

Aerospace Engineering • 2

*Technical electives can be chosen from the following list. At least three credit hours must come from either AER/ME 501 OR AER/ME 590.

AER 380 Topics in Aerospace Engineering (Variable Topics)

AER/ME 530 Gas Dynamics

AER/ME 531 Fluid Dynamics I

AER/ME 532 Advanced Strength of Materials

AER 545 Aircraft Control and Simulation

AER/ME 548 Aerodynamics of Turbomachinery

AER/ME 563 Basic Combustion Phenomena

AER/ME 565 Scale Modeling in Engineering

AER/ME 590 Applied CFD and Numerical Heat Transfer

AER/ME 516 Systems Engineering

AER 599 Topics in Aerospace Engineering (Subtitle required)

AER 395 Independent Work in Aerospace Engineering

AER/ME 501 Mechanical Design with Finite Element Methods

AER/ME 506 Mechanics of Composite Materials

AER/ME 510 Vibro-Acoustic Design in Mechanical Systems

AER/ME 513 Mechanical Vibrations

AER/ME 514 Computational Techniques in Mechanical System Analysis

Electrical Engineering • 2

**EE Technical Electives (must be 500-level courses). Courses recommended as electrical engineering technical electives are listed below (each course is 3 credit hours):

EE 503 Power Electronics
EE 511 Introduction to Communication Systems
EE 512 Digital Communication Systems
EE 513 Audio Signals and Systems
EE 517 Advanced Electromechanics
EE 518 Electric Drives
EE 522 Antenna Design
EE 523 Microwave Circuit Design
EE 525 Numerical Methods and Electromagnetics
EE 527 Electromagnetic Compatibility
EE 531 Alternative and Renewable Energy Systems
EE 532 Smart Grid: Automation and Control of Power Systems
EE 533 Advanced Power System Protection
EE 535 Power Systems: Generation, Operation and Control
EE 536 Power System Fault Analysis and Protection
EE 537 Electric Power Systems I
EE 538 Electric Power Systems II
EE 539 Power Distribution Systems
EE 543 Solar Cell Devices and Systems for Electrical Energy Generation
EE 546 Electric Power System Fundamentals
EE 560 Semiconductor Device Design
EE 566 Engineering Optics
EE 567 Introduction to Lasers and Masers
EE 568 Fiber Optics
EE 569 Electronic Packaging Systems and Manufacturing Processes
EE 571 Feedback Control Design
EE 572 Digital Control of Dynamic Systems
EE 582 Hardware Description Languages and Programmable Logic
EE 584 Introduction of VLSI Testing and Design
EE 585 Fault Tolerant Computing
EE 586 Communication and Switching Networks
EE 587 Microcomputer Systems Design
EE 588 Real-Time Computer Systems
EE 589 Advanced VLSI
EE 599 Topics in Electrical Engineering (Subtitle required)

Mechanical Engineering • 2

Mathematics Elective Hours

Choose one course from the following:

MA 320 Introductory Probability.....	MAT331...3
MA 321 Introduction to Numerical Methods.....	MAT327...3
MA 322 Matrix Algebra and Its Applications.....	MAT310...3
MA 416G Introduction to Optimization	3
MA 432G Methods of Applied Mathematics I	3
MA 433G Introduction to Complex Variables.....	MAT 405...3
MA 481G Differential Equations.....	3
STA 381 Engineering Statistics – A Conceptual Approach	3

Subtotal: Mathematics Elective..... 3

Technical Electives Hours

Choose 9 hours from the following:*

ME 380 Topics in Mechanical Engineering (Variable Topics).....	3
ME 395 Independent Work in Mechanical Engineering.....	1-3
ME 416 Automotive Painting Technology.....	3
ME 417 Sheet Metal Forming.....	3
ME 418 Automotive Assembly and Quality Control.....	3
ME 501 Mechanical Design with Finite Element Methods.....	3
ME/MFS 503 Lean Manufacturing Principles and Practices	3
ME/MFS 505 Modeling of Manufacturing Processes and Machines.....	3
ME/MSE 506 Mechanics of Composite Materials	3
ME/MFS 507 Design for Manufacturing.....	3
ME 510 Vibro-Acoustic Design in Mechanical Systems.....	3
ME/MFS 511 Machining of Materials and Applications.....	3
ME/MFS 512 Manufacturing Systems	3
ME 513 Mechanical Vibrations	3
ME 514 Computational Techniques in Mechanical System Analysis	3
ME 515 Rotordynamics of Turbomachinery	3
ME 516 Systems Engineering.....	3
ME/EE/MFS 526 Lean Operations Management I.....	3
ME 527 Applied Mathematics in the Natural Sciences I.....	3
ME 530 Gas Dynamics.....	3
ME 531 Fluid Dynamics I.....	3
ME 532 Advanced Strength of Materials.....	3
ME 542 Kinematic Synthesis of Mechanisms.....	3
ME 548 Aerodynamics of Turbomachinery.....	3
ME 549 Power Generation.....	3
ME/MFS/CME/MSE 554 Chemical and Physical Processing of Polymer Systems	3
ME/EE/MSE 555 Introduction to Micro-/Nano- Electromechanical Systems	3
ME/MFS/CME/MSE 556 Introduction to Composite Materials.....	3
ME 560 Engineering Optics.....	3
ME 563 Basic Combustion Phenomena	3
ME 565 Scale Modeling in Engineering.....	3
ME/EE/MSE 570 Fundamentals of Nanoelectric Devices and Materials	3
ME/BAE 580 Heating, Ventilating and Air-Conditioning	3
ME/BAE/EGR/MFS/EE 583 Industrial Energy Utilization and Assessment.....	3
ME 585 Fourier Series and Boundary Value Problems	3
ME 590 Applied CFD and Numerical Heat Transfer.....	3
ME 599 Topics in Mechanical Engineering (Subtitle required)	3
MFS 599 Topics in Manufacturing Systems Engineering (Subtitle required).....	3

Non-ME Technical Electives

BAE 502 Modeling of Biological Systems.....	3
BAE 515 Fluid Power Systems.....	3
BAE 516 Control of Off-Road Vehicles	3
BME 440 Introduction to Biomedical Signal Processing.....	3
BME 472 Human Biomechanics	3
BME 473 Fundamentals of Biofluid Mechanics.....	3
BME 488 Introduction to Biomaterials.....	3
BME 532 Modeling of Physiological Systems.....	3
BME 540 Biomedical Instrumentation	3
BME 550 Introduction to Biomedical Imaging	3
BME 571 Mechanical Modeling of Human Motion.....	3
BME 573 Cell Mechanics and Mechanobiology	3
BME 579 Neural Engineering: Merging Engineering with Neuroscience	3
EGR 523 Concepts, Assessment Tools and Methods in Sustainable Power and Energy.....	3
EGR 537 Numerical Analysis.....	3
EGR 540 Power Economics and Public Policy	3
EGR 542 Electric Power Generation Technologies.....	3
EGR 546 Electric Power System Fundamentals.....	3
EGR 553 Environmental Consequence of Energy Production	3
MFS 509 Leadership for a Lean Enterprise.....	3
MFS/MNG 520 Industrial Automation and Control.....	3
MFS 525 Organizational Learning for Lean Manufacturing.....	3
MFS 581 Quality Control	3
MFS 599 Topics in Manufacturing Systems Engineering (Subtitle required).....	3
MSE 201 Materials Science.....	3
MSE/CME 552 Automotive Plastics	3

*A minimum of 6 credit hours (two courses) must have an ME prefix or be cross-listed as an ME course. A maximum of 3 credit hours (one course) may be chosen from technical electives with prefixes other than ME. Exceptions only with the approval of the Director of Undergraduate Studies.

Mining Engineering

College of Engineering

Freshman Year

First Semester	Hours
CHE 105 General College Chemistry I*	CHE 111...4
CIS/WRD 110 Composition and Communication I*Δ.....	3
EGR 101 Engineering Exploration I § †.....	1
EGR 102 Fundamentals of Engineering Computing	CSC 115...2
MA 113 Calculus I*.....	MAT 125...4
Second Semester	
CIS/WRD 111 Composition and Communication II Δ.....	3
EGR 103 Engineering Exploration II § †.....	2
MA 114 Calculus II*.....	MAT 225...4
PHY 231 General University Physics*.....	PHY 211, 212, & 241...4
PHY 241 General University Physics Laboratory (PHY 211, 212, & 241) or CHE 111 General Chemistry I Laboratory ¶\$.....	CHE 111...1
UK Core – Social Sciences.....	3

Sophomore Year

First Semester	Hours
EES 220 Principles of Physical Geology.....	GEL 113...4
EM 221 Statics.....	PHY 317...3
MA 213 Calculus III*.....	MAT 325...4
MNG 201 Mining Engineering Fundamentals	3
PHY 232 General University Physics.....	PHY 211, 212, & 241...4
Second Semester	
EES 230 Fundamentals of Geology I.....	3
EM 302 Mechanics of Deformable Solids.....	3
MA 214 Calculus IV	MAT 345...3
MNG 291 Elements of Mine Design	3
MNG 303 Deformable Solids Laboratory	1
MNG 322 Mine Safety and Health Management and Processes.....	2
MNG 331 Explosives and Blasting.....	2

*Courses are required for Engineering Standing. A cumulative UK GPA of at least 2.5 and successful completion of all pre-major courses. Successful completion of the following courses with at least a 2.5 GPA: CIS 110/WRD 110, CHE 105, MA 113, MA 114, MA 213, and PHY 231. If a course is repeated, the best grade will be used for calculation of GPA in the above listed courses.

Δ Students taking ENG 101 (ENG 111) and ENG 102 (ENG 112, 115, 125, OR HON 200) should also complete COM 252 (COMM 200), COM 281 (COMM 312), or COM 287.

§ Transfer students will take EGR 215, Introduction to the Practice of Engineering for Transfer Students, in place of EGR 101 and EGR 103.

† Students must complete both EGR 101 and EGR 103 to fulfill the UK Core Arts and Creativity requirement. Transfer students may satisfy the UK Core Arts and Creativity requirement by taking EGR 215.

¶ Students only required to take one lab. Consult with advisor.

[1] The Minerals Processing Technical Elective is to be chosen between MNG 575, Coal Preparation Design, and MNG 580, Mineral Processing Plant Design.

∞ Graduation Composition and Communication Requirement (GCCR) course.

†† MNG 335 satisfies the Statistical Inferential Reasoning requirement in the UK Core.

**Courses recommended as technical electives are listed below. These courses must be chosen with the approval of the student's advisor to ensure that the curriculum includes sufficient engineering design content.

Technical Electives: Students are required to select their technical elective from the departmental courses listed below:

- MNG 511 Mine Power System Design
- MNG/MFS 520 Industrial Automation and Control
- MNG 531 Advanced Blast Design and Technology
- MNG 541 Computer Design of Mine Ventilation Systems

\$ Online Chemistry courses do not transfer. Chemistry classes and labs must be in person.

Junior Year

First Semester	Hours
EM 313 Dynamics	PHY 319...3
MNG 211 Mine Surveying	2
MNG 301 Minerals Processing.....	3
MNG 335 Introduction to Mine Systems Analysis†.....	3
MNG 463 Surface Mine Design	3
UK Core – Humanities.....	3
Second Semester	
CE 341 Introduction to Fluid Mechanics.....	4
MNG 311 Electrical Circuits and Mining Machinery	3
MNG 371 Professional Development of Mining Engineers ∞.....	3
MNG 435 Mine Systems Engineering and Economics	3
MNG 551 Rock Mechanics	4

Senior Year

First Semester	Hours
MNG 332 Mine Plant Machinery	3
MNG 341 Mine Ventilation	3
MNG 351 Underground Mine Design	3
MNG 591 Mine Design Project I.....	1
UK Core – Citizenship - USA.....	3
Second Semester	
BAE 535/MNG 535 Environmental Control System Design and Reclamation	3
MNG 592 Mine Design Project II (UK Core – Arts and Creativity).....	3
Minerals Processing Technical Elective[1].....	3
Technical Elective**	3
UK Core – Global Dynamics.....	3

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