BME Broad Electives

BME Broad Technical Electives (TEs) are designed to provide additional breadth in the undergraduate Biomedical Engineering (BME+) program

BME+ students are required to take 3 credits from classes on the following list.

Course availability changes frequently. Check with individual departments regarding course availability. If course is not showing on Ramweb schedule, it's likely not offered that term

See notes below in GREEN about courses restricted by BME pathway

Classes otherwise required for (or equivalent to) the degree not allowed for BME BE credit

SEE LAST PAGE OF THIS DOCUMENT FOR INFO ON HOW TO OBTAIN COURSE OVERRIDES

** Approved-DARS changes coming = course approved by BME, will show in catalog/on DARS eventually

Key: F - Fall; S - Spring; SS - Summer Session; OAN - Offered As Needed ; * Available Every Other Even Year; ** Available Every Other Odd Year; ^ Winter Break (with fall pre-departure classes)

COURSE	NAME	TERM	CR
AB 310	Understanding Pesticides	S	3
ANTH 416	Gender, Culture, and Health	F,S,SS	3
ART 237	Drawing for Non-Art Majors **Approved-DARS changes coming	OAN	3
ATS 555	Air Pollution	S**	3
ATS 560	Air Pollution Measurement	F	2
BC 351x	Principles of Biochemistry (Approved only for BME+EE/L&O/CPE, BME+MECH)	F, S, SS	4
BC 401	Comprehensive Biochemistry I	F	3
BC 403	Comprehensive Biochemistry II	S	3
BC 404	Comprehensive Biochemistry Lab	F,S	2
BC 411	Physical Biochemistry	F	4
BC 441	3D Molecular Models for Biochemistry	F	1
BC 463	Molecular Genetics	F	3
BC 464	Molecular Genetics Recitation	F	1
BC 465	Molecular Regulation of Cell Function	S	3
BC 517	Metabolism	F/S	2
BC 521	Principles of Chemical Biology	F	3
BIOM 350A	Study Abroad -- Ecuador: Prosthetics	SS	1 or 2
BIOM 350B	Study Abroad -- Portugal: BME Healthcare	SP (WB)	1
BIOM 304	Global Challenges & Int'l Collaborations in BME	S	3
BIOM 421×	Transp Phenomena in BME (Approved only for BME+EE/L&O/CPE, BME+MECH)	F	3
BIOM 422×	Quant. Systems in Synth. Bio (Approved only for BME+EE/L&O/CPE, BME+MECH)	S	3
BIOM 431•	Biomed Signal/Image Proc'sg (Approved only for BME+CBE, BME+MECH)	S	3
BIOM 441××	Biomechanicals and Biomaterials (Approved only for BME+CBE, BME+EE/L&O/CPE)	F	3
BIOM 504	Fundamentals of Biochemical Engineering	S	3
BIOM 517	Advanced Optical Imaging	F*	3
BIOM 518	Biophotonics	F	3
BIOM 522	Bioseparation Processes	F	3
BIOM 525	Cell and Tissue Engineering	S	3
BIOM 526	Biological Physics	F**	3
BIOM (A-F)	Biosensors	F, S, SS	1
BIOM 531	Materials Engineering	S	3
BIOM 533	Biomolecular Tools for Engineers	F	3
BIOM 537	Biomedical Signal Processing	S	3
BIOM 570	Bioengineering	F	3
BIOM 573	Structure and Function of Biomaterials	S	3
BIOM 574	Bio-Inspired Surfaces	S	3
BIOM 576	Quantitative Systems Physiology	S	4
BIOM 578	Musculoskeletal Biosolid Mechanics	F	3
BIOM 579	Cardiovascular Biomechanics	F**	3
BIOM 572	Regenerative Bioengineering with Stem Cells	F, S	3
BMS 301	Human Gross Anatomy	F,S,SS	5
BMS 302	Laboratory in Principles in Physiology	F,S	2
BMS 305	Domestic Animal Gross Anatomy	S	4
BMS 310	Anatomy for the Health Professions (online)	F, S, SS	4
BMS 325	Cellular Neurobiology	F	3
BMS 330	*Microscopic Anatomy*	*S*	*4*
BMS 345	Functional Neuroanatomy	S	4
BMS 405	Nerve and Muscle-Toxins, Trauma and Disease	S	3

COURSE	NAME	TERM	CR
BMS 409	Human and Animal Reproductive Biology	F	3
BMS 420	Cardiopulmonary Physiology	F	3
BMS 430	Endocrinology	F	3
BMS 450	Pharmacology	S	3
BMS 460	Essentials of Pathophysiology	S	3
BMS 500	Mammalian Physiology I	F	4
BMS 501	Mammalian Physiology II	S	4
BMS/NB 503	Developmental Neurobiology	S	3
BMS/NB 505	Neuronal Circuts, Systems and Behavior	S	3
BMS 545	Neuroanatomy	S	5
BMS 575	Human Anatomy Dissection	F	4
BSPM 302	Applied and General Entomology	F	2
BSPM 361	Elements of Plant Pathology	S	3
BSPM/MIP 576*	Bioinformatics	F,S	3
BZ 310	Cell Biology	F,S,SS	4
BZ 311	Developmental Biology	S,SS	4
BZ 348	Theory of Population and Evolutionary Ecology	F	4
BZ 350	Molecular and General Genetics	F,S,SS	4
BZ 360	Bioinformatics and Genomics	S	3
BZ 420	Evolutionary Medicine	S	3
BZ 476/BZ 576	Genetics of Model Organisms	F	3
CBE 330×	Process Simulation (Approved only for BME+EE, BME+EL-L&O, BME+MECH)	F	3
CBE 406	Introduction to Transport Phenomena	F	3
CBE 439	Environmental Enginnering Chemical Concepts	F	3
CBE/MIP 480A3	Interdisciplinary Synthetic Bio Lab (offered SM19 only)	S	4
CBE 501	Chemical Engineering Thermodynamics	F	3
CBE 502	Advanced Reactor Design	F	3
CBE 503	Transport Phenomena Fundamentals	S	3
CBE 505	Biochemical Engineering Laboratory	F**	1
CBE 514	Polymer Science and Engineering	S	3
CBE 521	Mathematical Modeling for Chemical Engineers	F	3
CBE 522	Bioseparation Processes	F	3
CBE 524	Bioremediation	F**	1
CBE/CIVE 540	Advanced Biological Wastewater Processing	F	3
CBE 570	Biomechular Engineering/Synthetic Biology	S	3
CHEM 246×	Fund'ls of Org Chem Lab (Approved only for BME+EE/L&O/CPE, BME+MECH)	F,S,SS	1
CHEM 261	Fundamentals of Inorganic Chemistry	S	3
CHEM 311	Introduction to Nanoscale Science	S*	3
CHEM 334	Quantitative Analysis Laboratory	F,S	1
CHEM 335	Introduction to Analytical Chemistry	F,S	3
CHEM 338	Environmental Chemistry	S**	3
CHEM 343×	Modern Org Chem II (Approved only for BME+EE/L&O/CPE, BME+MECH)	F, S, SS	3
CHEM 344×	Modern Org Chem II Lab (Approved only for BME+EE/L&O/CPE, BME+MECH)	F, S, SS	2
CHEM 346×	Organic Chem II (Approved only for BME+EE/L&O/CPE, BME+MECH)	S	4
CHEM 431	Instrumental Analysis	F	4
CHEM 433	Clinical Chemistry	S**	3
CHEM 440	Advanced Organic Chemistry Laboratory	F	2
CHEM 461	Inorganic Chemistry	S	3

COURSE	NAME	TERM	CR
CHEM 522	Methods of Chemical Biology	S	2
CHEM 532	Advanced Chemical Analysis II	F, S, SS	3
CHEM 537	Electrochemical Methods	S**	3
CHEM 539 (A,B,C)	Principles of NMR and MRI	S	1
CHEM 541	Organic Molecular Structure Determination	S	2
CHEM 543	Structure/Mechanisms in Organic Chemistry	F	2
CHEM 545	Synthetic Organic Chemistry I	S	3
CHEM 547	Physical Organic Chemistry	S	3
CHEM 555	Chemistry of Sustainability	F	3
CHEM 560	Foundations of Inorganic Synthesis	F	1
CHEM 566	Bioinorganic Chemistry	F*	3
CHEM 567	Crystallographic Computation		1
CHEM 569	Chemical Crystallography	S*	3
CHEM 570	Chemical Bonding	F*	3
CHEM 575	Chemical Thermodynamics	F	1
CHEM 576	Statistical Mechanics	F	2
CHEM 577	Surface Chemistry	S	3
CHEM 578A	Computational Chemistry: Electronic Structure	S	1
CHEM 579	Chemical Kinetics	F**	3
CIVE 322	Basic Hydrology	F,S	3
CIVE 330	Ecological Engineering	S	3
CIVE 360xx	Mechanics of Solids (Approved only for BME+CBE, BME+EE/L&O/CPE)	F,S,SS	3
CIVE 367	Structural Analysis	F,S	3
CIVE 371	Study Abrod - Peru: Grand Challenges in Engr	SP (WB)	3
CIVE 401	Hydraulic Engineering	S	3
CIVE 413	Environmental River Mechanics	F	3
CIVE 423	Groundwater Engineering	S	3
CIVE 425	Soil and Water Engineering	S	3
CIVE 438	Environmental Engineering Concepts	F,S	3
CIVE 440	Nonpoint Source Pollution	F	3
CIVE 442	Air Quality Engineering	S	3
CIVE 504	Wind Engineering	F	3
CIVE 520	Physical Hydrology	F	3
CIVE/WR 524	Modeling Watershed Hydrology	S	3
CIVE 531	Groundwater Hydrology	F	3
CIVE 538	Aqueous Chemistry	S	3
CIVE 560	Advanced Mechanics of Materials	F	3
CIVE 562	Fundamentals of Vibrations	S	3
CM 501	Advanced Cell Biology	F	4
CM/NB 502	Techniques in Molecular & Cellular Biology	F	2
CS 152	Intro to Programming- Python (not allowed for BME+EE or BME+EL)	F,S	2
CS 164 •	Java Prior Programming (Approved only for BME+CBE, BME+MECH)	F,S,SS	4
CS 165	AVA (CS2) Data Structures and Algorithms	F,S	4
CS 220	Discrete Structures and their Applications	F, S, SS	4
CS 253	Software Development with C++	F,S	4
CS 270	Computer Organization	F,S	4
CS/IDEA 310H	Design Thinking Toolbox: Mixed Reality Design	F*	3
CS 314	Software Engineering	F, S	3
CS 320 ++	Algorithms-Theory and Practice	F,S	3
CS 356	Systems Security	F, S	3
CS 370	Operating Systems	F, S	3
CS 4XX	Any CS course at the 400 level except CS 495 (Ind. Study)		
CS 5XX	Any CS course at the 500 level		
DSCI 369	Linear Algebra for Data Sci - OR MATH 369 (cr not allowed for both)	S	4

COURSE	NAME	TERM	CR
ECE 204 ••	Intro to Electrical Engineering (Approved only for BME+CBE)	F,S	3
ECE 312 ••••	Linear System Analysis II (Approved only for BME+CBE, BME+EE-L&O, BME+MECH)	S	3
ECE4XX	Any ECE course at the 400 level except ECE 495 (Ind. Study)	F, S	Varies
ECE5XX	Any ECE course at the 500 level	F,S	Varies
ECE/MECH 569	Micro-Electro-Mechanical Devices	S	3
ENGR 300	3D Printing Lab for Engineers	F,S,SS	1
ENGR 422	Technology Entrepreneurship	S	3
ENGR 478	Engineering Data Anlytics *Approved-DARS changes coming	S	3
ENGR 510	Engineering Optimization	F	3
ENGR 525	Intellectual Property and Invention Systems	S	3
ENGR 531	Engineering Risk Analysis	F, S	3
ENGR 533	Spaceflight and Biological systems ** Approved-DARS changes coming	S**	3
ENGR/MATH 550	Numerical Methods in Science and Engineerign	F,S	3
ENGR 570	Coupled Electromechanical Systems	F	3
ERHS 320 ++	Environmental Health- Water and Food Safety	F	3
ERHS 332 ++	Principles of Epidemiology	S	3
ERHS 400	Radiation Safety	F, S, SS	3
ERHS 410 ++	Environmental Health and Waste Management	S	3
ERHS 446	Environmental Toxicology	F	3
ERHS 448	Environmental Contaminants: Exposure and Fate	S	3
ERHS 450	Introduction to Radiation Biology	S	3
ERHS 502	Fundamentals of Toxicology	F,S	3
ERHS 503 ++	Toxicology Principles	S	1
ERHS 510	Cancer Biology	S	3
ERHS 530 ++	Radiological Physics and Dosimetry I	F	3
ERHS 540	Principles of Ergonomics	F	3
ERHS 542 ++	Biostatistical Methods for Qualitative Data	F	3
ERHS 547	Equipment and Instrumentation	S	3
ERHS 560	Helath Impact Assessment	F	2
F 311	Forest Ecology	F,S	3
FIN 305	Fundamentals of Finance	F,S,SS	3
FSHN 470	Integrated Nutrition & Metabolism	F,S	3
FTEC 447	Food Chemistry	S**	2
GEOL 150	Physical Geology for Scientists and Engineers	F	4
GEOL 452	Hydrogeology	F	4
GEOL 454	Geomorphology	S	4
GES 441	Analysis of Sustainable Energy Solutions	S	3
GES 450	Global Sustainability and Health	F,S	3
GES 542	Biobased Fuels, Energy, and Chemicals	S	3
GR 305	Geography of Global Health	S	3
HES 207	Anatomical Kinesiology	F,S,SS	3
HES 307	Biomechanical Principles of Human Movement	F,S,SS	4
HES 319	Neuromuscular Aspects of Human Movement	F,S	4
HES 345	Population Health and Disease Prevention	F,S,SS	3
HES 403	Physiology of Exercise	F,S,SS	4
HES 420	Electrocardiography and Exercise Management	F,S	3
HES 476	Exercise and Chronic Disease	F,S,SS	3
HORT 579	Professional Landscape Practices	S	2
IDEA 310B	Design Thinking Toolbox: 3D Modeling	OAN	2
IDEA 310D	Design Thinking Toolbox: Digital Imaging	OAN	1
IDEA/CS 310H	Design Thinking Toolbox: Mixed Reality Design	F*	3
IDEA 455	Design for Defense	F	3
LIFE 201B	Introductory Genetics	F,S	3
LIFE 202B	Introductory Genetics Recitation	F,S	1
LIFE 203	Introductory Genetics Laboratory	S	2
LIFE 210	Introductory Cell Biology	F	3

COURSE	NAME	TERM	CR
LIFE 211	Introductory Cell Biology Honors Recitation	F, S	1
LIFE 212	Introductory Cell Biology Laboratory	F,S	2
LIFE 320	Ecology	F,S	3
LSPA 340	Spanish for Animal Health and Care Fields	F	3
LSPA 346	Spanish for Healthcare	F,S,SS	3
MATH 151×	Math Algorithms in Matlab I (Approved only for BME+EE, BME+EE-L&O, BME+MECH)	S	1
MATH 229	Matrices & Linear Equations	F,S	2
MATH 235	Intro to Mathematical Reasoning	F,S	2
MATH 301	Introduction to Combinatorial Theory	F	3
MATH 317	Advanced Calculus of One Variable	F,S,SS	3
MATH 331	Introduction to Mathematical Modeling	F	3
MATH 332	Partial Differential Equations	S	3
MATH/BZ 348	Theory of Population and Evolutionary Ecology	F	4
MATH 360	Mathematics of Information Security	F	3
MATH 366	Introduction to Abstract Algebra	F,S,SS	3
MATH 369	Linear Algebra I -- OR DSCI 369 (credit not for both) *Approved-DARS changes coming	F,S,SS	3
MATH 405	Introduction to Number Theory	S*	3
MATH 417	Advanced Calculus I	F	3
MATH 418	Advanced Calculus II	S*	3
MATH 419	Introduction to Complex Variables	F	3
MATH/ECE 430	Fourier and Wavelet Analysis with Apps	S	3
MATH 450	Introduction to Numerical Analysis I	F	3
MATH 451	Introduction to Numerical Analysis II	S	3
MATH 455	Mathematics in Biology and Medicine	F**	3
MATH 460	Information and Coding Theory	S	3
MATH 466	Abstract Algebra I	F	3
MATH 467	Abrstract Algebra II	S**	3
MATH 469	Linear Algebra II	S	3
MATH 470	Euclidean and Non-Euclidean+B29 Geometry	S	3
MATH 474	Introduction to Differential Geometry	F**	3
MATH 525	Optimal Control	S**	3
MATH 530	Mathematics for Scientists and Engineers	F	4
MATH 532	Mathematical Modeling of Large Data Sets	S	3
MATH 535	Foundations of Applied Mathematics	F	3
MATH 546	Partial Differential Equations II	S	3
MATH 560	Linear Algebra	F	3
MATH 569A-D	Linear Algebra for Data Science *Approved-DARS changes coming		1
MECH 200××	Intro to Manufacturing Processes (Approved only for BME+CBE, BME+EE/L&O/CPE)	F,S	3
MECH 307 ××	Mechatronics & Meas'mt Syst (Approved only for BME+CBE, BME+EE/L&O/CPE)	F,S	4
MECH 324××	Dynamics of Machines (Approved only for BME+CBE, BME+EE/L&O/CPE)	F,S	4
MECH 325××	Machine Design (Approved only for BME+CBE, BME+EE/L&O/CPE)	F,S	3
MECH 331××	Intro to Engineering Materials (Approved only for BME+CBE, BME+EE/L&O/CPE)	F,S	4
MECH 4XX	Any MECH course at the 400 level except MECH 495 (Ind. Study)	F	3
MECH 5XX	Any MECH course at the 500 level	F*	3
MGT 305	Fundamentals of Management	F,S,SS	3
MGT 320	Contemporary Management Principles/Practices	F,S,SS	3
MGT 340	Fundamentals of Entrpreneurship	F,S,SS	3
MIP 300	General Microbiology	F,S,SS	3
MIP 302	General Microbiology Laboratory	F,S,SS	2
MIP 315	Pathology of Human and Animal Disease	F,S	3
MIP 334	Food Microbiology	F	3
MIP 335	Food Microbiology Laboratory	F**	2
MIP 342	Immunology	F,S	4
MIP 343	Immunology Laboratory	S	2
MIP 350	Microbial Diversity	S**	3

COURSE	NAME	TERM	CR
MIP 351	Medical Bacteriology	S	3
MIP 433	Microbial Ecology Laboratory	S*	1
MIP 436	Industrial Microbiology	F*	4
MIP 443	Microbial Physiology	S	4
MIP 450	Microbial Genetics	F	3
MIP 530	Advanced Molecular Virology	S*	4
MIP 543	RNA Biology	F**	3
MIP 550	Microbial and Molecular Genetics Laboratory	S	4
MIP 555	Principles and Mechanisms of Disease	F	3
MIP 352	Medical Bacteriology Laboratory	S	3
MIP 420	Medical and Molecular Virology	F	4
MIP 425	Virology and Cell Culture Laboratory	F	2
MIP 432	Microbial Ecology	S*	3
MIP/BSPM 576	Bioinformatics	F,S	3
MIP 578	Genetics of Natural Populations	F	4
MKT 300	Marketing	F,S,SS	3
MKT 305	Fundamentals of Marketing	F,S,SS	1
MSE 501	Materials Technology Transfer	F	3
MSE 502 (A-F)	Materials Science & Engineering Methods	F,S	3
MSE 503	Mechanical Behaviors of Materials	S	3
MSE 504	Thermodynamics of Materials	F	4
MSE 505	Kinetics of Materials	S	3
NR 319	Geospatial Applications in Natural Resources	F,S	4
NR/GR 323	Remote Sensing and Image Interpretation	F	4
NR 505	Concepts in GIS	F	2
PH 314•••	Intro to Modern Physics (Approved only for BME+CBE, BME+EE/CPE, BME+MECH)	S	4
PH 315	Modern Physics Laboratory	S	4
PH 341	Mechanics	F	4
PH 351	Electricity and Magnetism	S	3
PH 353 •••	Optics and Waves (Approved only for BME+CBE, BME+EE/CPE, BME+MECH)	F	2
PH 361	Physical Thermodynamics	S	3
PH 425	Advanced Physics Lab	S	3
PH 451 •••	Intro Quantum Mech'cs I (Approved only for BME+CBE, BME+EE/CPE, BME+MECH)	F	3
PH 452	Intro Quantum Mech'cs II	S	3
PH 462	Statistical Physics	F	3
PH 517	Chaos, Fractals, and Non-linear Dynamics	S	1
PH 521	Introduction to Lasers	S	3
PH 522	Introductory Laser Laboratory	S	3
PH 531	Introductory Condensed Matter Physics	S	3
PH 561	Elementary Particle Physics	S	3
PH 571	Mathematical Methods for Physics I	F	3
PH 572	Mathematical Methods for Physics II	S	3
PHIL 322	Biomedical Ethics *Approved-DARS changes coming	OAN	3
PHIL 410	Formal Logic	F,S	3
PSY 253	Human Factors in Engineering	S,SS	3
SOCR 330	Principles of Genetics	F,S,SS	3
SOCR 400	Soils and Global Change: Science and Impacts	F	3
SOCR 430	Applications of Plant Biotechnology	F*	1
SOCR 455	Soil Microbiology	F	3
SOCR 456	Soil Microbiology Laboratory	F	3
SOCR 467	Soil and Environmental Chemistry	S	1
SOCR 470	Soil Physics	F	4
SOCR 471	Soil Physics Laboratory	F	1
SOCR 567	Environmental Soil Chemistry	S	3
SPCM 434	Intercultural Communication	F,S,SS	3

COURSE	NAME	TERM	CR
STAT 158	Introduction to R Programming	S, SS	3
STAT 305	Sampling Techniques	F	3
STAT 331	Intermediate Applied Statistical Methods	F	3
STAT 340	Multiple Regression Analysis	S,SS	3
STAT 341	Statistical Data Analysis I	F	3
STAT 342	Statistical Data Analysis II	S	3
STAT 350	Design of Experiments	F,SS	3
STAT 400	Statistical Computing	F	3
STAT 420	Probability and Mathematical Statistics I	F	3

COURSE	NAME	TERM	CR
STAT 421	Introduction to Stachastic Processes	S	3
STAT 430	Probability and Mathematical Statistics II	S	4
STAT 460	Applied Multivariate Analysis	F,S,SS	3
STAT 512	Design and Data Analysis for Researchers II	S	3
SYSE 501	Foundations of Systems Engineering	F, S	3
SYSE 534	Human Systems Integration	S	3
SYSE 505	Application of Systems Thinking ** Approved-DARS changes coming	S	3
VS 333	Domestic Animal Anatomy	F,S,SS	4

KEY to courses allowed by BME Pathways	
× - Approved for BME+EE/L&O/CPE, BME+MECH; Not aproved for BME+CBE	
×× - Approved for Approved for BME+EE/L&O/CPE, BME+CBE; Not approved for BME+MECH	
××× - Approved for Approved for BME+EE/L&O/CPE; Not approved for BME+MECH, BME+CBE	
• - Approved for BME+CBE, BME+MECH; Not approved for BME+EE/L&O/CPE	
•• - Approved for BME+CBE; Not approved for BME+MECH, BME+EE/L&O/CPE	
••• - Approved for BME+CBE, BME+EE/CPE, BME+MECH; not approved for BME+EE-L&O	
•••• - Approved for BME+CBE, BME+EE-L&O/CPE; BME+MECH	
** Approved-DARS changes coming = course approved by BME, will show in catalog/on DARS eventually	
NOTE: BME+CPE students do not have BME Broad Electives due to program requirements.	

How to REQUEST COURSE OVERRIDES (if courses are 500-level and/or if you don't have prereqs for course you want to take)

If you don't meet course prerequisites, email the prof, explain why you think you'll be successful and forward approval/permissions to:

OVERRIDES For 500-level BIOM or MECH courses, forward request to to Sara.Neys@colostate.edu to request override (w/prof permission if you don't have 3.0+ GPA or prereqs)

OVERRIDES For 500-level BIOM courses, forward request to Sara.Neys@colostate.edu to request override (w/prof permission if you don't have 3.0+ GPA or prereqs)

OVERRIDES For 500-level CBE courses, forward prof permission permission to Claire.Lavelle@colostate.edu for override.

OVERRIDES For 500-level ECE courses forward prof permission to Courtney.Johnsrud@colostate.edu

OVERRIDES for ALL other courses - contact professor/department teaching the course. They will enter override into the system if your request is approved.

Rev.8-30-2024