credits of EE/CprE/SE 4900, Independent Study can be applied towards technical electives

LIST OF APPROVED SEQUENCES ****Must have one approved sequence to graduate**

<u>Analog/Digital Electronics (VLSI)</u>		<u>Electromagnetic, Fields, Antennas & Propagation (select 2)</u>	
EE 3300*	Required (Can only count as core or tech elective)	EE 4110	
EE 4030	or	EE 4140	
EE 4350*	or	EE 4170	
EE 4650*	or	EE 4180*	
<u>Biomedical Engineering</u>		<u>Linear Systems</u>	
BME 3410		EE 4750	Required
EE 4500*		EE 4760	Required
<u>Communications</u>		<u>Power systems</u>	
EE 3210	Required (Can only count as core or tech elective)	EE 4560	Required plus
EE 4220/4230	or	EE 4550	or
EE 4250	or	EE 4570	or
EE 4280		EE 4580	
<u>Computer Engineering</u>		<u>Semiconductor Devices (select 2)</u>	
CprE 3810	Required plus	EE 4320	
CprE 3080	or	EE 4360	
CprE 3880	or	EE 4380	
CprE 4800	or	EE 4390	
CprE 4870	or		
CprE 4880			

LIST OF APPROVED EE/CprE TECH ELECTIVES 12/13 crs

COURSES	DESCRIPTION	CR	PRE-REQS
EE 3210 ¹	Communication Systems I	3	EE 2240
EE 3240 ¹	Signals & Systems II	4	EE 2240
EE 3300* ¹	Integrated Electronics	4	CPRE 2810; EE 2010; Cr/E in EE 2300
EE 3320* ¹	Semiconductor Materials & Devices	3	EE 2300
EE 3330	Electronic Systmes Design	4	CPRE 2810; EE 2300
EE 3410*	BioMEMs & Nanotechnology	3	BME 2200
EE 3410L*	BioMEMs & Nanotechnology Lab	1	BME 2200 concurrent enrollment in EE 3410
EE 3510	Analysis of Energy Systems	3	PHYS 2320
EE 3880*	Sustainable Engineering & International Development	3	Jr classification in Engineering
EE 4030x	Introducation to Power Electronic Circuits	3	EE 2300
EE 4110	Wave Propagation and Transmission Lines	3	EE 3110
EE 4140	Microwave Engineering	4	EE 2300; EE 3110
EE 4170	Electromagnetic Radiation, Antennas & Propagation	4	EE 3110
EE 4180*	High Speed System Engineering Measurement & Testing	4	EE 2300; EE 3110
EE 4190*	Magnetism & Magnetic Materials	3	EE 3110 or MATE 3170 or Phys 3640
EE 4220	Communication Systems II	4	EE 3210; EE 3220; Enrollment in EE 4230
EE 4230	Communication Systems Laboratory	1	EE 3210; Enrollment in EE 4220
EE 4240	Introduction to Digital Signal Processing	4	EE 2240
EE 4250	Machine Learning: A Signal Processing Perspective	3	EE 3220 or Stat 3300 or Stat 3220; Math 2070 or 4070 or 5070
EE 4320*	Microelectronics Fabrication Techniques	4	EE 2300
EE 4350*	Analog VLSI Circuit Design	4	EE/CprE 3300
EE 4360	Physics of Transistors	3	EE 3320
EE 4370*	Electronic Properties of Materials	3	EE 3320 or MATE 3170 or PHYS 3220
EE 4380	Optoelectronic Devices and Applications	3	EE 3110; EE 3320
EE 4390	Nanoelectronics	3	EE 3320 or MATE 3340
EE 4400x	Semiconductor Material & Device Characterization	3	EE 3320
EE 4430x	Microfabrication Process Design & Simulation using Computer Aided Design	3	EE 3320
EE 4500*	Biosensors	3	BME 2200
EE 4500L*	Biosensors Laboratory	1	BME 2200 concurrent enrollment in BME 4500
EE 4510*	Engineering Acoustics	3	PHYS 2310 & 2310L; Math 2670
EE 4520	Electrical Machines & Power Electronic Drives	3	EE 3030; EE 3240
EE 4550	Introduction to Energy Distribution Systems	3	EE 3030; Credit or Enrollment in EE 3240
EE 4560	Power System Analysis I	3	EE 3030; Credit or Enrollment in EE 3240
EE 4570	Power System Analysis II	3	EE 3030; Credit or Enrollment in EE 3240
EE 4580	Economic Systems for Electric Power Planning	3	EE 3030 or Econ 3010
EE 4590	Electromechanical Wind Energy conversion and Grid Integration	3	Credit or enrollment in EE 4520; 4560
EE 4650*	Digital VLSI Design	4	EE/CprE 3300
EE 4750	Automatic Control Systems	3	EE 3240
EE 4760	Control System Simulation	3	EE 4750
EE 4880*	Eddy current Nondestructive Evaluation	3	Math 2650; EE 3110
EE 4890*	Survey of Remote Sensing Technologies	3	

LIST OF APPROVED EE/CprE TECH ELECTIVES (cont.) 12/13 crs

COURSES	DESCRIPTION	CR	PRE-REQS
EE 4890L*	Satellite Remote Sensing Laboratory	1	EE 4890
EE 4960*	Modern Optics	3	C/E in PHYS 3220; PHYS 3650; PHYS 4800
CPRE 3080	Operating Systems: Principles & Practice	4	CPRE 3810 or COMS 3210
CPRE 3100	Theoretical Foundations of Cpr Engr.	3	COMS 2280
CPRE 3290*	Software Project Management	3	COMS 3090
CPRE 3390*	Software Architechure & Design	3	SE 3190
CPRE 3810	Computer Org & Assembly Lvl Prgming	4	CPRE 2880
CPRE 3880	Embedded Systems II: Mobile Platforms	4	CPRE 2880
CPRE 4140*	Introduction to Software Systems for Big Data Analytics	4	CPRE 3080
CPRE 4160*	Software Evolution and Maintenance	3	COMS 3090
CPRE 4190*	Software Tools for Lrge Scale Data Anal	4	CPR E 3080; COMS 2280
CPRE 4210*	Software Analysis & Verification for Safety & Security	3	CPRE 3100; COMS 3090
CPRE 4240*	Intro to High Perform Computing	3	MATH 2650; MATH 2070 or 3170
CPRE 4250*	High Perform Cmpting for Sci & Engr App	3	COMS 3110, ENGL 2500, SPCM 2120
CPRE 4260*	Intro to Parallel Algorithms & Program	4	CPRE 3080 or COMS 3520, COM S 3110
CPRE 4300*	Network Protocols & Security	3	CPRE 2880
CPRE 4310	Basics of Information Systems Security	3	C/E CPRE 3080 or COMS 3520
CPRE 4400*	Operating System Security	3	CPRE 3080 or COM S 3520
CPRE 4500	Distributed Systems & Middleware	3	CPRE 3080 or COMS 3520
CPRE 4540*	Distributed & Ntwk Operating Systems	3	COMS 3110, CPRE 3080 or COMS 3520
CPRE 4580	Real Time Systems	3	CPRE 3080 or COMS 3520
CPRE 4590x*	Secuirty & Privcy in Cloud Computing	3	COM S 3520 or CPRE 3080
CPRE 4800	Graphics Processing & Architecture	4	CPRE 3810 or COMS 3210
CPRE 4870	Hardware Design for Machine Learning	4	CPRE 3810 or COMS 3210
CPRE 4880	Embedded Systems Design	4	CPRE 3810 or COMS 3210
CPRE 4890	Cpr. Ntwking and Data Communications	4	CPRE 2880 or COMS 3270
SE 3190*	Software Construction & User Interface	3	COMS 2280
SE 4120*	Formal Methods in Software Engr	3	COMS 3110, STAT 3300
SE 4170*	Software Testing	3	COMS 3090; CPRE 3100; ENGL 2500; SPCM 2120

Tech Electives 7crs - select from the EE/CprE tech electives and/or the below lists

300 & 400+ level courses from the following majors

ABE	CHE	CPRE	IE	PHYS
AERE	CHEM	CYBE	MATE	SE
BME	COMS	EE	MATH	
CE	CONE	ENVE	ME	

OR Other approved tech electives

COURSES	DESCRIPTION	CR	PRE-REQS
AERE 4940	M2I	1...3	
ARTIS 4080	Principles of 3D Animation	3	ARTIS 3080 (see adviser for form)
ARTIS 4090	Computer/Video Game Design & Dvmt	3	COMS 2270, 2280; ARTIS 2300 & 3080
ASTRO 3420	Introduction to Solar System Astronomy	3	PHYS 2320 & 2320L
ASTRO 3440L	Astronomy Laboratory	3	PHYS 2320 & 2320L
ASTRO 3460	Introduction to Astrophysics	3	PHYS 2320 & 2320L
ASTRO 4050	Astrophysical Cosmology	3	ASTRO 3460
BME 2200	Introduction to Biomedical Engineering	3	BIOL 2120, ENGR 1600 or equiv, MATH 1660, CHEM 1670 or 1770, PHYS 2320 & 2320L
BIOL 2110	Principles of Biology I	3	HS Biol
BIOL 2110L	Principles of Biology I Lab	1	Credit or enrollment in BIOL 2110
BIOL 2120	Principles of Biology II	3	HS Biol; HS CHEM or Cr/E in CHEM 1630/1770
BIOL 2120L	Principles of Biology II Lab	1	Credit or enrollment in BIOL 2120
CE 2740	Engineering Statics	3	PHYS 2310 & 2310L; Co-req MATH 1660
COMS 2070 ⁶	Fundamentals of Computer Programming	3	MATH 1500 or placement into MATH 1400+
COMS 2270 ⁶⁷	Introduction to Object-Oriented Programming	4	1850
COMS 2280 ⁶	Introduction to Data Structures	3	COMS 2270 with C- or better, C/E MATH 1650
COMS 2520	Linux Operating System Essentials	3	CPRE 1850 or COMS 2070 or 2270
CONE 2410	Construction Materials & Methods	3	Completion of Basic Program
ENVS 3240 ⁸	Energy & The Environment	3	CHEM 1670 or 1770
MATE 2730 ²	Principles of Materials Science & Engr	3	CHEM 1670 or CHEM 1770, MATH 1650
ME 2310	Engineering Thermodynamics I	3	MATH 1660; CHEM 1670; PHYS 2310 & 2310L
ME/FSHN 3730x	Science and Practice of Brewing	3	CHEM 1670 or 1770 and PHYS 2310 or BIOL 2110 or 2120
MEOR 3420	Atmospheric Physics II	3	MTEOR 3410
MTEOR 4350	Radar Applications in Meteorology	3	Credit or enrollment in MTEOR 3410
NS 3200	Naval Ship Systems I: Engineering	3	PHYS 2310; PHYS 2310L; Sophomore
NS 3300	Naval Ship Systems II: Weapons	3	PHYS 2310, Sophomore
PHYS 2320L	Physics II Lab	1	Credit or enrollment in PHYS 2320