MECHANICAL ENGINEERING
TECHNICAL ELECTIVES

(This is a general TE list - refer to the mae.ucsd.edu website for the specific list of TEs for a specialization)

-Mech. Eng. majors following the Fall 2019 catalog must complete five TEs.
-Mech. Eng. majors following the Fall 2017 catalog must complete three TEs.
-Mech. Eng. majors following a pre-Fall 2017 catalog must complete four TEs.

At least one of your electives must be an MAE course.

-Not all courses are offered each year/quarter.
-All prerequisites are enforced.

FLUIDS AND THERMAL ENGINEERING (Area of Study)

- MAE 101D Intermediate Heat Transfer
- MAE 104 Aerodynamics
- MAE 110 Thermodynamic Systems (formerly 110B)
- MAE 113 Fundamentals of Propulsion
- MAE 118 Intro to Energy Systems
- MAE 119 Intro to Renewable Energy: Solar & Wind
- MAE 120 Intro to Nuclear Energy
- MAE 180 Orbital Mechanics
- MAE 181 Space Mission Analysis and Design
- MAE 185 Computational Fluid Mechanics
- MAE 201 Mechanics of Fluids
- MAE 202 Thermal Processes
- MAE 210A Fluid Mechanics I
- MAE 211 Intro to Combustion
- MAE 212 Introductory Compressible Flow
- MAE 220A Physics of Gases

ENVIRONMENTAL ENGINEERING (Area of Study)

- MAE 118 Intro to Energy Systems
- MAE 119 Intro to Renewable Energy: Solar & Wind
- MAE 120 Intro to Nuclear Energy
- MAE 122 Flow and Transport in the Environment
- MAE 123 Intro to Transport in Porous Media
- MAE 124 Environmental Challenges, Science and Solutions
- MAE 125 Building Energy Efficiently
- CENG 100 Material and Energy Balances
- CHEM 171 Environmental Chemistry I
- CHEM 172 Environmental Chemistry II
- CHEM 173 Atmospheric Chemistry
- ECE 121A Power Systems Analysis and Fundamentals
- ECE 121B Energy Conversion
- ECE 125A Introduction to Power Electronics I
- ECE 125B Introduction to Power Electronics II
- ESYS 101 Environmental Biology
- ESYS 103 Environmental Challenges: Science and Solutions
- SIO 111 Introduction to Ocean Waves
- SIO 117 The Physical Basis of Global Warming
- SIO 141 Chemical Principles of Marine System/CHEM 174
- SIO 143 Ocean Acidification
SIO 171/CHEM 174  Introduction to Physical Oceanography
SIO 172  Physics of the Atmosphere
SIO 173  Dynamics of the Atmosphere and Climate
SIO 174  Chemistry of the Atmosphere and Oceans
SIO 175  Analysis of Oceanic and Atmospheric Data
SIO 176  Observational Physical Oceanography
SIO 178  Geophysical Fluid Dynamics
SIO 179  Ocean Instruments and Sensors
MAE 206  Energy Systems

**DESIGN (Area of Study)**

MAE 131B  Solid Mechanics II (only counts for TE if MAE 160 was taken)
MAE 131C  Solid Mechanics III
MAE 133  Finite Element Methods in Mechanical and Aerospace Engineering
MAE 144  Embedded Control & Robotics (formerly 143C)
MAE 154  Product Design and Entrepreneurship
MAE 190  Topics: Design of Machine Elements  (Note: Must be this specific course topic)
MAE 232A/B  Finite Element Methods in Solid Mechanics I & II
MAE 291  Design and Mechanics Problems in Computer Technology
MAE 292  Computer Aided Analysis and Design

**DYNAMIC SYSTEMS AND CONTROL (Area of Study)**

MAE 108  Prob & Stat/Method/ME (only if following FA19 academic plan)
MAE 142  Dynamics and Control of Aerospace Vehicles
MAE 144  Embedded Control & Robotics (formerly 143C)
MAE 145  Robotic Planning & Estimation
MAE 146  Introduction to ML Algorithms
MAE 148  Intro to Autonomous Vehicles
MAE 149  Sensor Networks
MAE 180  Orbital Mechanics
MAE 181  Space Mission Analysis and Design
BENG 103B  Bioengineering Mass Transfer
CENG 101C  Mass Transfer
ECE 172A  Robotics and Machine Intelligence
SIO 111  Introduction to Ocean Waves
SIO 172  Physics of the Atmosphere
SIO 173  Dynamics of the Atmosphere and Climate
SIO 178  Geophysical Fluid Dynamics
MAE 200  Controls
MAE 204  Robotics
MAE 280A  Linear Systems Theory
MAE 281A  Nonlinear Systems
MAE 283A  Parametric Identification: Theory and Methods

**MECHANICS AND MATERIALS ENGINEERING (Area of Study)**

MAE 130  Advanced Vibrations (only if following FA19 academic plan)
MAE 131B  Solid Mechanics II (only counts for TE if MAE 160 was taken)
MAE 131C  Solid Mechanics III
MAE 133  Finite Element Methods in Mechanical and Aerospace Engineering
MAE 160  Mechanical Behavior of Materials (only counts for TE if MAE 131B was taken)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>MAE 165</td>
<td>Fatigue and Failure Analysis of Engineering Components</td>
</tr>
<tr>
<td>MAE 166</td>
<td>Modern Concepts in Nanotechnology</td>
</tr>
<tr>
<td>MAE 167</td>
<td>Wave Dynamics in Materials</td>
</tr>
<tr>
<td>MAE 190</td>
<td>Topics: Biomaterials &amp; Medical Devices <em>(Note: Must be this specific course topic)</em></td>
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<tr>
<td>SE 131A</td>
<td>Finite Element Analysis</td>
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<tr>
<td>SE 131B</td>
<td>Finite Element Analysis: Beam and Shell Models</td>
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<td>SE 163</td>
<td>Nondestructive Evaluation</td>
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<tr>
<td>NANO 134</td>
<td>Polymetric Materials</td>
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<tr>
<td>NANO 148</td>
<td>Thermodynamics of Materials</td>
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<tr>
<td>NANO 158</td>
<td>Phase Transformations and Kinetics</td>
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<tr>
<td>NANO 158L</td>
<td>Material Processing Laboratory</td>
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<tr>
<td>NANO 161</td>
<td>Material Selection Engineering</td>
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<tr>
<td>NANO 174L</td>
<td>Mechanical Behavior Laboratory</td>
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<tr>
<td>MAE 231A</td>
<td>Foundations of Solid Mechanics</td>
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**STRUCTURAL ENGINEERING (Area of Study)**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>SE 103</td>
<td>Conceptual Structural Design</td>
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<tr>
<td>SE 120</td>
<td>Engineering Graphics and Computer Aided Structural Design</td>
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<tr>
<td>SE 130A/B</td>
<td>Structural Analysis</td>
</tr>
<tr>
<td>SE 142</td>
<td>Design of Composite Structures</td>
</tr>
<tr>
<td>SE 143A</td>
<td>Aerospace Structural Design I</td>
</tr>
<tr>
<td>SE 143B</td>
<td>Aerospace Structural Design II</td>
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*Note: SE 143A/B are the SE senior design capstone courses so students will be expected to complete both A&B in consecutive quarters (credit will be given for 2 TEs)*

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>SE 181</td>
<td>Geotechnical Engineering</td>
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**OTHER**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>COGS 152</td>
<td>Cognitive Foundations of Mathematics</td>
</tr>
<tr>
<td>ECE 120</td>
<td>Solar System Physics</td>
</tr>
<tr>
<td>PSYC 161</td>
<td>Engineering Psychology</td>
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<tr>
<td>MATH 102</td>
<td>Applied Linear Algebra</td>
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<tr>
<td>MATH 109</td>
<td>Mathematical Reasoning</td>
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<tr>
<td>MATH 120A</td>
<td>Elements of Complex Analysis</td>
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<tr>
<td>MATH 175</td>
<td>Numerical Partial Differential Equations</td>
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<tr>
<td>MATH 187A</td>
<td>Introduction to Cryptography</td>
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<tr>
<td>MGT 164</td>
<td>Business and Org Leadership <em>(Only one MGT course can be used for TE credit)</em></td>
</tr>
<tr>
<td>MGT 172</td>
<td>Business Project Management <em>(Only one MGT course can be used for TE credit)</em></td>
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<tr>
<td>MAE 198/199</td>
<td>Independent Study. Two quarters of MAE 198/199 can be used for one TE under certain circumstances. See our website, mae.ucsd.edu, for details.</td>
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**Global TIES:** One quarter of ENG 100D and two consecutive quarters of ENG 100L can be used for one TE.

* Enrollment in graduate courses requires approval by the instructor and course dept via an EASy request.

*All TEs must be taken for a letter grade. No P/NP grades allowed except in MAE 199.*