

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

Biomedical Engineering

College of Engineering

Freshman Year

First Semester	Hours
MA 113 Calculus I*	0...OCVJ '344.'348.'qt'358...4
PHY 231 General University Physics*	RJ [U'477...4
PHY 241 General University Physics Laboratory*	RJ [U'478...1
CIS/WRD 110 Composition and Communication I*Δ	...3
EGR 101 Engineering Exploration I §∇*	...1
EGR 102 Fundamentals of Engineering Computing	EU'3: 2.'462.'qt'467...2

Second Semester	Hours
MA 114 Calculus II*	0...OCVJ '354.'359.'qt'449...4
CHE 105 General College Chemistry I*	0...EJ GO '342...4
CIS/WRD 111 Composition and Communication II*Δ	...3
EGR 103 Engineering Exploration II §*∇	...2
BIO 148 Introductory Biology I*	DIQN'342...3

Sophomore Year

First Semester	Hours
MA 213 Calculus III	OCVJ '459.'qt'549...4
PHY 232 General University Physics	RJ [U'487...4
PHY 242 General University Physics Laboratory	RJ [U'488...1
BIO 152 Principles of Biology II	(0000) DIQN'344...3
BME 201 Introduction to Biomedical Engineering	...3
Guided Engineering Elective I [1]	...3

Second Semester	Hours
MA 214 Calculus IV	OCVJ '553...3
CHE 107 General College Chemistry II	EJ GO '444...3
PRD/BME 170 Human Anatomy for Design	...3
PRD 272 Introduction to UX for Product Design	...2
Guided Engineering Elective II [1]	...3
UK Core – Humanities	...3

Junior Year

First Semester	Hours
BME 322 Design Strategies for Biomedical Engineering	...3
BME 435 Computer Modeling of Complex Systems	...3
PRD/EGR 250 Computer-Aided Design: Solidworks	...2
PRD 371 Ergonomics	...1
Guided Engineering Elective III [1]	...3
UK Core – Social Sciences	...3

Second Semester	Hours
STA 381 Engineering Statistics – A Conceptual Approach	...3
BME 330 Experimental Methods in Biomedical Engineering	...3
PRD/BME 350 Materials and Processes	...3
PRD 372 UX + UI for Product Design	...1
BME Basic Elective I [2]	...3
UK Core – Citizenship - USA	...3

Senior Year

First Semester	Hours
BME 420 Senior Design Project in Biomedical Engineering I	...3
PRD/BME 451 Integrated Entrepreneurship in Product Design	...2
PGY 206 Elementary Physiology	...3
PGY 207 Case Studies in Physiology	...1
BME Basic Elective II [2]	...3
BME Advanced Elective I [3]	...3

Second Semester	Hours
BME 421 Senior Design Project in Biomedical Engineering II ∞	...3
BME Basic Elective III [2]	...3
BME Basic Elective IV [2]	...3
BME Advanced Elective II [3]	...3
UK Core – Global Dynamics	...3

*Courses are required for Engineering Standing. A cumulative UK GPA of at least 2.5 and successful completion of the following courses with at least a 2.5 GPA: BIO 148, BIO 152, BME 201, CHE 105, CIS 110 / WRD 110, CIS 111 / WRD 111, EGR 101, EGR 102, EGR 103, MA 113, MA 114, MA 213, PHY 231, PHY 241, PHY 232 and PHY 242. If the course is repeated, the best grade will be used for calculation of GPA in the above listed courses.

Δ Usvf gpw'icnkpī 'GPI '323''GPI '322'qt'GPI N'322E +c'pf 'GPI '324''GPI '522 +ij qwf 'cnaq'eqo rrvvg'E'QO '3: 3''E'QO O '367.'367E.'UE'QO '367.'qt'UE'QO '383+'E'QO '474''E'QO O '36: 'qt'56: +'E'QO '4: 3''E'QO O '56: +'qt'E'QO '4: 9''E'QO O '467'qt'567-0

§*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.

∞ Graduation Composition and Communication Requirement (GCCRC) course.

J3_ Guided Engineering Elective options: CME 200, CME 320, EE 211, EE 305, EM 221''GO '444'qt'RJ [U'449+ EM 302''GO '524'qt'525+ EM 313, ME 340

J4_ Basic BME Elective options: BME 440, BME 455, BME 464, BME 465, BME 470, BME 472, BME 473, BME 476, BME 477, BME 488, BME 491

J5_ Advanced BME Elective options: BME 532, BME 540, BME 571, BME 573, BME 395

Biosystems Engineering

College of Engineering

Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § †.....	1
EGR 102 Fundamentals of Engineering Computing	CS 180, 240, or 245...2
CHE 105 General College Chemistry I*.....	CHEM 120...4
CIS/WRD 110 Composition and Communication I*Δ.....	3
MA 113 Calculus I *.....	MATH 122, 126, or 136...4
Second Semester	
EGR 103 Engineering Exploration II § †	2
MA 114 Calculus II *.....	MATH 132, 137, or 227...4
CIS/WRD 111 Composition and Communication II Δ.....	3
PHY 231 General University Physics*.....	PHYS 255...4
PHY 241 General University Physics Laboratory	PHYS 256...1
UK Core.....	3

Sophomore Year

First Semester	Hours
BAE 200 Principles of Biosystems Engineering*.....	3
BIO 148 Introductory Biology I	BIOL 120...3
MA 213 Calculus III*.....	MATH 237 or 327...4
PHY 232 General University Physics.....	PHYS 265...4
PHY 242 General University Physics Laboratory	PHYS 266...1
CE 106 Computer Graphics and Communication	AMS 163 or 202...3
Second Semester	
BAE 202 Statistical Inferences for Biosystems Engineering	3
MA 214 Calculus IV	MATH 331...3
ME 220 Engineering Thermodynamics I.....	ME 220...3
EM 221 Statics.....	EM 222 or PHYS 227...3
CHE 107 General College Chemistry II	CHEM 222...3

Junior Year

First Semester	Hours
BAE 301 Economic Analysis for Biosystems	2
ME 330 Fluid Mechanics.....	3
EE 305 Electrical Circuits and Electronics.....	3
EM 313 Dynamics	3
BIO 152 Principles of Biology II.....	BIOL 122...3
WRD 204 Technical Writing ∞.....	3
Second Semester	
BAE 305 DC Circuits and Microelectronics	3
EM 302 Mechanics of Deformable Solids.....	EM 302 or 303...3
BAE 310 Heat and Mass Transfer in Biosystems Engineering	3
Biosystems Core Elective**	3
UK Core.....	3
UK Core.....	3

Senior Year

First Semester	Hours
BAE 402 Biosystems Engineering Design I.....	2
BAE 400 Senior Seminar.....	1
Biosystems Core** or Technical Elective***	3
Biosystems Core** or Technical Elective***	3
Biosystems Core** or Technical Elective***	3
Biological Science Elective	3
Second Semester	
BAE 403 Biosystems Engineering Design II.....	2
BAE 502 Modeling of Biological Systems.....	3
Biosystems Core** or Technical Elective***	3
Biosystems Core** or Technical Elective***	3
UK Core.....	3

*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: CHE 105, CIS 110/WRD 110, MA 113, MA 114, MA 213, and PHY 231. Completion of BAE 200 with a grade of C or better. 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 100 or ENGL 100C) and ENG 102 (ENG 300) should also complete COM 181 (COMM 145, 145C, SCOM 145, or SCOM 161), COM 252 (COMM 148 or 348), COM 281 (COMM 349), or COM 287 (COMM 245 or 345).

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

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**A minimum of 9 hours are required from the biosystems engineering core courses: BAE 417 Design of Machine Systems, BAE 427 Structures and Environment Engineering, BAE 437 Land and Water Resources Engineering, and BAE 447 Bioprocess Engineering Fundamentals.

***A minimum of 9 hours are to be taken in addition to the 9 core hours selected by the student. The technical electives allow the student an opportunity to concentrate or gain depth in one or more of the various specialty areas of biosystems engineering. The technical electives must be selected from the courses listed below and approved by the student's academic advisor. Other courses may be considered, each on its individual merit.

Approved technical electives: ABT 360, 495; ASC 325, 364; BAE 435G, 438G, 450, 503, 505, 506, 514, 515, 516, 532, 535, 536, 537, 538, 541, 542, 543, 545, 547, 549, 580, 581, 583, 599; BCH 401G; BIO 302 (BIOL 335), 303 (BIOL 316), 304 (BIOL 327), 315 (BIOL 220, 319, or 411), 350, 395 (BIOL 399); BME 301, 395, 472, 481G, 485, 488, 501, 530, 540, 579, 580, 599; CE 211 (CE 160 7 161, or CET 216 & 218), 303, 351, 451, 461G, 471G, 525, 551; CHE 230 (CHEM 340), 236 (CHEM 314); CME 599; EE 402G; EES 530, 585; EGR 540, 542, 546, 599; FSC 434G, 530, 536, 538; GEO 309 (GEOG 316 or 317), 451G; ME 321, 344 (ME 344), 440, 501, 503, 513, 532; NRE 556; PGY 412G.

∞ Graduation Composition and Communication Requirement (GCCR) course.

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Computer Engineering

College of Engineering

Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § †.....	1
EGR 102 Fundamentals of Engineering Computing.....	CS 180, 240, or 245...2
MA 113 Calculus I.....	MATH 122, 126, or 136...4
CHE 105 General College Chemistry I*.....	CHEM 120...4
CIS/WRD 110 Composition and Communication I*Δ.....	3

Second Semester	Hours
EGR 103 Engineering Exploration II § †.....	2
MA 114 Calculus II.....	MATH 132, 137, or 227...4
PHY 231 General University Physics*.....	PHYS 255...4
PHY 241 General University Physics Laboratory.....	PHYS 256...1
CIS/WRD 111 Composition and Communication II Δ.....	3
CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques*.....	4

Sophomore Year

First Semester	Hours
MA 213 Calculus III.....	MATH 237 or 327...4
PHY 232 General University Physics.....	PHYS 265...4
PHY 242 General University Physics Laboratory.....	PHYS 266...1
CS 216 Introduction to Software Engineering Techniques*.....	CS 360...3
CPE 200 Computer Engineering Sophomore Seminar.....	1
CPE 282 Digital Logic Design*.....	4

Second Semester	Hours
MA 214 Calculus IV.....	MATH 331...3
EE 211 Circuits I.....	4
CPE 287 Introduction to Embedded Systems.....	4
CS 270 Systems Programming.....	3
CS 275 Discrete Mathematics.....	CS 280 or MATH 310...4

*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: CHE 105, CIS 110/WRD 110, CS 215, CS 216, EE 282/CPE 282, 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 100 or ENGL 100C) and ENG 102 (ENG 300) should also complete COM 181 (COMM 145, 145C, SCOM 145, or SCOM 161), COM 252 (COMM 148 or 348), COM 281 (COMM 349), or COM 287 (COMM 245 or 345).

§ 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.

∞ Graduation Composition and Communication Requirement (GCCR) course.

†† Technical elective may be selected from upper-division engineering, mathematics, statistics, computer science, physics, or other technically-related fields excluding more elementary version of required courses. To be selected in consultation with academic advisor. If a student wishes to use CS 499 instead of CPE 490 and CPE 491 to fulfill the GCCR and senior design requirements, the student must receive approval from the DUS to select an additional technical elective that supports the proposed CS 499 project.

††† 400-level CS courses and 500-level CPE and EE courses with emphasis in the computer engineering area. To be selected in consultation with academic advisor.

€ Hardware electives are senior level courses in the CPE or EE disciplines and shall be selected from the following list and/or selected in consultation with academic advisor:

- EE 582 Hardware Description Languages and Programmable Logic
- CPE 584 Introduction of VLSI Design and Testing
- CPE 585 Fault Tolerant Computing
- CPE 586 Communication and Switching Networks

~ Software electives are senior level courses in the CPE or EE disciplines and shall be selected from the following list and/or selected in consultation with academic advisor:

- CS 441G Compilers for Algorithmic Languages (fall only)
- CS 471G Networking and Distributed Operating Systems (CS 450)
- CS 570 Modern Operating Systems
- CPE 588 Real-Time Computer Systems

Junior Year

First Semester	Hours
EE 223 AC Circuits.....	4
CS 315 Algorithm Design and Analysis.....	3
CPE 380 Computer Organization.....	3
STA 381 Engineering Statistics – A Conceptual Approach.....	3
UK Core – Humanities.....	3

Second Semester	Hours
EE 421G Signals and Systems.....	3
EE 461G Introduction to Electronics.....	3
Technical Elective††.....	3
CPE 480 Advanced Computer Architecture.....	3
UK Core – Social Sciences.....	3

Senior Year

First Semester	Hours
CPE 490 ECE Capstone Design I ∞.....	3
CPE Elective†††.....	3
CPE Elective†††.....	3
Technical Elective†.....	3
UK Core – Citizenship - USA.....	3

Second Semester	Hours
CPE 491 ECE Capstone Design II †.....	3
Hardware Elective €.....	3
Software Elective ~.....	3
CPE Elective†††.....	3
UK Core – Global Dynamics.....	3

Mining Engineering

College of Engineering

Freshman Year

First Semester	Hours
CHE 105 General College Chemistry I*.....	CHEM 120...4
CIS/WRD 110 Composition and Communication I*Δ.....	3
EGR 101 Engineering Exploration I § †.....	1
EGR 102 Fundamentals of Engineering Computing.....	CS 180, 240, or 245...2
MA 113 Calculus I*.....	MATH 122, 126, or 136...4
Second Semester	
CIS/WRD 111 Composition and Communication II Δ.....	3
EGR 103 Engineering Exploration II § †.....	2
MA 114 Calculus II*.....	MATH 132, 137, or 227...4
PHY 231 General University Physics*.....	PHYS 255...4
PHY 241 General University Physics Laboratory (PHYS 256)	
or	
CHE 111 General Chemistry I Laboratory ¶\$.....	CHEM 121...1
UK Core – Social Sciences.....	3

Sophomore Year

First Semester	Hours
EES 220 Principles of Physical Geology.....	GEOL 111 & 113...4
EM 221 Statics.....	EM 222 or PHYS 227...3
MA 213 Calculus III*.....	MATH 237 or 327...4
MNG 201 Mining Engineering Fundamentals.....	3
PHY 232 General University Physics.....	PHYS 265...4
Second Semester	
EES 230 Fundamentals of Geology I.....	3
EM 302 Mechanics of Deformable Solids.....	EM 302 or 303...3
MA 214 Calculus IV.....	MATH 331...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

Junior Year

First Semester	Hours
EM 313 Dynamics.....	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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¶ 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 courses do not transfer. Chemistry labs must be in person.

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OPI '777'Cfxcpegf'I gqo gejcpleu'K
OPI '783'O kg'Eqputvevqp"Gpi kpgt kpi 'K
OPI '797'EqcnRtgrctcvqp'F guli p
OPI '7: 2'O kpgt cn'Rtqegukpi 'Rrpv'F guli p
OPI '7: 7'Cr r rlgf 'Uwthceg'Ej go kut {
OPI '7: ; "Vqr le'p'O kpi 'Gpi kpgt kpi