BME+MECH Technical Electives

Technical Electives (TEs) are designed to provide additional breadth and depth in the Biomedical and partner major degrees. BME+MECH students must take 6 credits of BME TEs and 3 credits of MECH TEs chosen from the following lists.

**NOTE:** 1. Classes otherwise required for the degree are not allowed for TE credit.
   2. Course availability changes frequently. Please check with individual departments regarding course availability.
   3. Crosslisted courses (e.g. BIOM/MECH 570) are in italics and must be taken as *BIOM* courses to count for BME Technical Elective credit.

### BME-MECH Technical Electives

#### BME Technical Electives

<table>
<thead>
<tr>
<th>COURSE</th>
<th>COURSE NAME &amp; DESCRIPTION</th>
<th>Prerequisites</th>
<th>TERM CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 351</td>
<td>Principles of Biochemistry: Structure and function of biological molecules; biocatalysis; metabolism and energy transduction; gene expression.</td>
<td>(BZ 110 or BZ 120 or LIFE 102) and (CHEM 245 or CHEM 341 or CHEM 345).</td>
<td>F, S, SS 4</td>
</tr>
<tr>
<td>BC 401</td>
<td>Comprehensive Biochemistry I: Macromolecular structure and dynamics; membranes; enzymes; bioenergetics.</td>
<td>(CHEM 245, CHEM 343, or CHEM 346, may be taken concurrently) and (MATH 155)</td>
<td>F 3</td>
</tr>
<tr>
<td>BC 403</td>
<td>Comprehensive Biochemistry II: Metabolic pathways and their regulation; cellular biochemistry.</td>
<td>CHEM 245 or CHEM 341 or CHEM 345.</td>
<td>S 3</td>
</tr>
<tr>
<td>BC 404</td>
<td>Comprehensive Biochemistry Laboratory: Experimental approaches to studying macromolecules, metabolism, and gene expressions.</td>
<td>(BC 401, may be taken concurrently) and (CHEM 246 or CHEM 344 or CHEM 346) and (LIFE 212 and LIFE 203).</td>
<td>F, S 2</td>
</tr>
<tr>
<td>BC 411</td>
<td>Physical Biochemistry: Thermodynamics; reaction rates; quantum chemistry; spectroscopy; macromolecular folding and interactions; ligand binding; enzyme kinetics; membranes.</td>
<td>(BC 351 with a minimum grade of B or BC 401) and (CHEM 113) and (MATH 161 or MATH 255).</td>
<td>F 4</td>
</tr>
<tr>
<td>BC 463</td>
<td>Molecular Genetics: Molecular basis of gene structure, replication, repair, recombination, and expression.</td>
<td>(BC 401, or BC 351 with a minimum grade of C) and (LIFE 201B or LIFE 203).</td>
<td>F 3</td>
</tr>
<tr>
<td>BC 465</td>
<td>Molecular Regulation &amp; Cell Function: Molecular regulation of cell organization, membrane formation, organelle biogenesis, cell communication, shape and motility, growth, aging, and death.</td>
<td>(LIFE 210) and (BC 403, or BC 351 may be taken concurrently).</td>
<td>S 3</td>
</tr>
<tr>
<td>BC 565</td>
<td>Molecular Regulation of Cell Function: Molecular regulation of cell organization, membrane formation, organelle biogenesis, cell communication, shape and motility, growth, aging, and death.</td>
<td>(LIFE 210) and (BC 351 or BC 403, may be taken concurrently).</td>
<td>S 4</td>
</tr>
<tr>
<td>BIOM 421</td>
<td>Transport Phenomena in Biomedical Engineering: Engineering models of active and passive mechanisms of momentum. Heat and mass transport in mammalian cells, tissues, and organ systems.</td>
<td>(BMS 300) and (CBE 332 or MECH 344).</td>
<td>F 3</td>
</tr>
<tr>
<td>BIOM 422</td>
<td>Kinetics of Biomolecular and Cellular Systems: In-depth analysis of the systems approach to biology and biological engineering at the molecular and the cellular scales.</td>
<td>BIOM 421 or CBE 320</td>
<td>S 3</td>
</tr>
<tr>
<td>BIOM/ECE 431</td>
<td>Biomedical Signal and Image Processing</td>
<td>S 3</td>
<td></td>
</tr>
<tr>
<td>BIOM 476 A-B</td>
<td>Biomedical Clinical Practicum (formerly BIOM 486): Biomedical lab work or exposure to the hospital/clinical environment.</td>
<td>BMS 300 and BIOM 470</td>
<td>F, S, SS 2 or 4</td>
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</tbody>
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### BME Technical Electives (Continued)

<table>
<thead>
<tr>
<th>COURSE</th>
<th>COURSE NAME &amp; DESCRIPTION</th>
<th>Prerequisites</th>
<th>TERM CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BZ 350</td>
<td>Molecular and General Genetics: Mendelian, molecular, and population genetics emphasizing the molecular basis of genetics.</td>
<td>(BZ 110 or BZ 120 or LIFE 102) and (STAT 201, STAT 301, STAT 307, or ERHS 307, may be taken concurrently).</td>
<td>F, S, SS 4</td>
</tr>
<tr>
<td>BZ 476*</td>
<td>Genetics of Model Organisms: Advanced topics in model genetic systems including molecular and developmental genetics.</td>
<td>BZ 350 or LIFE 201A or LIFE 201B or SOCR 330.</td>
<td>F 3</td>
</tr>
<tr>
<td>CHEM 334</td>
<td>Quantitative Analysis Laboratory: Laboratory applications of principles presented in CHEM 335.</td>
<td>CHEM 114 and CHEM 335, may be taken concurrently.</td>
<td>F, S 1</td>
</tr>
<tr>
<td>CHEM 335</td>
<td>Intro to Analytical Chemistry: Modern and classical applications and methods in analytical chemistry including statistical, kinetic, spectroscopic, and chromatographic analysis.</td>
<td>CHEM 113 with a minimum grade of C and CHEM 334, may be taken concurrently.</td>
<td>F, S 3</td>
</tr>
<tr>
<td>CHEM 343</td>
<td>Modern Organic Chemistry II: Continued studies of reactions and mechanisms of organic molecules and biological chemistry.</td>
<td>CHEM 245 or CHEM 341 or CHEM 345</td>
<td>F, S, SS 3</td>
</tr>
<tr>
<td>CHEM 344</td>
<td>Modern Organic Chemistry Laboratory: Laboratory applications of modern organic chemistry.</td>
<td>CHEM 114 and CHEM 343, may be taken concurrently.</td>
<td>F, S, SS 2</td>
</tr>
<tr>
<td>CHEM 346</td>
<td>Organic Chemistry II: Continued studies of reactions and mechanisms of organic molecules. Laboratory applications of principles presented in lecture.</td>
<td>CHEM 345</td>
<td>F, S 4</td>
</tr>
<tr>
<td>CHEM 433**</td>
<td>Clinical Chemistry: Principles and methodology of clinical chemistry. Lab experience in methodology and method development.</td>
<td>CHEM 334 and (BC 351 or BC 401).</td>
<td>S 3</td>
</tr>
<tr>
<td>CHEM 539A-C</td>
<td>Principles of NMR and MRI:</td>
<td>CHEM 474</td>
<td>S 1</td>
</tr>
</tbody>
</table>
### BME Independent Study (4 credits max allowed of BIOM 476 and/or HES 319)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM 459</td>
<td>Exercise and Chronic Disease:</td>
<td>3</td>
<td>ECE 101, BIOM 474, or MECH 474</td>
<td></td>
</tr>
</tbody>
</table>

**BME-MECH students must take 6 credits from the following BME Technical Electives:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM/ CBE 504</td>
<td>Fundamentals of Biochemical Engineering: Application of chemical engineering principles to enzyme kinetics, fermentation and cell culture, product purification, and bioprocess design.</td>
<td>3</td>
<td>(MIP 300) and (MATH 255 or MATH 340) and (BIOM 306, BTEC 306, or CBE 320, may be taken concurrently).</td>
<td></td>
</tr>
<tr>
<td>BIOM/ ECE 518</td>
<td>Biophotonics: Engineering design principles of optical instrumentation for medical diagnostics. Light propagation and imaging in biological tissues.</td>
<td>3</td>
<td>ECE 342 or ECE 457 or MATH 340 or MATH 345.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ CBE 522</td>
<td>Bioprocessing Processes: Analysis of processes to recover and purify fermentation products.</td>
<td>3</td>
<td>CBE 331.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 525</td>
<td>Cell and Tissue Engineering:</td>
<td>3</td>
<td>BC 351 or BMS 300 or BMS 500 or BZ 310 or NB 501.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ ECE 526</td>
<td>Biological Physics: Mathematical and physical modeling of biological systems. Mass transport in cellular environments. Electrical/mechanical properties of biomolecules.</td>
<td>3</td>
<td>(MATH 340 or MATH 345) and (PH 122 or PH 142).</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 531</td>
<td>Materials Engineering: Selection of structural engineering materials by properties, processing, and economics; materials for biomedical and biotechnology applications.</td>
<td>3</td>
<td>MECH 331 or MECH 431.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ CIVE 533</td>
<td>Biomedical Tools for Engineers: Theoretical and practical aspects of biomolecular laboratory tools—PCR, cloning, sequencing, single-molecule optical techniques and live-cell imaging.</td>
<td>3</td>
<td>BMS 300 or MIP 300.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ ECE 537</td>
<td>Biomedical Signal Processing:</td>
<td>3</td>
<td>MATH 340 or ECE 311 or STAT 303.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ CBE 543</td>
<td>Membranes for Biotechnology and Biomedicine: Polymeric membrane formation, modification, module design and applications to bioprocessing and biomedical separations and tissue engineering.</td>
<td>3</td>
<td>CHEM 343 and CBE 310.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 570</td>
<td>Biomedical Engineering: Physiological and medical systems analysis using engineering methods including mechanics, fluid dynamics, control electronics, and signal processing.</td>
<td>3</td>
<td>MECH 307 and MECH 324.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 573</td>
<td>Structure and Function of Biomaterials: Structure-function relationships of natural biomaterials; application to analysis of biomimetic materials and biomaterials used in medical devices.</td>
<td>3</td>
<td>MECH 331.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 574</td>
<td>Bio-Inspired Surfaces: Analysis of surface functionalities of various biological species; identification of design principles.</td>
<td>3</td>
<td>MECH 342 and CHEM 111.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 576</td>
<td>Quantitative Systems Physiology: Quantitative, model-oriented approach to cellular and systems physiology with design examples from biomedical engineering.</td>
<td>4</td>
<td>BMS 300 and CHEM 113 and MATH 340 and PH 142.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 578</td>
<td>Musculoskeletal Biomechanics: Application of engineering concepts to quantify the mechanical behavior of load-bearing biological tissues and orthopaedic implant performance.</td>
<td>3</td>
<td>CIVE 360.</td>
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</tr>
<tr>
<td>BME Technical Electives (Continued)</td>
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</tr>
<tr>
<td>BIOM/ CBE 504</td>
<td>Fundamentals of Biochemical Engineering:</td>
<td>3</td>
<td>(MIP 300) and (MATH 255 or MATH 340) and (BIOM 306, BTEC 306, or CBE 320, may be taken concurrently).</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 525</td>
<td>Cell and Tissue Engineering:</td>
<td>3</td>
<td>BC 351 or BMS 300 or BMS 500 or BZ 310 or NB 501.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ ECE 526</td>
<td>Biological Physics:</td>
<td>3</td>
<td>(MATH 340 or MATH 345) and (PH 122 or PH 142).</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 531</td>
<td>Materials Engineering:</td>
<td>3</td>
<td>MECH 331 or MECH 431.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ CIVE 533</td>
<td>Biomedical Tools for Engineers:</td>
<td>3</td>
<td>BMS 300 or MIP 300.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ ECE 537</td>
<td>Biomedical Signal Processing:</td>
<td>3</td>
<td>MATH 340 or ECE 311 or STAT 303.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ CBE 543</td>
<td>Membranes for Biotechnology and Biomedicine:</td>
<td>3</td>
<td>CHEM 343 and CBE 310.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 570</td>
<td>Biomedical Engineering:</td>
<td>3</td>
<td>MECH 307 and MECH 324.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 573</td>
<td>Structure and Function of Biomaterials:</td>
<td>3</td>
<td>MECH 331.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 574</td>
<td>Bio-Inspired Surfaces:</td>
<td>3</td>
<td>MECH 342 and CHEM 111.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 576</td>
<td>Quantitative Systems Physiology:</td>
<td>4</td>
<td>BMS 300 and CHEM 113 and MATH 340 and PH 142.</td>
<td></td>
</tr>
<tr>
<td>BIOM/ MECH 578</td>
<td>Musculoskeletal Biomechanics:</td>
<td>3</td>
<td>CIVE 360.</td>
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<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>CM/MECH 502</td>
<td>Techniques in Molecular &amp; Cellular Biology: Current methods in molecular and cellular neurobiology.</td>
<td>3</td>
<td>BI 100 to 481, BI 100 to 481, LIFE 100 to 481 - at least 4 credits.</td>
<td></td>
</tr>
<tr>
<td>ECE/ MECH 569*</td>
<td>Micro-Electro-Mechanical Devices:</td>
<td>3</td>
<td>Micro-electro-mechanical processes and applications in sensors, optics, and structures.</td>
<td></td>
</tr>
<tr>
<td>ERHS 450</td>
<td>Introduction to Radiation Biology: Genetic and somatic effects of radiation on cells, tissues, and the whole organism; tumor therapy; carcinogenesis; risks vs. benefits of radiation.</td>
<td>3</td>
<td>LIFE 102 and PH 122, may be taken concurrently.</td>
<td></td>
</tr>
<tr>
<td>ERHS 502</td>
<td>Fundamentals of Toxicology:</td>
<td>3</td>
<td>BMS 300 or BMS 360 and CHEM 245 or CHEM 341 or CHEM 345.</td>
<td></td>
</tr>
<tr>
<td>ERHS 510</td>
<td>Cancer Biology:</td>
<td>3</td>
<td>BC 351 or BC 403, may be taken concurrently or BZ 310 or CM 501.</td>
<td></td>
</tr>
<tr>
<td>ERHS 540</td>
<td>Principles of Ergonomics:</td>
<td>3</td>
<td>Theory and practice of ergonomics.</td>
<td></td>
</tr>
<tr>
<td>FSHN 470</td>
<td>Integrated Nutrition &amp; Metabolism: Influence of nutrition on roles and action of hormones and gene expression on metabolism.</td>
<td>3</td>
<td>BC 351 and FSHN 350.</td>
<td></td>
</tr>
<tr>
<td>HES 307</td>
<td>Biomechanical Principles of Human Movement:</td>
<td>4</td>
<td>HES 207 or BMS 301 and PH 121 or PH 141.</td>
<td></td>
</tr>
<tr>
<td>HES 319</td>
<td>Neuromuscular Aspects of Human Movement:</td>
<td>4</td>
<td>BMS 300 and HES 207.</td>
<td></td>
</tr>
<tr>
<td>HES 403</td>
<td>Physiology of Exercise:</td>
<td>4</td>
<td>(BMS 300 or BMS 360) and (LIFE 102).</td>
<td></td>
</tr>
<tr>
<td>HES 476</td>
<td>Exercise and Chronic Disease:</td>
<td>3</td>
<td>Interaction of physical activity with pathophysiology and treatment of chronic diseases and conditions.</td>
<td></td>
</tr>
<tr>
<td>MATH 455**</td>
<td>Mathematics in Biology and Medicine: Models in population biology, cell division, host-parasite systems, bacterial growth and predator-prey systems.</td>
<td>3</td>
<td>BZ 348 or MATH 255 or MATH 340 or MATH 345 or MATH 348.</td>
<td></td>
</tr>
<tr>
<td>MECH 432</td>
<td>Engineering of Nanomaterials:</td>
<td>3</td>
<td>MECH 331.</td>
<td></td>
</tr>
<tr>
<td>MECH 543**</td>
<td>Biophysical Mechanics: Fluid dynamic concepts for understanding fluid motion in living organs/organisms; advanced research applications.</td>
<td>3</td>
<td>MECH 342, CIVE 300, BMS 300 and PH 121 or BMS 300 and PH 141 or BMS 420.</td>
<td></td>
</tr>
</tbody>
</table>
### BME-MECH students must take 6 credits from the following BME Technical Electives:

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<tr>
<th>BME Technical Electives</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>BMS 301</strong> Human Gross Anatomy: Structure and function of the human body. Study of prosected human cadavers; clinical applications; living anatomy.</td>
<td><strong>MIP 300</strong> General Microbiology: Structure, function, development, physiology, and molecular biology of microorganisms emphasizing bacteria.</td>
</tr>
<tr>
<td>BZ 110 or LIFE 102.</td>
<td>(BZ 110, BZ 120, or LIFE 102) and (CHEM 245, CHEM 341, or CHEM 345, may be taken concurrently).</td>
</tr>
<tr>
<td>F, S, SS</td>
<td>F, S, SS</td>
</tr>
<tr>
<td><strong>BMS 302</strong> Laboratory in Principles in Physiology: Basic physiology lab exercises.</td>
<td><strong>MIP 302</strong> General Microbiology Laboratory: Laboratory skills and techniques for isolating, characterizing, and identifying bacteria.</td>
</tr>
<tr>
<td>BMS 300 or BMS 360, may be taken concurrently.</td>
<td>MIP 300, may be taken concurrently.</td>
</tr>
<tr>
<td>F, S</td>
<td>F, S</td>
</tr>
<tr>
<td><strong>BMS 310</strong> Anatomy for the Health Professions (Online): Gross anatomy of the human body from a regional perspective, utilizing clinical applications as a basis for anatomical understanding.</td>
<td><strong>MIP 342</strong> Immunology: Principles of immunology: components of the immune system, interactions of humoral and cellular elements, and clinical applications of basic concepts</td>
</tr>
<tr>
<td>LIFE 000 to 499</td>
<td>(CHEM 245, CHEM 341, or CHEM 345 may be taken concurrently) and (LIFE 201B or LIFE 210 or MIP 300)</td>
</tr>
<tr>
<td>F, S, SS</td>
<td>F, S, SS</td>
</tr>
<tr>
<td><strong>BMS 325</strong> Cellular Neurobiology: Cellular and molecular bases of nervous system function and behavior.</td>
<td><strong>MIP 343</strong> Immunology Laboratory: Techniques used in research and clinical immunology, including diagnostic problem solving and data analysis.</td>
</tr>
<tr>
<td>BMS 300 or BMS 360.</td>
<td>MIP 302 and MIP 342, may be taken concurrently</td>
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</tr>
<tr>
<td><strong>BMS 345</strong> Functional Neuroanatomy: Functional systems and circuits of the human brain and spinal cord.</td>
<td><strong>MIP 351</strong> Medical Bacteriology: Bacteria which cause human and veterinary diseases; host-parasite relat'ps, disease mech'ms, prevention, therapy</td>
</tr>
<tr>
<td>BMS 300 or BMS 360.</td>
<td>MIP 342</td>
</tr>
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</tr>
<tr>
<td><strong>BMS 405</strong> Nerve and Muscle-Toxins, Trauma and Disease: Structure, composition, function of nerves and muscles, etiology of genetic and autoimmune neuromuscular diseases, alteration by toxins and nerve gas.</td>
<td><strong>MIP 352</strong> Medical Bacteriology Lab: Laboratory skills and techniques necessary for identifying medically important bacteria.</td>
</tr>
<tr>
<td>BMS 325 or BMS 345.</td>
<td>MIP 302 and MIP 351, may be taken concurrently</td>
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<td>S</td>
<td>S</td>
</tr>
<tr>
<td><strong>BMS 409</strong> Human and Animal Reproductive Biology: Basis for male and female reproductive function in humans and animals.</td>
<td><strong>MIP 420</strong> Medical and Molecular Virology: Principles of animal virology: structure, classification, assay, diagnosis, control, replication, genetics, host-parasite relationships.</td>
</tr>
<tr>
<td>BMS 300 or BMS 360</td>
<td>(MIP 342) and (BC 351, may be taken concurrently or BC 401, may be taken concurrently)</td>
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<tr>
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</tr>
<tr>
<td><strong>BMS 420</strong> Cardiopulmonary Physiology: Normal and pathophysiology of cardiovascular and pulmonary systems.</td>
<td><strong>MIP 364</strong> Industrial Microbiology: Use of microorganisms for producing commercially valuable products.</td>
</tr>
<tr>
<td>BMS 300 or BMS 360</td>
<td>LIFE 206 or MIP 302</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>BMS 430</strong> Endocrinology: Physiology of the glands of internal secretion.</td>
<td><strong>MIP 443</strong> Microbial Physiology: trucrature, function of bacterial constituents; comparison with other organisms. Bacterial growth, energy production, biosynthesis.</td>
</tr>
<tr>
<td>BMS 300 or BMS 360</td>
<td>(MIP 300) and (BC 351 or BC 401).</td>
</tr>
<tr>
<td>F</td>
<td>S</td>
</tr>
<tr>
<td><strong>BMS 450</strong> Pharmacology: Pharmacologic principles, absorption, distribution, metabolism, excretion, side effects, and actions of drugs.</td>
<td><strong>MIP 450</strong> Microbial Genetics: Principles of genetics at molecular level; mutation, recombination, complementation, suppression, control of gene expression, and recombinant DNA.</td>
</tr>
<tr>
<td>BMS 300 or BMS 360</td>
<td>MIP 300 and (BC 351, or BC 401, may be taken concurrently).</td>
</tr>
<tr>
<td>S</td>
<td>F</td>
</tr>
<tr>
<td><strong>BMS 500</strong> Mammalian Physiology I: Cell physiology of nerve, skeletal, cardiac and smooth muscle with an emphasis on how cellular functions integrate into systems behavior.</td>
<td><strong>MIP/ B5PM 576</strong> Bioinformatics: Technical computing across platforms using bioinformatics tools in molecular analysis.</td>
</tr>
<tr>
<td>BMS 300 or BMS 360</td>
<td>BC 463, BZ 310 or, 155, ERHS 332, MIP 275, MIP 300, MIP 450 or STAT 307.</td>
</tr>
<tr>
<td>F</td>
<td>F, S</td>
</tr>
<tr>
<td><strong>BMS 501</strong> Mammalian Physiology II: Respiratory, renal, digestive, endocrine, metabolic, and reproductive function.</td>
<td><strong>NB 500</strong> Readings in Cellular Neurobiology: Membrane properties of nerve and muscle; molecular mechanisms of synaptic function; neuro-muscular units.</td>
</tr>
<tr>
<td>BMS 300 or BMS 360</td>
<td>(BZ 100 to 481, BIO 100 to 481 -LIFE 100 to 481 - at least 1 course) and (BC 100 to 481, PH 100 to 481 - at least 1 course).</td>
</tr>
<tr>
<td>S</td>
<td>F</td>
</tr>
<tr>
<td><strong>BMS/ NB 503</strong> Developmental Neurobiology: Molecular mechanisms involved in development of nervous system including differentiation, growth, pathfinding, and synaptogenesis</td>
<td><strong>NB 501</strong> Cellular and Molecular Neurophysiology: Membrane properties of nerve and muscle; molecular mechanisms of synaptic function; neuromuscular units.</td>
</tr>
<tr>
<td>BIO 100 to 481, BZ 100 to 481, LIFE 100 to 481 - at least 1 course each) and (1 course: BC 100 to 481, PH 100 to 481) and (MATH 141, MATH 155, MATH 160 to 161 - at least 1 course or MATH 255 or MATH 261).</td>
<td>(BZ 100 to 481, BIO 100 to 481, LIFE 100 to 481 - at least 1 course) and (BC 100 to 481, PH 100 to 481 - at least 1 course) and (MATH 141, MATH 155, MATH 160 to 161 - at least 1 course or MATH 255 or MATH 261).</td>
</tr>
<tr>
<td>S</td>
<td>F, S</td>
</tr>
</tbody>
</table>

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1 A maximum total of 3 credits of BIOM 476 and/or BIOM 495 may be applied towards BME technical elective degree requirements.
BME-MECH students must take 6* credits from the following approved MECH Technical Electives:

<table>
<thead>
<tr>
<th>COURSE</th>
<th>COURSE NAME &amp; DESCRIPTION</th>
<th>Prerequisites</th>
<th>TERM</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 303</td>
<td>Energy Engineering: Energy generation (coal, oil, natural gas, solar, wind, geothermal, hydropower, tidal, biofuel, nuclear...), conversion, distribution, storage, efficiency</td>
<td>CBE 310 or ECE 341 or MECH 237 or MECH 337 or PH 361</td>
<td>F</td>
<td>3</td>
</tr>
</tbody>
</table>

* - Change pending that removes MECH 402 as required and increases MECH TE requirement for BME+MECH students from 3 credits to 6 credits.

NOTE: Certain courses are “Alternative TEs” (e.g. CS 163/164, MGT 305) for standalone MECH students but do not qualify as MECH TEs for MECH+BMEs. MECH TEs for BME+MECHs must have a MECH prefix.

To Request Overrides - Include your CSU ID and verification that you meet prerequisites; If you do not meet prerequisites, request permission from the prof and indicate why you think you would be successful in the course. If granted permission, forward as indicated below.

- For 500-level BIOM courses, request approval from the course professor; once obtained, forward permission to Sara.Mattern@colostate.edu (BME grad adviser) to request override.
- For 500-level CBE courses, you should be able to register if you meet the prerequisites. If you need an override, get permission from the professor and forward that to Claire.Lavelle@colostate.edu and she will input the override.
- For 500-level ECE courses, you should be able to register if you meet the prerequisites. If you need an override, forward permission to Courtney.Johnsrud@colostate.edu.
- For CIVE courses, email your BME adviser with the reason you want the override (e.g. meet requirements but not in the major) and she will forward request to the department on your behalf.
- For MECH courses, request approval via your BME adviser, who will forward to MECH on your behalf. If you do not meet prerequisites for 500-level courses (cum 3.0+ gpa or coursework), request permission from the prof and forward to your BME adviser.
- To request overrides for other courses (e.g. 500-level or prereq override), email the course professor or the department teaching the course.

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