Proposal:

Delete old Minor - Electromechanical Design and Manufacturing

Add new Minor - Electromechanical Systems - ONLY FOR NON ECE MAJORS

Old minor for AE majors

BUS 305	Operation and Supply Chain Des	3
ECE 218	Digital Systems	4
ECE 242	Digital Computers&Computing	3
ECE 441	Microcomputers/Embedded Comp (replaces MMAE 315)	4
MMAE 445	Computer-Aided Design	3
MMAE 485	Manufacturing Processes	3

New minor for AE & ME majors

ECE 211	Circuit Analysis I	3
ECE 213	Circuit Analysis II	4
ECE 311	Engineering Electronics	4
ECE 319	Fundamentals of Power Engineering	4

Plus 1 of below

ECE 411	Power Electronics	4
ECE 412	Hybrid Electric Vehicle Drives	4
ECE 420	Analytical Methods for Power System Economics and Cybersecurity	3

4 Required courses - (subtotal 15 credits)

ECE 211
Circuit Analysis I

Ohm's Law, Kirchhoff's Laws, and network element voltage-current relations. Application of mesh and nodal analysis to circuits. Dependent sources, operational amplifier circuits, superposition, Thevenin's and Norton's Theorems, maximum power transfer theorem. Transient circuit analysis for RC, RL, and RLC circuits. Introduction to Laplace Transforms. Laboratory experiments include analog and digital circuits; familiarization with test and measurement equipment; combinational digital circuits; familiarization with latches, flip-flops, and shift registers; operational amplifiers; transient effects in first-order and second-order analog circuits; PSpice software applications. Concurrent registration in MATH 252 and ECE 218.

Prerequisite(s): MATH 252*, An asterisk (*) designates a course which may be taken concurrently.

Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 213
Circuit Analysis II

Sinusoidal excitation and phasors. AC steady-state circuit analysis using phasors. Complex frequency, network functions, pole-zero analysis, frequency response, and resonance. Two-port networks, transformers, mutual inductance, AC steady-state power, RMS values, introduction to three-phase systems and Fourier series. Design-oriented experiments include counters, finite state machines, sequential logic design, impedances in AC steady-state, resonant circuits, two-port networks, and filters. A final project incorporating concepts from analog and digital circuit design will be required. Prerequisites: ECE 211 with a grade C or better.

Prerequisite(s): ECE 211 with min. grade of C
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

ECE 311

Engineering Electronics

Physics of semiconductor devices. Diode operation and circuit applications. Regulated power supplies. Bipolar and field-effect transistor operating principles. Biasing techniques and stabilization. Linear equivalent circuit analysis of bipolar and field-effect transistor amplifiers. Laboratory experiments reinforce concepts.

Prerequisite(s): ECE 213
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

ECE 319

Fundamentals of Power Engineering

Principles of electromechanical energy conversion. Fundamentals of the operations of transformers, synchronous machines, induction machines, and fractional horsepower machines. Introduction to power network models and per-unit calculations. Gauss-Seidel load flow. Lossless economic dispatch. Symmetrical three-phase faults. Laboratory considers operation, analysis, and performance of motors and generators. The laboratory experiments also involve use of PC-based interactive graphical software for load flow, economic dispatch, and fault analysis.

Prerequisite(s): ECE 213
Lecture: 3 **Lab:** 3 **Credits:** 4

And 1 of the following courses - (3-4 credits, bringing total to 18-19 credits)

ECE 411
Power Electronics
Power electronic circuits and switching devices such as power transistors, MOSFET's, SCR's, GTO's, IGBT's and UJT's are studied. Their applications in AC/DC DC/DC, DC/AC and AC/AC converters as well as switching power supplies are explained. Simulation mini-projects and lab experiments emphasize power electronic circuit analysis, design and control.
Prerequisite(s): ECE 311
Lecture: 3 **Lab:** 3 **Credits:** 4

ECE 412
Hybrid Electric Vehicle Drives
Fundamentals of electric motor drives are studied. Applications of semiconductor switching circuits to adjustable speed drives, robotic, and traction are explored. Selection of motor drives, calculating the ratings, speed control, position control, starting, and braking are also covered. Simulation mini-projects and lab experiments are based on the lectures given.
Prerequisite(s): ECE 311 and ECE 319
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 420
Analytical Methods for Power System Economics and Cybersecurity
Analytical Methods for the Economic operation of power systems with consideration of transmission losses. Analytical methods for the optimal scheduling of power generation, including real power and reactive power. Analytical methods for the estimation of power system state. Analytical methods for the modeling of smart grid cybersecurity.
Prerequisite(s): ECE 319
Lecture: 3 **Lab:** 0 **Credits:** 3

Proposed Bulletin Entry

Admission
Requirements

Course Requirements

~~BUS 305~~	~~Operation and Supply Chain Des~~	~~3~~
~~ECE 218~~	~~Digital Systems~~	~~4~~
~~ECE 242~~	~~Digital Computers&Computing~~	~~3~~
~~ECE 441~~	~~Microcomputers/Embedded Comp (replaces MMAE 315)~~	~~4~~
~~MMAE 445~~	~~Computer-Aided Design~~	~~3~~
~~MMAE 485~~	~~Manufacturing Processes~~	~~3~~
Required Courses		**(18-19)**
ECE 211	**Circuit Analysis I**	**3**
ECE 213	**Circuit Analysis II**	**4**
ECE 311	**Engineering Electronics**	**4**
ECE 319	**Fndmntls of Power Engrn**	**4**
Select one of the following courses:		**3-4**
ECE 411	**Power Electronics**	**4**
ECE 412	**Hybrid Electric Vehicle Drives**	**4**
ECE 420	**Analyt. Methods for Power Syst**	**3**

Program Change Request

Date Submitted: 04/16/21 12:58 pm

Viewing: EMS ~~EDM~~ : Minor in Electromechanical Systems ~~Design and Manufacturing~~

Last approved: 10/15/18 1:59 pm

Last edit: 04/16/21 4:30 pm

Changes proposed by: nicholsonj

Catalog Pages
Using this Program

Minor in Electromechanical Design and Manufacturing

Add Comment

In Workflow

1. **MMAE Chair**
2. **Academic Affairs**
3. **Undergraduate Academic Affairs**
4. **AC Dean**
5. **Undergraduate Studies Committee Chair**
6. Faculty Council

Report to Faculty Council	
Report from Faculty Council	
Reviewer Comments	**Sumanta Acharya (sacharya1) (04/14/21 7:35 pm):** Rollback: Not entered correctly as noted in email to her by Prof Wark (earlier) and me today (4/14). Reference to EDM & Electromechanical design and manufacturing should not appear--it was the old title. The required courses are not separated by mechanical and aerospace engineering— They should read as per Prof. Wark's email of April 6 as re-noted below: Five courses are required for this new Electromechanical Systems minor 1) ECE 211 Circuit Analysis I 2) ECE 213 Circuit Analysis II 3) ECE 311 Engineering Electronics 4) ECE 319 Fundamentals of Power Engineering And then for the 5th course a student would choose one of the following three courses ECE 411 Power Electronics ECE 412 Hybrid Electric Vehicle Drive ECE 420 Analytical Methods for Power System Economics and Cybersecurity
	Jessica Nicholson (nicholsonj) (04/15/21 8:59 am): Patty Winston will be able to fix the issues you are not pleased with. I can only do so much on my end. I am sending back. I will send her an email as well.
	Sumanta Acharya (sacharya1) (04/15/21 2:54 pm): Rollback: Still not correct; rolling it back again got Jessica to get this done correctly.
	Sumanta Acharya (sacharya1) (04/16/21 1:08 pm): The reference to Catalog Pages Using this Program Minor in Electromechanical Design and Manufacturing should be removed. The new name is Minor in Electromechanical systems
	Patty Johnson Winston (winston) (04/16/21 4:30 pm): PJW: The reference to the Minor in Electromechanical Design and Manufacturing page will change after the Electromechanical Systems Minor is fully approved and the bulletin page's URL is updated to reflect the revised minor program's title. After full approval through the workflow, the revised URL will be generated by the CourseLeaf CIM technical support representative/vendor,