Technical electives must be upper-level courses taken JR or SR year, courses on this list are pre-approved by faculty. Undergraduates: email instructor for permission to enroll in 5000+ courses. 3 Electives/9 hours REQUIRED of which 1 technical or advanced chemistry elective must be CHE.

Students are responsible for pre-requisites/instructor permission for non-CHE courses, check classnav.ou.edu or banner for class availability.

**Chemical Engineering**
- CH E 3960 Honors Reading
- CH E 3983/4983 Honors Research I & II
- CH E 3953/4953 Undergrad Research I & II
- CH E 4203/5203 Bioengineering Principles
- CH E 4243/5243 Biochemical Engineering
- CH E 4281 Engineering CO-OP*
- CH E 4323 Chemical Process Sustainability
- CH E 4373/5373 Tissue Engineering
- CH E 4423/5243 Genetic Eng & Biotec
- CH E 4583/5583 Adv Techniques in Biomfg
- CH E 4990 Independent Study
- CH E 5063 Sustainable Energy Applications
- CH E 5123 Sustainable Separations
- CH E 5133 Water Sustainability
- CH E 5143 Multi-Scale Modeling Matter
- CH E 5163 Catalysis
- CH E 5183 Grad Transport Phenomena
- CH E 5213 Exp. Methods Materials Res
- CH E 5223 Refining Principles
- CH E 5233 Colloidal Assembly
- CH E 5263 Ind & Env Transport Processes
- CH E 5293 Transport in Biological Systems
- CH E 5353 Emerging Tech Water Sust
- CH E 5293 Transport in Biological Systems
- CH E 5353 Emerging Tech Water Sust
- CH E 5393 Rhoehology of Complex Fluids
- CH E 5433 Data Science for Engineers
- CH E 5453 Polymer Science & Eng.
- CH E 5463 Polymer Processing
- CH E 5480 Seminar in Selected Topics
- CH E 5523 Adv Math Methods in S&E
- CH E 5533 Materials Design Energy App
- CH E 5673 Colloids and Surface Science
- CH E 5843 Adv CHE Therodynamics
- CH E 5970 Seminar in Selected Topics
- CH E 6723 Adv Kinetics and Reaction Engr

*CHE4281 must be taken 3 times to fulfill a technical elective.

**Biomedical Engineering**
- BME 3143 Biomechanics
- BME 3153 Molecular Cell Tissue Eng
- BME 3163 Biomed Micro/Nano Tech
- BME 3233 Biomaterials
- BME 4013 Biomedical Device Design
- BME 4813 Quantitative Physiology
- BME 5143 Biosensor: Fund & Apps

**Civil Engineering & Env Science**
- CEES 3213 Water Resources Engineering
- CEES 3243 Water and Wastewater
- CEES 4813 Electronics
- CEES 5843 Medical Imaging Systems
- CEES 5863 Bioinstrumentation

**Industrial and Systems Engineering**
- ISE 3293 Applied Eng Statistics
- ISE 5293 Applied Eng Statistics

**Petroleum and Geological Engineering**
- PE 5603 Intro Natural Gas Engr. & Mgmt
- PE 5613 Natural Gas Engineering
- PE 5623 Natural Gas Processing

**Engineering**
- ENGR 4013 Leadership & Management

**Chemical and Biochemistry**
- CHEM 4444 Adv Synthesis/Spectral Character
- CHEM 4333 Advanced Inorganic Chemistry
- CHEM 4023 Instr Methods CHE Analysis
- CHEM 5453 Polymer Science
- CHEM 4753 Principles of Biochem I
- CHEM 6813 Intro to Biochemical Methods

**Geography**
- GEOG 4523 Life Cycle Analysis
- GEOG 5823/5583 Energy Sys Sustainability
- GEOG 5293 The Economics of Sustainability
- GEOG 5433 Sustainability: Theory and Practice

**Mathematics**
- MATH 3333 Linear Algebra I
- MATH 4753 Applied Statistical Methods
- MATH 4733 Theory of Probability
- MATH 3423 Physical Math II
- MATH 4163 Intro Partial Diff. Equations

**Physics**
- PHYS 3223 Modern Physics for Engineers

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**Standard Option Technical Elective List (Choose 2)**

**Chemical Engineering**
- CH E 3960 Honors Reading
- CH E 3983/4983 Honors Research I & II
- CH E 3953/4953 Undergrad Research I & II
- CH E 4203/5203 Bioengineering Principles
- CH E 4243/5243 Biochemical Engineering
- CH E 4281 Engineering CO-OP*
- CH E 4323 Chemical Process Sustainability
- CH E 4373/5373 Tissue Engineering
- CH E 4423/5243 Genetic Eng & Biotec
- CH E 4583/5583 Adv Techniques in Biomfg
- CH E 4990 Independent Study
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- CH E 5533 Materials Design Energy App
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*CHE4281 must be taken 3 times to fulfill a technical elective.

**Biomedical Engineering**
- BME 3143 Biomechanics
- BME 3153 Molecular Cell Tissue Eng
- BME 3163 Biomed Micro/Nano Tech
- BME 3233 Biomaterials
- BME 4013 Biomedical Device Design
- BME 4813 Quantitative Physiology
- BME 5143 Biosensor: Fund & Apps

**Civil Engineering & Env Science**
- CEES 3213 Water Resources Engineering
- CEES 3243 Water and Wastewater
- CEES 4813 Electronics
- CEES 5843 Medical Imaging Systems
- CEES 5863 Bioinstrumentation

**Industrial and Systems Engineering**
- ISE 3293 Applied Eng Statistics

**Petroleum and Geological Engineering**
- PE 5603 Intro Natural Gas Engr. & Mgmt
- PE 5613 Natural Gas Engineering
- PE 5623 Natural Gas Processing

**Engineering**
- ENGR 4013 Leadership & Management

**NON-ENGINEERING Technical Electives**

**Geography**
- GEOG 4523 Life Cycle Analysis
- GEOG 4583/5583 Energy Sys Sustainability
- GEOG 5293 The Economics of Sustainability
- GEOG 5433 Sustainability: Theory and Practice

**Mathematics**
- MATH 3333 Linear Algebra I
- MATH 4753 Applied Statistical Methods
- MATH 4733 Theory of Probability
- MATH 3423 Physical Math II
- MATH 4163 Intro Partial Diff. Equations

**Meteorology**
- METR 5103 Boundary Layer Meteorology
- METR 4344 Comp Fluid Dynamics I

**Biology**
- BIOL 3101 Princ of Physiology Lab (take w/ 3103-Princ of Physiology lecture)
- BIOL 3103 Princ of Physiology
- BIOL 3113 Cell Biology
- BIOL 3201 Animal Development Lab
- BIOL 3203 Animal Development
- BIOL 3333 Genetics
- BIOL 3463 Water Eco Sus.
- BIOL 4244 Animal Histology
- BIOL 4843 Molecular Biology
- BIOL 4913 Quantitative Biology
- BIOL 5113 Cellular Pathology
- BIOL 5153 Endocrine Physiology
- BIOL 5364 Transmission Electron Micro
- BIOL 5374 Scanning Electron Microscopy

**Chemistry and Biochemistry**
- CHEM 3523 Physical Chemistry II
- CHEM 3653 Intro to Biochemistry
- CHEM 3753 Intro to Biochemical Methods
- CHEM 4023 Instr Methods CHE Analysis
- CHEM 4333 Advanced Inorganic Chemistry
- CHEM 4444 Adv. Synthesis Spectral Characterization
- CHEM 5100 Instrument. Methods-Analysis
- CHEM 5110 Spectroscopic CHE Analysis
- CHEM 5453 Polymer Science
- CHEM 4753 Principles of Biochem I
- CHEM 6813 Intro to Biochemical Methods

**Microbiology**
- MBIO 3113 Cell Biology
- MBIO 3813 Fundamentals of MBIO
- MBIO 3812 Fundamentals of MBIO Lab
- MBIO 4723 Biocatalysis Bioremediation
- MBIO 4833 Basic Immunology
- MBIO 4843 Molecular Biology
- MBIO 5620 Investigations in Microbiology
- MBIO 5843 Molecular Biology

**Physics**
- PHYS 3223 Modern Physics for Engineers
# Pre-Medical and Biomedical Technical Elective List

Students must choose one of the Technical Elective options below to follow.

<table>
<thead>
<tr>
<th>Pre-Medical Option</th>
<th>Bioengineering Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take CHEM3653 Intro to Biochemistry</td>
<td>Take CHEM3653 Intro to Biochemistry</td>
</tr>
<tr>
<td><strong>Take one of the following:</strong></td>
<td><strong>Take one of the following CH E Biomedical Option Technical Elective II</strong></td>
</tr>
<tr>
<td>BIOL3113 Cell Biology</td>
<td>Biological Content Options:</td>
</tr>
<tr>
<td>OR</td>
<td>BIOL 3113 Cell Biology</td>
</tr>
<tr>
<td>OR</td>
<td>BIOL 3333 Genetics</td>
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<tr>
<td>OR</td>
<td>BIOL 4843 Molecular Biology</td>
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<td>OR</td>
<td>BIOL 3101 Principles of Physiology*</td>
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<td>OR</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>CH E 4423/5423 Genetic Engineering and Biotechnology</td>
<td>CH E 4423/5423 Genetic Engineering and Biotechnology</td>
</tr>
<tr>
<td>CH E 4243/5243 Biochemical Engineering</td>
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<tr>
<td>CH E 4373/5373 Tissue Engineering</td>
<td>CH E 5293 Transport in Biological Systems</td>
</tr>
<tr>
<td><strong>Aerospace and Mechanical Engineering</strong></td>
<td>CH E 4373/5373 Tissue Engineering</td>
</tr>
<tr>
<td>AME 2213 Biomechanics I **</td>
<td>Aerospace and Mechanical Engineering</td>
</tr>
<tr>
<td><strong>Electrical and Computer Engineering</strong></td>
<td>AME 4213 Biomechanics I **</td>
</tr>
<tr>
<td>ECE 5843 Medical Imaging Systems</td>
<td>Electrical and Computer Engineering</td>
</tr>
<tr>
<td><strong>Biomedical Engineering</strong></td>
<td>ECE 5863 Bioinstrumentation</td>
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<tr>
<td>BME 3143 Biomechanics**</td>
<td>Biomedical Engineering</td>
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<td>BME 3153 Molecular, Cellular &amp; Tissue Engineering</td>
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<td>BME 3163 Biomedical Micro/Nano Technology</td>
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<td>BME 3233 Biomaterials</td>
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<td>BME 4013 Biomedical Device Design</td>
<td>BME 3233 Biomaterials</td>
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<tr>
<td>BME 4813 Quantitative Physiology*</td>
<td>BME 4813 Quantitative Physiology</td>
</tr>
<tr>
<td><strong>Sustainability Content Options</strong></td>
<td>BME 5143. Biosensor: Fundamentals and Applications</td>
</tr>
<tr>
<td>CH E 5063 Sustainable Energy Applications</td>
<td><strong>Metropolitan</strong></td>
</tr>
<tr>
<td>CH E 5123 Sustainable Separations</td>
<td>METR 4553 Climate and Renewable Energy</td>
</tr>
<tr>
<td>CH E 5133 Water Sustainability</td>
<td><strong>Biology</strong></td>
</tr>
<tr>
<td>CH E 5323 Sustainable Eng. Principles</td>
<td>MBIO 4723 Biocatalysis and Bioremediation</td>
</tr>
<tr>
<td>CH E 5353 Energy Technology toward Water Sustainability</td>
<td><strong>Geography</strong></td>
</tr>
<tr>
<td><strong>Aerospace and Mechanical Engineering</strong></td>
<td>GEOG 3233 Principles of Sustainability</td>
</tr>
<tr>
<td>AME 4043 Analysis of Heat Pumping</td>
<td>GEOG 4523 Life Cycle Analysis</td>
</tr>
<tr>
<td><strong>Microbiology</strong></td>
<td>GEOG 4583/5583 Energy Sys &amp; Sustainability</td>
</tr>
<tr>
<td>BIOL 3463 Water &amp; Ecol. Sustainability</td>
<td>GEOG 5253 The Economics of Sustainability</td>
</tr>
</tbody>
</table>

*(updated 3/2024) Students on B163 and B164 plans 2020 and later have their elective options listed on their check sheets and flowchart.*

*Credit cannot be received for both BIOL 3101 and BME 4813; **credit cannot be received for both BME 3143 and AME 4213

**Standard Option:** For students on the standard option any 4000 or 5000 level CHE course not listed on their degree checksheet may be used as a technical elective, however students should obtain adviser approval before enrolling in any course NOT on this list for technical elective credit.