MAE Technical Electives

Version: 8/11/25

Important notes:

- **If a course satisfies a requirement for a major, then it cannot be used a technical elective for that major.**
- Course links allow convenient checking of prerequisites, which must be respected.
- Some courses have graduate-level listings, and credit can only be awarded for one version.
- Technical electives can double count for a minor or certificate. A minor typically requires 6 or more dedicated hrs.
- There are limits for special credits: 3 for internship, 3 for AE individual study, 6 for ME individual study, 8 for total combination of individual study, internships, and special problems or special topics.
- There is a four credit limit for 2000-level courses.

Course	Title	Cr	biomechanics minor	vehicles	aeronautical	astronautical	machine dynamics	design and manufacture	thermal, fluids, energy	solid mechanics	materials	math	science	controls, robotics, autonomy	AI and computational	electrical	economics	ethics, professional development	management and entrepreneurial	research or work experience	special credits
	Ag-Bio																				
ABE 3612C	Heat and Mass Transfer in Biological Systems	4	X						X												
ABE 3652C	Physical and Rheological Properties of Bio. Materials	3	X								X										
ABE 4008	Control Methods in SmartAg Systems	3												X							
ABE 4034	Remote Sensing in Engineering: Science, Sensors and Applications	3												X							
ABE 4171	Power and Machines for Biological Systems	3					X	X													
ABE 4655C	Bio-Based Products from Renewable Resources	3							X												
ABE 4662	Quantification of Biological Processes	3	X																		
	APK																				
APK 2100C	Applied Human Anatomy with Laboratory	4	X																		
APK 2105C	Applied Human Physiology with Laboratory	4	X																		
APK 3220C	Biomechanical Basis of Movement	3	X																		
	Astronomy																				
AST 3018	Astronomy and Astrophysics 1	3				X							X								
AST 3019	Astronomy and Astrophysics 2	3				X							X								
AST 3722C	Techniques of Observational Astronomy 1	3				X							X								
	Biology																				
BSC 2010	Integrated Principles of Biology 1	3											X								
BSC 2010L	Integrated Principles of Biology Laboratory	1											X								
BSC 2011	Integrated Principles of Biology 2	3	X										X								
BSC 2011L	Integrated Principles of Biology Laboratory 2	1											X								
BSC 3096	Human Physiology	3											X								
BSC 4452	Computational Tools for Research in Biology	3											X								
BSC 4892	AI in Biology	3											X								
	Biomedical Engineering																				
BME 3060	Biomedical Fundamentals	3											X								
BME 3219	Eng. Analysis of Musculoskeletal Biomechanics	3	X										X								
BME 3234	Mechanical Behavior of Biological Tissues and Sys	3	X										X								
BME 4632	Biomedical Transport Phenomena	3	X										X								

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	Chemistry																				
CHM 2046	General Chemistry 2	3											X								
CHM 2046L	General Chemistry 2 Laboratory	1											X								
CHM 2096	Applied General Chemistry 2	3											X								
CHM 2096L	Applied General Chemistry 2 Lab	1											X								
CHM 2200	Fundamentals of Organic Chemistry	3											X								
CHM 2200L	Fundamentals of Organic Chemistry Laboratory	1											X								
CHM 2210	Organic Chemistry 1	3											X								
CHM 2211	Organic Chemistry 2	3											X								
CHM 2211L	Organic Chemistry Laboratory	2											X								
CHM 3120	Introduction to Analytical Chemistry	3											X								
CHM 3120L	Analytical Chemistry Laboratory	1											X								
CHM 3217	Organic Chemistry/Biochemistry 1	4											X								
CHM 3218	Organic Chemistry/Biochemistry 2	4											X								
CHM 4411	Physical Chemistry: Thermodynamics and Kinetics	4											X								
CHM 4411L	Physical Chemistry Laboratory	2											X								
	Computer Science																				
CAI 4104	Machine Learning Engineering	3												X	X						
CAP 3032	Interactive Modeling and Animation 1	3													X						
CAP 3034	Introduction to Computer-Aided Animation	3													X						
CAP 3220	Introduction to Computer-Aided Modeling	3													X						
CAP 4053	Artificial Intelligence for Computer Games	3													X						
CAP 4410	Computer Vision	3												X	X						
CAP 4613	Deep Learning for Computer Graphics	3												X	X						
CAP 4621	Artificial Intelligence and Heuristics	3													X						
CAP 4641	Natural Language Processing	3													X						
CAP 4730	Computational Structures in Computer Graphics	3													X						
CAP 4770	Introduction to Data Science	3												X	X						
CDA 3101	Introduction to Computer Organization	3													X						
CDA 4630	Embedded Systems	3												X	X						
CNT 4007	Computer Network Fundamentals	3												X	X						
COP 3502C	Programming Fundamentals 1	4													X						
COP 3503C	Programming Fundamentals 2	4													X						
COP 3530	Data Structures and Algorithm	3													X						
COP 4600	Operating Systems	3													X						
COT 3100	Applications of Discrete Structures	3													X						
	Civil																				
CEG 4011	Soil Mechanics	4								X											
CES 3102	Mechanics of Engineering Structures	4								X											
	Electrical																				
EEE 3308C	Electronic Circuits 1	4														X					
EEE 3396	Solid-State Electronic Devices	3														X					
EEE 3773	Introduction to Machine Learning	4												X	X	X					
EEE 4310	VLSI Circuits and Technology 1	3														X					

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EEL 3008	Physics of Electrical Engineering	3														X					
EEL 3135	Introduction to Signals and Systems	4														X					
EEL 3211C	Basic Electric Energy Engineering	4														X					
EEL 3701C	Digital Logic and Computer Systems	4														X					
EEL 4242C	Power Electronic Circuits	3							X							X					
EEL 4744C	Microprocessor Applications	4														X					
	General Engineering																				
COP 2271L	Computer Programming for Engineers Laboratory	1													X						
COP 2274	C++ Programming for Engineers	3													X						
EEL 3872	Artificial Intelligence Fundamentals	3												X	X						
EGN 2020C	Engineering Design & Society	2						X													
EGN 4641	Engineering Entrepreneurship	3															X	X	X		
EGN 4643	Engineering Innovation	3																X	X		
EGS 4034	Engineering Ethics and Professionalism	1																X			
EGS 4038	Engineering Leadership	3																X	X		
EGS 4619	Agile Project Management for Eng.s and Scientists	3																X	X		
EGS 4625	Fundamentals of Engineering Project Management	3																X	X		
EGS 4680	Advanced Engineering Leadership Development	3																X	X		
EGN 5216	Machine Learning for Artificial Intelligence Systems	3													X						
EGN 5442	Programming for Applied Data Science	3													X						
EGN 6640	Entrepreneurship for Engineers	3															X	X	X		
EGN 6642	Engineering Innovation	3																X	X		
EGS 6039	Engineering Leadership	3																X	X		
	Industrial																				
EIN 3354	Engineering Economy	3															X				
EIN 4242C	Workplace Ergonomics and Biomechanics	3	X																		
	Materials																				
EMA 3011	Fundamental Principles of Materials	3									X										
EMA 3050	Introduction to Inorganic Materials	3									X										
EMA 3066	Introduction to Organic Materials	3									X										
EMA 3413	Electronic Properties of Materials	3									X										
EMA 4061	Biomaterials: Structure and Properties	3									X										
EMA 4061L	Biomaterials Laboratory	1									X										
EMA 4125	Kinetics of Materials	3								X	X										
EMA 4223	Mechanical Behavior of Materials	3								X	X										
EMA 4314	Thermodynamics of Materials	3							X		X										
EMA 4324	Stability of Materials	3								X	X										
EMA 4714	Materials Selection and Failure Analysis	3								X	X										
	Math																				
MAA 4102	Introduction to Real Analysis 1	3										X									
MAA 4103	Introduction to Real Analysis 2	3										X									
MAA 4211	Real Analysis and Advanced Calculus 1	3										X									
MAA 4212	Real Analysis and Advanced Calculus 2	3										X									
MAD 2502	Intro to Computational Math	3										X			X						

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MAD 4401	Introduction to Numerical Analysis	3										X			X						
MAP 4305	Differential Eqs for Engineers and Physical Scientists	3										X									
MAS 3114	Computational Linear Algebra	3										X			X						
MAS 4105	Linear Algebra 1	4										X									
MHF 3202	Reasoning and Proof in Mathematics	3										X									
	Nuclear																				
ENU 4001	Nuclear Engineering Analysis 1	4							X												
ENU 4103	Reactor Analysis and Computation I	4							X												
ENU 4605	Radiation Interactions and Sources 1	4							X												
ENU 4612	Nuclear Radiation Detection and Instrumentation	3							X												
	Packaging Science																				
PKG 3001	Principles of Packaging	3						X													
PKG 3103	Food Packaging	3						X													
PKG 4008	Distribution and Transport Packaging	3						X													
PKG 4011	Packaging Production and Processing	3						X													
PKG 4101C	Computer Tools for Packaging	3						X							X						
	Physics																				
PHY 3101	Introduction to Modern Physics	3											X								
PHY 3221	Mechanics 1	3					X						X								
PHY 3323	Electromagnetism 1	3											X								
PHY 3513	Thermal Physics 1	3							X				X								
PHY 4222	Mechanics 2	3					X						X								
PHY 4324	Electromagnetism 2	3											X								
PHY 4604	Introductory Quantum Mechanics 1	3											X								
PHZ 4710	Introduction to Biological Physics	3	X										X								
	Statistics																				
STA 3032	Engineering Statistics	3										X									
STA 3100	Programming With Data in R	3										X			X						
STA 3180	Statistical Modelling	3										X			X						
STA 4210	Regression Analysis	3										X									
STA 4211	Design of Experiments	3										X									
	MAE																				
EAS 2011	Introduction to Aerospace Engineering	3			X	X			X												
EAS 4101	Aerodynamics	3			X				X												
EAS 4132	Compressible Flow	3			X				X												
EAS 4200	Aerospace Structures	3			X	X		X		X	X										
EAS 4240	Aerospace Composites	3			X	X		X		X	X										
EAS 4300	Aerospace Propulsion	3			X	X			X												
EAS 4400	Stability and Control of Aircraft	3			X									X							
EAS 4412	Dynamics and Control of Space Vehicles	3				X								X							
EAS 4510	Astrodynamics	3				X															
EAS 4530	Space Systems Design	3				X		X													
EAS 4700	Aerospace Design 1	3				X		X										X			

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EAS 4710	Aerospace Design 2	3			X			X										X			
EAS 4810C	Aerospace Sciences Lab and Design	3			X													X			
EAS 4905	Individual Study in Aerospace Engineering	1-4																			X
EAS 4939	Special Topics in Aerospace Engineering	1-4																			X
EAS 4949	Co-op Work Experience	1																		X	X
EGM 4585	Modeling and Control of Biomolecular Machines	3	X						X												
EGM 4590	Biodynamics	3	X						X												
EGM 4592	Bio-Solid Mechanics	3	X						X												
EGM 4853	Bio-Fluid Mechanics and Bio-Heat Transfer	3	X						X												
EGN 3353C	Fluid Mechanics	3							X												
EGN 4912	Engineering Directed Independent Research	0-3																		X	
EMA 4450	Li-ion Next Generation Batteries	3							X												
EML 3005	Mechanical Engineering Design 1	3					X	X		X											
EML 4140	Heat Transfer	3							X												
EML 4147C	Thermal Sciences Design and Laboratory	3							X									X			
EML 4220	Vibrations	3					X														
EML 4285	Off-Highway Vehicle Design	3		X			X	X													
EML 4292	Microfluidics and BioMEMS	3	X						X												
BME 5580	Microfluidics and BioMEMS	3	X						X												
EML 4314C	Dynamics and Controls System Design Laboratory	3												X	X			X			
EML 4321	Manufacturing Engineering	3						X													
EML 4416	Solar Energy Utilization	3							X												
EML 4450	Energy Conversion	3							X												
EML 4461	Industrial Energy Management	3							X										X		
EML 4500C	Reengineering Historic Machinery	3						X													
EML 4501	Mechanical Engineering Design 2	3						X										X			
EML 4502	Mechanical Engineering Design 3	3						X										X			
EML 4507	Finite Element Analysis and Design	3						X							X						
EML 4535C	Automation in Production Engineering	3						X													
EML 4600	Refrigeration and Air Conditioning Fundamentals	3						X	X												
EML 4601	Heating and Air Conditioning System Design	3						X	X												
EML 4722	Introduction to Computational Fluid Dynamics	3							X						X						
EML 4842	Autonomous Vehicles	3		X										X	X						
EML 4905	Individual Study in Mechanical Engineering	1-3																			X
EML 4914	Undergraduate Realization Thesis	3						X										X			X
EML 4926	Mechanical Consulting Practice	3						X									X	X	X		
EML 4930	Special Topics in Mechanical Engineering	1-3																			X
EML 4945	Practical Work in Mechanical Engineering	1																		X	X
EML 4949	Co-op Work Experience	1																		X	X
	EAS 5XXX Course taught by MAE faculty	3																			
	EAS 6XXX Course taught by MAE faculty	3																			
	EGM 5XXX Course taught by MAE faculty	3																			
	EGM 6XXX Course taught by MAE faculty	3																			
	EML 5XXX Course taught by MAE faculty	3																			
	EML 6XXX Course taught by MAE faculty	3																			