

# Aerospace Engineering

## College of Engineering

### Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § ▽	ENGR 110...1
EGR 102 Fundamentals of Engineering Computing	.....2
CIS/WRD 110 Composition and Communication I Δ	.....3
MA 113 Calculus I	EAC 101, ENGR 101, or MATH 205...4
PHY 231 General University Physics	.....PHYS 298...4
PHY 241 General University Physics Laboratory	.....PHYS 295 or 301...1
Second Semester	Hours
EGR 103 Engineering Exploration II § ▽	ENGR 111...2
MA 114 Calculus II	EAC 102, ENGR 102, or MATH 206...4
CIS/WRD 111 Composition and Communication II Δ	.....3
CHE 105 General College Chemistry I	.....4
UK Core – Social Sciences	.....3

### Sophomore Year

First Semester	Hours
MA 213 Calculus III	EAC 201, ENGR 201, or MATH 301...4
PHY 232 General University Physics	.....PHYS 299...4
PHY 242 General University Physics Laboratory	.....PHYS 296...1
EM 221 Statics	.....CEE 205...3
AER/ME 251 Introduction to Materials and Manufacturing Processes	.....3
AER 245 Introduction to Aerospace Engineering	.....3
Second Semester	Hours
AER/ME 220 Engineering Thermodynamics I	.....ME 251...3
EM 302 Mechanics of Deformable Solids	.....CEE 254, ME 323 or 432...3
MA 214 Calculus IV	.....ENGR 205 or MATH 405...3
EM 313 Dynamics	.....ME 206 or 320...3
UK Core – Humanities	.....3
STA 210 Making Sense of Uncertainty: An Introduction to Statistical Reasoning	or
STA 296 Statistical Methods and Motivations	BIOL 350, BSTA 201, or MATH 109
or	
STA 381 Engineering Statistics – A Conceptual Approach	.....IE 360...3

\*Courses 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 111/WRD 111, EGR 101, EGR 102, EGR 103 (or EGR 215 in lieu of EGR 101 and EGR 103), EM 221, MA 113, MA 114, MA 213, PHY 231, PHY 241, PHY 232, and PHY 242 and a C or better in each course. 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 (ENGL 101) and ENG 102 (ENLG 102 or 105, or ML 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111) COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

§ 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.

§ Online courses do not transfer. Chemistry labs must be in person.

### Junior Year

First Semester	Hours
EE 305 Electrical Circuits and Electronics	.....ECE 252...3
AER 355 Engineering Analysis	.....3
AER 305 Aerospace Structures	.....3
AER/ME 330 Fluid Mechanics	.....ME 401...3
WRD 204 Technical Writing	.....3
Second Semester	Hours
AER/ME 310 Engineering Experimentation I	.....ME 314...3
AER 320 Propulsion	.....3
AER/ME 325 Elements of Heat Transfer	.....ME 435...3
AER 345 Flight Dynamics	.....3
AER 335 Aerodynamics	.....3

### Senior Year

First Semester	Hours
AER 411 AER Capstone Design I	.....3
AER 410 Aerospace Engineering Laboratory	.....3
AER/ME 440 Design of Control Systems	.....3
AER 445 Aircraft Performance	.....3
Technical Elective*	.....3
Second Semester	Hours
AER 412 AER Capstone Design II	.....3
Technical Elective*	.....3
Technical Elective*	.....3
UK Core – Citizenship	.....3
UK Core – Global Dynamics	.....3

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\*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*.....EAC 101, ENGR 101, or MATH 205...4	
PHY 231 General University Physics*.....PHYS 298...4	
PHY 241 General University Physics Laboratory*.....PHYS 295 or 301...1	
CIS/WRD 110 Composition and Communication I*Δ .....3	
EGR 101 Engineering Exploration I §∇*.....ENGR 110...1	
EGR 102 Fundamentals of Engineering Computing *.....2	

Second Semester	Hours
MA 114 Calculus II*.....EAC 102, ENGR 102, or MATH 206...4	
CHE 105 General College Chemistry I*.....4	
CIS/WRD 111 Composition and Communication II*Δ.....3	
EGR 103 Engineering Exploration II §*∇ .....ENGR 111...2	
BIO 148 Introductory Biology I*.....BIOL 240...3	

### Sophomore Year

First Semester	Hours
MA 213 Calculus III.....EAC 201, ENGR 201, or MATH 301...4	
PHY 232 General University Physics.....PHYS 299...4	
PHY 242 General University Physics Laboratory.....PHYS 296...1	
BIO 152 Principles of Biology II.....BIOL 242...3	
BME 201 Introduction to Biomedical Engineering.....3	
Guided Engineering Elective I [1].....3	

Second Semester	Hours
MA 214 Calculus IV.....ENGR 205 or MATH 405...3	
CHE 107 General College Chemistry II.....CHEM 202...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.....IE 360...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.....BIOL 465...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 Students taking ENG 101 (ENGL 101) and ENG 102 (ENGL 102 or 105, or M L 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111) COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319)

§ 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.

[1] Guided Engineering Elective options: CME 200, CME 320, EE 211 (ECE 220), EE 305 (ECE 252), EM 221 (CEE 205), EM 302 (CEE 254, ME 323 or 432), EM 313 (ME 206 or 320), ME 340 (ME 435)

[2] 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

[3] Advanced BME Elective options: BME 532, BME 540, BME 571, BME 573, BME 395

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# Biosystems Engineering

## College of Engineering

### Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § †.....	ENGR 110...1
EGR 102 Fundamentals of Engineering Computing .....	2
CHE 105 General College Chemistry I*.....	CHEM 201...4
CIS/WRD 110 Composition and Communication I*Δ.....	3
MA 113 Calculus I *.....	EAC 101, ENGR 101, or MATH 205...4
<b>Second Semester</b>	
EGR 103 Engineering Exploration II § †.....	ENGR 111...2
MA 114 Calculus II *.....	EAC 102, ENGR 102, or MATH 206...4
CIS/WRD 111 Composition and Communication II Δ.....	3
PHY 231 General University Physics*.....	PHYS 298...4
PHY 241 General University Physics Laboratory.....	PHYS 295 or 301...1
UK Core.....	3

### Sophomore Year

First Semester	Hours
BAE 200 Principles of Biosystems Engineering*.....	3
BIO 148 Introductory Biology I.....	BIOL 240...3
MA 213 Calculus III*.....	EAC 201, ENGR 201, or MATH 301...4
PHY 232 General University Physics.....	PHYS 299...4
PHY 242 General University Physics Laboratory.....	PHYS 296...1
CE 106 Computer Graphics and Communication.....	EG 150 or ENGR 150...3
<b>Second Semester</b>	
BAE 202 Statistical Inferences for Biosystems Engineering.....	3
MA 214 Calculus IV.....	ENGR 205 or MATH 405...3
ME 220 Engineering Thermodynamics I.....	ME 251...3
EM 221 Statics.....	CEE 205...3
CHE 107 General College Chemistry II.....	CHEM 202...3

### Junior Year

First Semester	Hours
BAE 301 Economic Analysis for Biosystems .....	2
ME 330 Fluid Mechanics.....	ME 401...3
EE 305 Electrical Circuits and Electronics.....	ECE 252...3
EM 313 Dynamics .....	ME 206 or 320...3
BIO 152 Principles of Biology II.....	BIOL 242...3
WRD 204 Technical Writing ∞.....	3
<b>Second Semester</b>	
BAE 305 DC Circuits and Microelectronics .....	3
EM 302 Mechanics of Deformable Solids.....	CEE 254, ME 323, or ME 432...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
<b>Second Semester</b>	
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 Δ Students taking ENG 101 (ENGL 101) and ENG 102 (ENGL 102 or 105, or M L 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111), COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

§ 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.

\*\*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, 303, 304 (BIOL 330), 315 (BIOL 329 or 415), 350, 395 (BIOL 406 or 501); BME 301, 395, 472, 481G, 485, 488, 501, 530, 540, 579, 580, 599; CE 211 (CEE 260 & 261), 303, 351 (CEE 309), 451, 461G, 471G (CEE 450 & 451), 525, 551; CHE 230 (CHEM 341), 236; CME 599; EE 402G; EES 530, 585; EGR 540, 542, 546, 599; FSC 434G, 530, 536, 538; GEO 309 (GEOG 357 or 558), 451G; ME 321 (ME 310), 344 (ME 422), 440, 501 (ME 512), 503, 513, 532; NRE 556; PGY 412G.

∞ Graduation Composition and Communication Requirement (GCCR) course.

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# Chemical Engineering

## College of Engineering

### Freshman Year

First Semester	Hours
CIS/WRD 110 Composition and Communication I* $\Delta$ .....	3
MA 113 Calculus I*.....	<b>EAC 101, ENGR 101, or MATH 205</b> ...4
EGR 101 Engineering Exploration I $\S$ $\dagger$ .....	<b>ENGR 110</b> ...1
EGR 102 Fundamentals of Engineering Computing.....	2
CHE 105 General College Chemistry I*.....	<b>CHEM 201</b> ...4
CHE 111 General Chemistry I Laboratory*\$.....	<b>CHEM 207</b> ...1

### Second Semester

CIS/WRD 111 Composition and Communication II $\Delta$ .....	3
MA 114 Calculus II*.....	<b>EAC 102, ENGR 102, or MATH 206</b> ...4
EGR 103 Engineering Exploration II $\S$ $\dagger$ .....	<b>ENGR 111</b> ...2
PHY 231 General University Physics*.....	<b>PHYS 298</b> ...4
UK Core – Social Sciences.....	3

### Sophomore Year

First Semester	Hours
CME 200 Process Principles.....	3
MA 213 Calculus III*.....	<b>EAC 201, ENGR 201, or MATH 301</b> ...4
CHE 107 General College Chemistry II*.....	<b>CHEM 202</b> ...3
CHE 113 General Chemistry II Laboratory*\$.....	<b>CHEM 208 or 209</b> ...2
MSE 201 Materials Science.....	3
UK Core – Humanities.....	3

### Second Semester

CME 220 Computational Tools in Chemical Engineering.....	3
CME 320 Engineering Thermodynamics.....	3
MA 214 Calculus IV.....	<b>ENGR 205 or MATH 405</b> ...3
PHY 232 General University Physics.....	<b>PHYS 299</b> ...4
STA 381 Engineering Statistics – A Conceptual Approach.....	<b>IE 360</b> ...3

### Junior Year

First Semester	Hours
CME 330 Fluid Mechanics.....	3
CME 415 Separation Processes.....	3
CHE 230 Organic Chemistry I.....	<b>CHEM 341</b> ...3
CHE 231 Organic Chemistry Laboratory I\$.....	1
CHE 446G Physical Chemistry for Engineers.....	3
WRD 204 Technical Writing $\infty$ .....	3

### Second Semester

CME 006 The Engineering Profession (Junior and Senior).....	0
CME 420 Process Modeling in Chemical Engineering.....	3
CME 425 Heat and Mass Transfer.....	4
CME 432 Chemical Engineering Laboratory I\$.....	2
CHE 232 Organic Chemistry II.....	<b>CHEM 342</b> ...3
Engineering/Science Elective [1].....	3

### Senior Year

First Semester	Hours
CME 006 The Engineering Profession (Junior and Senior).....	0
CME 433 Chemical Engineering Laboratory II.....	3
CME 455 Chemical Engineering Process Design I.....	3
CME 470 Professionalism, Ethics and Safety.....	2
CME 550 Chemical Reactor Design.....	3
UK Core – Citizenship - USA.....	3
Engineering/Science Elective [1].....	3

### Second Semester

CME 006 The Engineering Profession (Junior and Senior).....	0
CME 456 Chemical Engineering Process Design II.....	3
CME 462 Process Control.....	3
UK Core – Global Dynamics.....	3
Engineering/Science Elective [1].....	3
Engineering/Science Elective [1].....	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, CHE 107, CHE 111, CHE 113, CIS 110/WRD 110, MA 113, MA 114, MA 213, and PHY 231. Completion of CME 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.

$\Delta$  Students taking ENG 101 (ENGL 101) and ENG 102 (ENGL 102 or 105, or M L 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111), COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

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

$\dagger$  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.

$\infty$  Graduation Composition and Communication Requirement (GCCR) course.

[1] Engineering/Science Elective Structure. Students must select four courses as follows:

1. Chemical Engineering elective [CME 395\*\*\*, 404G, 505, 515, 523, 542, 552, 554, 556, 570, 573, 580, 599]
2. Science/math elective (totaling three or more credit hours) that is not a more elementary version of a required course. [Students may combine multiple qualifying courses that total 3 credits (e.g. pre-medical students may wish to combine PHY 241 (PHYS 295 or 301), 242 (PHYS 296) and CHE 233 (CHEM 344)]
  - a. Math [MA 321 (ENGR 307, MATH 704, or MATH 508), 322 (ENGR 330 or MATH 325), 416G, 432G, 433G, 471G (MATH 501), 481G]
  - b. Chemistry (CHE 226, 250, 510 and above)
  - c. Biology [BIO 148 (BIOL 240) and above]
  - d. Physics [PHY 241 (PHYS 295 or 301) and above]
  - e. Other courses by approval of Director of Undergraduate Studies
3. Engineering elective (level 300 and above) that does not significantly duplicate content in a core chemical engineering course (e.g. ME 330 (ME 401)) OR a CME Elective (CME 395 & above).
4. Chemical engineering elective (CME 395 and above) OR one engineering elective (level 300 and above) OR one science/math elective as described above.

\*\*\*CME 395 (3 credits) may be used to satisfy only one elective requirement

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# Civil Engineering

## College of Engineering

### Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § †.....	ENGR 110...1
EGR 102 Fundamentals of Engineering Computing.....	2
CIS/WRD 110 Composition and Communication I*Δ.....	3
MA 113 Calculus I*.....	EAC 101, ENGR 101, or MATH 205...4
CHE 105 General College Chemistry I*.....	CHEM 201...4
Second Semester	
EGR 103 Engineering Exploration II § †.....	ENGR 111...2
CIS/WRD 111 Composition and Communication II Δ.....	3
MA 114 Calculus II*.....	EAC 102, ENGR 102, or MATH 206...4
PHY 231 General University Physics*.....	PHYS 298...4
PHY 241 General University Physics Laboratory*.....	PHYS 295 or 301...1
UK Core – Social Sciences.....	3

### Sophomore Year

First Semester	Hours
CE 211 Surveying*.....	CEE 260 & 261...4
CHE 107 General College Chemistry II*.....	CHEM 202...3
EM 221 Statics*.....	CEE 205...3
MA 213 Calculus III*.....	EAC 201, ENGR 201, or MATH 301...4
CE 106 Computer Graphics and Communication*.....	EG 150 or ENGR 150...3
Second Semester	
EM 302 Mechanics of Deformable Solids.....	CEE 254, ME 323, or ME432...3
MNG 303 Deformable Solids Laboratory.....	CEE 255...1
MA 214 Calculus IV.....	ENGR 205 or MATH 405...3
PHY 232 General University Physics.....	PHYS 299...4
PHY 242 General University Physics Laboratory.....	PHYS 296...1
Statistics Elective [1].....	3

### Junior Year

First Semester	Hours
WRD 204 Technical Writing ∞.....	3
EES 220 Principles of Physical Geology.....	4
CE 312 Fundamentals and Applications of Sustainable Engineering.....	3
CE 341 Introduction to Fluid Mechanics.....	CEE 370...4
CE 381 Civil Engineering Materials I.....	3
Second Semester	
CE 303 Introduction to Construction Engineering.....	3
CE 331 Transportation Engineering.....	3
CE 351 Introduction to Environmental Engineering.....	CEE 309...3
CE 482 Structural Analysis and Design.....	3
Engineering Science Elective [2].....	3

### Senior Year

First Semester	Hours
CE 461G Water Resources Engineering.....	4
CE 471G Soil Mechanics.....	CEE 450 & 451...4
CE Design Elective [3].....	3
Math/Science/Technical Elective [5].....	3
UK Core – Citizenship - US.....	3
Second Semester	
CE 401 Seminar.....	1
CE 429 Civil Engineering Systems Design.....	3
CE Design Elective [3].....	3
Technical Elective [4].....	3
UK Core – Humanities.....	3
UK Core – Global Dynamics.....	3

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Δ Students taking ENG 101 (ENGL 101) and ENG 102 (ENGL 102 or 105, or M L 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111), COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

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∞ Graduation Composition and Communication Requirement (GCCCR) course.

[1] STA 296 (BIOL 350, BSTA 201, or MATH 109) or STA 381 (IE 360).

[2] ME 220 (ME 251) or EM 313 (ME 206 or 320).

[3] Students are required to select two design electives from different areas. Choose from: CE 508, CE 531 or CE 533, CE 534, CE 549, CE 551 or CE 599, CE 579, CE 589. Design elective courses are typically taught once a year.

[4] Technical Electives are to be chosen from any of the courses at the 300-level or above that carry a CE prefix and in which a student is qualified to enroll, exclusive of required courses. Engineering elective courses are typically taught once a year.

[5] Math/Science/Technical Elective Options: MA 321 (ENGR 307, MATH 407, or MATH 508), MA 322 (ENGR 330 or MATH 325), CHE 230 (CHEM 341), CHE 236, EE 305 (ECE 252), EES 550, EES 585, MNG 551, or the other half of the Engineering Science Elective in (2), or Technical Elective as defined in (4).

§ Online courses do not transfer. Chemistry labs must be in person.

# Computer Engineering

## College of Engineering

### Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § †.....	ENGR 110...1
EGR 102 Fundamentals of Engineering Computing .....	2
MA 113 Calculus I .....	EAC 101, ENGR 101, or MATH 205...4
CHE 105 General College Chemistry I*.....	CHEM 201...4
CIS/WRD 110 Composition and Communication I*Δ .....	3
<b>Second Semester</b>	
EGR 103 Engineering Exploration II § † .....	ENGR 111...2
MA 114 Calculus II .....	EAC 102, ENGR 102, or MATH 206...4
PHY 231 General University Physics*.....	PHYS 298...4
PHY 241 General University Physics Laboratory.....	PHYS 295 or 301...1
CIS/WRD 111 Composition and Communication II Δ.....	3
CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques*.....	CIS 111...4

### Sophomore Year

First Semester	Hours
MA 213 Calculus III .....	EAC 201, ENGR 201, or MATH 301...4
PHY 232 General University Physics .....	PHYS 299...4
PHY 242 General University Physics Laboratory .....	PHYS 296...1
CS 216 Introduction to Software Engineering Techniques*.....	CIS 200...3
CPE 200 Computer Engineering Sophomore Seminar .....	1
CPE 282 Digital Logic Design*.....	4
<b>Second Semester</b>	
MA 214 Calculus IV .....	ENGR 205 or MATH 405...3
EE 211 Circuits I.....	ECE 220...4
CPE 287 Introduction to Embedded Systems.....	4
CS 270 Systems Programming .....	3
CS 275 Discrete Mathematics.....	4

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∞ 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 CS 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 570 Modern Operating Systems
- CPE 588 Real-Time Computer Systems

§ Online courses do not transfer. Chemistry labs must be in person.

### 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 .....	IC 360...3
UK Core – Humanities.....	3
<b>Second Semester</b>	
EE 421G Signals and Systems.....	3
EE 461G Introduction to Electronics.....	ECE 333...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
<b>Second Semester</b>	
CPE 491 ECE Capstone Design II † .....	3
Hardware Elective € .....	3
Software Elective ~ .....	3
CPE Elective††† .....	3
UK Core – Global Dynamics.....	3

# Computer Science

## College of Engineering

### Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § †.....	ENGR110...1
EGR 102 Fundamentals of Engineering Computing.....	2
CHE 105 General College Chemistry I (CHEM 201) or	
PHY 231 General University Physics °.....	PHYS298...4
CIS/WRD 110 Composition and Communication I Δ.....	3
MA 113 Calculus I.....	EAC 101, ENGR 101, or MATH 205...4
<b>Second Semester</b>	
EGR 103 Engineering Exploration II †.....	ENGR 111...2
CIS/WRD 111 Composition and Communication II Δ.....	3
MA 114 Calculus II*.....	EAC 102, ENGR 102, or MATH 206...4
PHY 231 General University Physics (PHYS 298) or	
CHE 105 General College Chemistry I °.....	CHEM 201...4
PHY 241 General University Physics Laboratory ‡.....	PHYS 295 or 301...1
CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques*.....	CIS 111...4

### Sophomore Year

First Semester	Hours
CS 216 Introduction to Software Engineering Techniques*.....	CIS200...3
CS 275 Discrete Mathematics*.....	4
EE 280 Design of Logic Circuits.....	ECE 210...3
MA 213 Calculus III.....	EAC 201, ENGR 201, or MATH 301...4
UK Core – Social Sciences.....	3
<b>Second Semester</b>	
CS 270 Systems Programming.....	3
CS 315 Algorithm Design and Analysis.....	3
Technical Elective [T].....	3
UK Core – Humanities.....	3
Science Elective [S].....	3

\*Courses 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: CS 215, CS 216, CS 275, and MA 114. 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 (ENGL 101) and ENG 102 (ENLG 102 or 105, or ML 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111), COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

§ 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.

° Based on advisor consult.

‡ Only if enrolled in PHY 231 (PHYS 298).

[T] Any additional 300-level or higher classes selected from computer science, electrical engineering, mathematics [including MA 214 (ENGR 205 or MATH 405): Calculus IV and excluding MA 308: Problem Solving-Middle School and MA 310: Mathematics Problem Solving-Teachers], College of Business and Economics, or by the Department of Computer Science's approval.

[S] Science Elective (3 credit hours)- must be selected from UK core natural science list, UK core social science list, or approved by the Department of Computer Science. Natural science course cannot be an elementary version of a required course.

[C] Computer Science Elective (18 credit hours) – include 300-level and above computer science courses with three classes to be selected from: CS 316, CS 335, CS 378, CS 405G, CS 441G, CS 450G, CS 460G and CS 463G.

[N] Natural Science (3 credit hours) – Any natural science course to be selected from the UK core natural science list or approved by the Department of Computer Science. Natural science course cannot be an elementary version of a required course.

[E] Free Elective (10 credit hours) – can be any course that earns college credit and is not a more elementary version of a required course. 6 credits are not to be selected from computer science, mathematics, natural science and engineering.

∞ Graduation Composition and Communication Requirement (GCCR) course.

§ Online courses do not transfer. Chemistry labs must be in person.

### Junior Year

First Semester	Hours
CS/MA 321 Introduction to Numerical Methods (ENGR 307, MATH 407, or MATH 508) or	
MA 322 Matrix Algebra and Its Applications.....	ENGR330 or MATH325...3
CS 371 Introduction to Computer Networking.....	3
Computer Science Elective [C].....	3
Computer Science Elective [C].....	3
STA 381 Engineering Statistics – A Conceptual Approach.....	IE 360...3
<b>Second Semester</b>	
CS 375 Logic and Theory of Computing.....	3
Computer Science Elective [C].....	3
Computer Science Elective [C].....	3
Technical Elective [T].....	3
UK Core – Citizenship - US.....	3
Natural Science Elective [N].....	3

### Senior Year

First Semester	Hours
CS 498 Software Engineering for Senior Project.....	3
Computer Science Elective [C].....	3
Technical Elective [T].....	3
UK Core – Global Dynamics.....	3
Free Elective [E].....	4
<b>Second Semester</b>	
CS 499 Senior Design Project ∞.....	3
Computer Science Elective [C].....	3
Technical Elective [T].....	3
Free Elective [E].....	3
Free Elective [E].....	3



# Electrical Engineering

## College of Engineering

### Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § †.....	ENGR 110...1
EGR 102 Fundamentals of Engineering Computing.....	2
PHY 231 General University Physics.....	PHYS 298...4
PHY 241 General University Physics Laboratory .....	PHYS 295 or 301...1
CIS/WRD 110 Composition and Communication I Δ.....	3
MA 113 Calculus I.....	EAC 101, ENGR 101, or MATH 205...4

Second Semester	Hours
EGR 103 Engineering Exploration II § †.....	ENGR 111...2
CIS/WRD 111 Composition and Communication II Δ.....	3
MA 114 Calculus II.....	EAC 102, ENGR 102, or MATH 206...4
CHE 105 General College Chemistry I.....	CHEM 201...4
CS 215 Introduction to Program Design, Abstraction, and Problem Solving.....	CIS 111...4

### Sophomore Year

First Semester	Hours
MA 213 Calculus III.....	EAC 201, ENGR 201, or MATH 301...4
PHY 232 General University Physics.....	PHYS 299...4
PHY 242 General University Physics Laboratory .....	PHYS 296...1
EE 211 Circuits I.....	ECE 220...4
EE/CPE 282 Digital Logic Design.....	4

Second Semester	Hours
MA 214 Calculus IV.....	ENGR 205 or MATH 405...3
EE 223 AC Circuits.....	4
EE/CPE 287 Introduction to Embedded Systems.....	4
UK Core – Social Sciences.....	3
UK Core – Humanities.....	3

### Junior Year

First Semester	Hours
EE 415G Electromechanics.....	3
EE 421G Signals and Systems.....	3
Elective EE Laboratory [L].....	2
EE 461G Introduction to Electronics.....	ECE 333...3
MA 320 Introductory Probability (MATH 561) or STA 381 Engineering Statistics – A Conceptual Approach .....	IE 360...3
Technical Elective [T].....	3
Second Semester	Hours
EE 468G Introduction to Engineering Electromagnetics.....	ECE 473...4
Elective EE Laboratory [L].....	2
Engineering/Science Elective [E].....	3
Technical Elective [T].....	3
UK Core – Citizenship - USA.....	3

### Senior Year

First Semester	Hours
EE/CPE 490 ECE Capstone Design I∞.....	3
EE Technical Elective**.....	3
EE Technical Elective**.....	3
Math/Statistics Elective [M].....	3
UK Core – Global Dynamics.....	3
Second Semester	Hours
EE/CPE 491 ECE Capstone Design II.....	3
EE Technical Elective**.....	3
EE Technical Elective**.....	3
Engineering/Science Elective [E].....	3
UK Core – Statistical Inferential Reasoning.....	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: CIS 110/WRD 110, CHE 105, CS 215, EE 211, 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 (ENGL 101) and ENG 102 (ENLG 102 or 105, or M L 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111), COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

§ 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.

[M] **Math/Statistics Elective:** Any upper-division (300-level or higher) math or statistics course excluding MA 308 and MA 310 (3 credit hours total).

[E] **Engineering/Science Electives:** Any engineering, physics, computer science, or math course at the 200-level or higher, other than an electrical engineering course and excluding MA 308, MA 310, and more elementary versions of required courses (6 credit hours total). Cooperative education credit may not be used to satisfy this requirement.

[T] **Technical elective** may be selected from upper-division (300-level or higher) engineering, mathematics, statistics, computer science, physics, or other technically-related fields excluding MA 308, MA 310, EE 305 (ECE 252), and more elementary versions of required courses, to be selected in consultation with the academic advisor (6 credit hours total).

[L] **Electrical Engineering Laboratory Elective:** EE 416G, EE 422G, EE 462G (ECE 334) (4 credit hours total).

∞ Graduation Composition and Communication Requirement (GCCR) course.

§ Online courses do not transfer. Chemistry labs must be in person.

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# Electrical Engineering • 2

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\*\*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)

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# Materials Engineering

## College of Engineering

### Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § †.....	ENGR110...1
EGR 102 Fundamentals of Engineering Computing.....	2
CHE 105 General College Chemistry I*.....	CHEM 201...4
CHE 111 General Chemistry I Laboratory*\$.....	CHEM 207...1
CIS/WRD 110 Composition and Communication I*Δ.....	3
MA 113 Calculus I*.....	EAC 101, ENGR 101, or MATH 205...4
<b>Second Semester</b>	
EGR 103 Engineering Exploration II § †.....	ENGR 111...2
CIS/WRD 111 Composition and Communication II Δ.....	3
MA 114 Calculus II*.....	EAC 102, ENGR 102, or MATH 206...4
PHY 231 General University Physics*.....	PHYS 298...4
PHY 241 General University Physics Laboratory*.....	PHYS 295 or 301...1
UK Core – Social Sciences.....	3

### Sophomore Year

First Semester	Hours
MSE 201 Materials Science.....	3
MSE 202 Materials Science Laboratory.....	1
MA 213 Calculus III*.....	EAC 201, ENGR 201, or MATH 301...4
CHE 107 General College Chemistry II*.....	CHEM 202...3
CHE 113 General Chemistry II Laboratory*\$.....	CHEM 208 or 209...2
EM 221 Statics.....	CEE 205...3
<b>Second Semester</b>	
MSE 301 Materials Science II.....	3
MSE 351 Materials Thermodynamics.....	3
MA 214 Calculus IV.....	ENGR 205 or MATH 405...3
PHY 232 General University Physics.....	PHYS 299...4
CHE 236 Survey of Organic Chemistry.....	3

### Junior Year

First Semester	Hours
MSE 401G Metal and Alloys.....	3
MSE 404G Polymeric Materials.....	3
CME 200 Process Principles.....	3
EM 302 Mechanics of Deformable Solids.....	CEE 254, ME 323, or ME 432...3
STA 381 Engineering Statistics – A Conceptual Approach.....	IE 360...3
UK Core – Humanities.....	3
<b>Second Semester</b>	
MSE 402G Electronic Materials and Processing.....	3
MSE 403G Ceramic Engineering and Processing.....	3
MSE 407 Materials Laboratory I ∞.....	3
MSE 535 Mechanical Properties of Materials.....	3
PHY 361 Principles of Modern Physics.....	PHYS 300...3

### Senior Year

First Semester	Hours
MSE 408 Materials Laboratory II.....	3
MSE 436 Material Failure Analysis.....	3
MSE 470 Application of Materials Engineering to Design Problems.....	1
MSE 585 Materials Characterization Techniques.....	3
EE 305 Electrical Circuits and Electronics.....	ECE 252...3
Technical Elective [1].....	3
<b>Second Semester</b>	
MSE 480 Materials Design.....	3
MSE 538 Metals Processing.....	3
Technical Elective [1].....	3
UK Core – Citizenship - USA.....	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 all pre-major courses. Successful completion of the following courses with at least a 2.5 GPA: CHE 105, CHE 107, CHE 111, CHE 113, CIS 110/WRD 110, MA 113, MA 114, MA 213, PHY 231, and PHY 241. Completion of MSE 201 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 (ENGL 101) and ENG 102 (ENLG 102 or 105, or M L 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111), COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

§ 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.

[1] Technical Electives - total of 6 credit hours and must be chosen. Technical electives are to be selected from a technical discipline, with approval from the Director of Undergraduate Studies. At least 3 credit hours must come from a course with a MSE prefix. MSE 395 (research) may count for one elective, but not both. Recommended technical electives include but are not limited to: MSE 395, 506, 531, 552, 554, 556, 569, 599; BME 488; CHE 580; CME 542, 599; MA 322 (ENGR 330 or MATH 325), 422, 432G; ME/MFS 503

∞ Graduation Composition and Communication Requirement (GCCR) course.

§ Online courses do not transfer. Chemistry labs must be in person.

# Mechanical Engineering

## College of Engineering

### Freshman Year

First Semester	Hours
EGR 101 Engineering Exploration I § † *	ENGR 110...1
EGR 102 Fundamentals of Engineering Computing*	.....2
CIS/WRD 110 Composition and Communication I*	.....3
MA 113 Calculus I*	EAC 101, ENGR 101, or MATH 205...4
PHY 231 General University Physics*	.....PHYS 298...4
PHY 241 General University Physics Laboratory *	.....PHYS 295 or 301...1
<b>Second Semester</b>	
EGR 103 Engineering Exploration II § † *	ENGR 111...2
MA 114 Calculus II *	EAC 102, ENGR 102, or MATH 206...4
CIS/WRD 111 Composition and Communication II Δ	.....3
CHE 105 General College Chemistry I*	.....CHEM 201...4
UK Core ¶ – Social Sciences	.....3

### Sophomore Year

First Semester	Hours
MA 213 Calculus III*	EAC 201, ENGR 201, or MATH 301...4
PHY 232 General University Physics*	.....PHYS 299...4
PHY 242 General University Physics Laboratory*	.....PHYS 296...1
EM 221 Statics*	.....CEE 205...3
ME 205 Computer Aided Engineering Graphics	.....3
Guided Elective	
or	
UK Core ¶ – Humanities	.....3
<b>Second Semester</b>	
ME 220 Engineering Thermodynamics I	.....ME 251...3
ME 251 Introduction to Materials and Manufacturing Processes	.....3
MA 214 Calculus IV	ENGR 205 or MATH 405...3
EM 313 Dynamics	.....ME 206 or 320...3
Guided Elective or	
UK Core* – Humanities	
Guided Elective or	
UK Core* – Statistical Inferential Reasoning.	
Recommended:	
STA 210 Making Sense of Uncertainty:	
An Introduction to Statistical Reasoning or	
STA 381 Engineering Statistics – A Conceptual Approach	.....IE 360...3

\*Courses 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 111/WRD 111, EGR 101, EGR 102, EGR 103 (or EGR 215 in lieu of EGR 101 and EGR 103), EM 221, MA 113, MA 114, MA 213, PHY 231, PHY 241, PHY 232, and PHY 242 and a C or better in each course. 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 (ENGL 101) and ENG 102 (ENLG 102 or 105, or ML 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111), COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

§ 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.

¶ To be selected from UK Core courses in consultation with the academic advisor.

\*\*Graduation Composition and Communication Requirement (GCCR) course.

\*\*\*Mathematics Elective – choose one course from approved list.

††Technical Electives – choose 9 hours from approved list.

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

### Junior Year

First Semester	Hours
EM 302 Mechanics of Deformable Solids	CEE 254, ME 323, or ME 432...3
EE 305 Electrical Circuits and Electronics	.....ECE 252...3
ME 330 Fluid Mechanics	.....ME 401...3
ME 340 Introduction to Mechanical Systems	.....ME 435...3
WRD 204 Technical Writing**	.....3
<b>Second Semester</b>	
ME 310 Engineering Experimentation I	.....ME 314...3
ME 321 Engineering Thermodynamics II	.....ME 310...3
ME 325 Elements of Heat Transfer	.....ME 440...3
ME 344 Mechanical Design	.....ME 422...3
Mathematics Elective***	.....3

### Senior Year

First Semester	Hours
ME 411 ME Capstone Design I	.....3
ME 311 Engineering Experimentation II	.....3
ME 440 Design of Control Systems	.....3
ME 501 Mechanical Design with Finite Element Methods	
or	
ME 590 Computational Fluid Dynamics	.....3
Technical Elective††	.....3
<b>Second Semester</b>	
ME 412 ME Capstone Design II	.....3
Technical Elective††	.....3
Technical Elective††	.....3
UK Core* – Citizenship - US	.....3
UK Core* – Global Dynamics	.....3

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# Mechanical Engineering • 2

## Mathematics Elective Hours

Choose one course from the following:

MA 320 Introductory Probability.....	MATH561...3
MA 321 Introduction to Numerical Methods....	ENGR307,MATH407,orMATH508...3
MA 322 Matrix Algebra and Its Applications.....	ENGR330orMATH325...3
MA 416G Introduction to Optimization .....	3
MA 432G Methods of Applied Mathematics I .....	3
MA 433G Introduction to Complex Variables.....	3
MA 481G Differential Equations.....	3
STA 381 Engineering Statistics – A Conceptual Approach .....	IE 360...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.....	ME512...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*.....	CHEM 201...4
CIS/WRD 110 Composition and Communication I*Δ.....	.....3
EGR 101 Engineering Exploration I § †.....	ENGR 110...1
EGR 102 Fundamentals of Engineering Computing.....	.....2
MA 113 Calculus I*.....	EAC 101, ENGR 101, or MATH 205...4
<b>Second Semester</b>	
CIS/WRD 111 Composition and Communication II Δ.....	.....3
EGR 103 Engineering Exploration II § †.....	ENGR 111...2
MA 114 Calculus II*.....	EAC 102, ENGR 102, or MATH 206...4
PHY 231 General University Physics*.....	PHYS 298...4
PHY 241 General University Physics Laboratory (PHYS 295 or 301) or CHE 111 General Chemistry I Laboratory ¶\$.....	CHEM 207...1
UK Core – Social Sciences.....	.....3

### Sophomore Year

First Semester	Hours
EES 220 Principles of Physical Geology.....	.....4
EM 221 Statics.....	CEE 205...3
MA 213 Calculus III*.....	EAC 201, ENGR 201, or MATH 301...4
MNG 201 Mining Engineering Fundamentals.....	.....4
PHY 232 General University Physics.....	PHYS 299...4
<b>Second Semester</b>	
EES 230 Fundamentals of Geology I.....	.....3
EM 302 Mechanics of Deformable Solids.....	CEE 254, ME 323, or ME 432...3
MA 214 Calculus IV.....	ENGR 205 or MATH 405...3
MNG 291 Elements of Mine Design.....	.....3
MNG 303 Deformable Solids Laboratory.....	CEE 255...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.....	ME 206 or 320...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
<b>Second Semester</b>	
CE 341 Introduction to Fluid Mechanics.....	CEE 370...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
<b>Second Semester</b>	
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

\*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 (ENGL 101) and ENG 102 (ENLG 102 or 105, or M L 199, or WGST 199) should also complete COM 181 (BIOL 203 or COMM 111), COM 252 (COMM 115 or 315), COM 281 (COMM 312), or COM 287 (COMM 311 or 319).

§ 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 courses do not transfer. Chemistry labs must be in person.

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MNG 555 Advanced Geomechanics I  
MNG 561 Mine Construction Engineering I  
MNG 575 Coal Preparation Design  
MNG 580 Mineral Processing Plant Design  
MNG 585 Applied Surface Chemistry  
MNG 599 Topic in Mining Engineering