Courses

Mechanical Engineering (MECH)

MECH 103 Introduction to Mechanical Engineering Credits: 3 (3-0-0)
Course Description: Introduction to mechanical engineering, including relevant programming and computer technologies such as MATLAB and Excel.
Prerequisite: None.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 104A Study Abroad--Germany: Introduction to Mechanical Engineering Credits: 3 (0-0-0)
Course Description: Introduction to mechanical engineering, and relevant programming and computer technologies, including MATLAB and Excel. Exploration of global engineering in Berlin, Germany. Explore concepts through guest lectures, discussion with German engineers, and visits to German engineering companies.
Prerequisite: None.
Registration Information: Written consent of advisor. Credit allowed for only one of the following: MECH 103, MECH 104A, or MECH 182A.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 105 Mechanical Engineering Problem Solving Credits: 3 (3-0-0)
Course Description: Programming and engineering problem solving techniques, algorithms and processes based on first principles of physics and calculus.
Prerequisite: (MATH 159, may be taken concurrently or MATH 160, may be taken concurrently) and (MECH 103 and PH 141, may be taken concurrently).
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 102 and MECH 105.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 200 Introduction to Manufacturing Processes Credits: 3 (2-0-0)
Course Description: Introduction to engineering drawings, materials, manufacturing processes, and shop safety. Fundamentals and principles associated with hand tools, cutting, grinding, the lathe, mill, and numerical control.
Prerequisite: MECH 105.
Registration Information: Mechanical Engineering and Biomedical Engineering-Mechanical Engineering dual majors only. Credit not allowed for both MECH 200 and MECH 200A. Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 200A Introduction to Manufacturing Processes: Lecture Credits: 2 (2-0-0)
Course Description: Introduction to engineering drawings, materials, manufacturing processes, and shop safety. Fundamentals and principles associated with hand tools, cutting, grinding, the lathe, mill, and numerical control.
Prerequisite: MECH 105.
Registration Information: Mechanical Engineering and Biomedical Engineering-Mechanical Engineering dual majors only. Credit not allowed for both MECH 200 and MECH 200A. Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 201 Engineering Design I Credits: 2 (1-2-0)
Course Description: Engineering design methods used to portray three-dimensional objects and visually communicate design information, with an emphasis on computer-aided design using parametric solid modeling, and geometric dimensioning / tolerancing.
Prerequisite: MECH 105.
Registration Information: Must register for lecture and laboratory. Sections may be offered as Mixed Face-to-Face or Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 202 Engineering Design II Credits: 3 (2-2-0)
Course Description: The engineering design process with emphasis on teamwork, ideation, decision-making, and project planning as applied to a group design project in mechanical engineering.
Prerequisite: (MECH 200, may be taken concurrently or MECH 200A, may be taken concurrently and MECH 200B, may be taken concurrently) and (MECH 201).
Registration Information: Must register for lecture and laboratory.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 231 Engineering Experimentation Credits: 3 (2-2-0)
Course Description: Measurement systems, experimental design, and data acquisition / analysis techniques for engineering applications.
Prerequisite: (MECH 102 or MECH 105) and (PH 142).
Registration Information: Must register for lecture and laboratory. Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.
MECH 237 Introduction to Thermal Sciences Credits: 3 (3-0-0)
Course Description: First and second laws of thermodynamics, properties of substances, energy conversion, heat transfer, thermodynamic applications.
Prerequisite: (MATH 159 or MATH 160) and (PH 141).
Registration Information: Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 262 Engineering Mechanics Credits: 4 (4-0-0)
Course Description: Forces, static equilibrium, mass center, moments of inertia, kinematics and kinetics of particles and rigid bodies.
Prerequisite: (MATH 161) and (PH 141).
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 301A Engineering Design III: Finite Element Analysis Credit: 1 (0-2-0)
Course Description: Application of computer-aided finite element analysis (FEA) tools for the simulation and prediction of robustness and performance of mechanical components and assemblies.
Prerequisite: CIVE 360 and MECH 202, may be taken concurrently and MECH 342.
Registration Information: This is a partial semester course. Sections may be offered: Mixed Face-to-Face or Online. Credit not allowed for both (MECH 301 and MECH 301A) or (MECH 301A and MECH 302).
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 301B Engineering Design III: Computational Fluid Dynamics Credit: 1 (0-2-0)
Course Description: Application of computer-aided computational fluid dynamics (CFD) tools for the simulation and prediction of robustness and performance of mechanical components and assemblies.
Prerequisite: CIVE 360 and MECH 202, may be taken concurrently and MECH 301A, may be taken concurrently and MECH 342.
Registration Information: This is a partial semester course. Sections may be offered: Mixed Face-to-Face or Online. Credit not allowed for both (MECH 301 and MECH 301B) or (MECH 301B and MECH 302).
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 307 Mechatronics and Measurement Systems Credits: 4 (3-3-0)
Course Description: Mechatronic and measurement system analysis and design; applied electronics; data acquisition; microcontroller interfacing and programming.
Prerequisite: CIVE 261 and ECE 204 and MATH 340 and MECH 231.
Registration Information: Must register for lecture and laboratory. Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 324 Dynamics of Machines Credits: 4 (3-2-0)
Course Description: Analysis and synthesis of moving machinery.
Prerequisite: CIVE 261 and MATH 340, may be taken concurrently.
Registration Information: Must register for lecture and laboratory.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 325 Machine Design Credits: 3 (3-0-0)
Course Description: Design of mechanical components to avoid failure during operation. Stress analysis, failure theories, and specific mechanical components in design context.
Prerequisite: CIVE 360.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 331 Introduction to Engineering Materials Credits: 4 (3-2-0)
Course Description: Characteristics of metallic, plastic, and ceramic material; basic principles which relate properties of materials to their atomic and microstructure.
Prerequisite: CHEM 111 and CHEM 112 and MECH 231.
Registration Information: Must register for lecture and laboratory.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 331A Introduction to Engineering Materials: Lecture Credits: 3 (3-0-0)
Course Description: Characteristics of metallic, plastic, and ceramic materials; basic principles that relate properties of materials to their atomic and micro-structure.
Prerequisite: CHEM 111 and CHEM 112 and MECH 231.
Registration Information: Must register for lecture and laboratory.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 331B Introduction to Engineering Materials : Lab Credit: 1 (0-2-0)
Course Description: Experiments to study and test metallic, plastic, and ceramic material, including approaches to relate properties of materials to their atomic and micro-structure.
Prerequisite: CHEM 111 and CHEM 112 and MECH 231 and MECH 331A, may be taken concurrently.
Registration Information: Must register for lecture and laboratory.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 337 Thermodynamics Credits: 4 (3-0-1)
Course Description: First and second laws of thermodynamics, properties of pure substances, analysis of open and closed thermodynamic systems, applications of thermodynamic principles to power and refrigeration cycles.
Prerequisite: MATH 261 and PH 141.
Registration Information: Must register for lecture and recitation. Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.
MECH 338 Thermal/Fluid Sciences Laboratory Credit: 1 (0-3-0)
Course Description: Experimental methods in heat transfer, fluid flow, and thermodynamics.
Prerequisite: MECH 337 and MECH 342 and MECH 344, may be taken concurrently.
Registration Information: Biomedical Engineering with ME and Mechanical Engineering majors only.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 342 Fluid Mechanics for Mechanical Engineers Credits: 3 (3-0-0)
Course Description: Thermodynamic properties of fluids, control volume and differential analysis, conservation of mass, momentum, and energy, measurements, dimensional analysis, boundary layer theory, Navier-Stokes equations and exact solutions; internal and external flows, lift and drag, mechanical engineering applications such as pumps, compressors, turbines, and airfoils.
Prerequisite: MATH 340 and PH 141 and MECH 337, may be taken concurrently.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 344 Heat and Mass Transfer Credits: 3 (3-0-0)
Course Description: Thermal transport properties of substances, conduction, convection, radiation, transient heat transfer, numerical methods, and heat exchangers.
Prerequisite: MECH 342.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 392 Graduate Education and Research Seminar Credit: 1 (0-0-1)
Course Description: Research in graduate school and industry as a career option for mechanical engineers.
Prerequisite: MECH 231 and MECH 237.
Registration Information: Written consent of instructor.
Terms Offered: Fall, Spring.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 403 Energy Engineering Credits: 3 (3-0-0)
Course Description: Energy generation, conversion, distribution, storage, and efficiency, including analysis of power generation systems associated with fossil fuels, biofuels, solar, wind, geothermal, hydropower, tidal, and nuclear energy.
Prerequisite: CBE 310 or MECH 237 or MECH 337 or PH 361.
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 303 and MECH 403.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 407 Laser Applications in Mechanical Engineering Credits: 3 (3-0-0)
Course Description: Review of electromagnetic waves; applications of lasers and optics in engineering, e.g., position sensing, flowfield measurement, cutting and welding.
Prerequisite: PH 142.
Registration Information: Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 408 Applied Engineering Economy Credits: 3 (3-0-0)
Course Description: The basic principles and calculations of engineering economy with application to real problems, including energy and the environment.
Prerequisite: MATH 161.
Registration Information: Credit not allowed for both MECH 408 and MECH 410. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 411 Manufacturing Engineering Credits: 3 (3-0-0)
Course Description: Casting, forming, machining, and welding processes used in manufacturing operations.
Prerequisite: (CIVE 360) and (MECH 331 or MECH 331A and MECH 331B).
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 417 Control Systems Credits: 3 (3-0-0)
Course Description: Feedback and forward loop control design and simulation; discrete time and frequency domain methods with implementation considerations.
Prerequisite: MATH 340 and MECH 307.
Registration Information: Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 420 Aerospace Structures Credits: 3 (3-0-0)
Course Description: Analysis of aerospace structures; introduction to theory of elasticity, stress analysis of thin-walled structures in bending, torsion, and shear, and finite element methods and applications to aerospace structures.
Prerequisite: MATH 340 and MECH 325.
Registration Information: Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 421 Fundamentals of Wind Energy Credits: 3 (3-0-0)
Course Description: Fundamental concepts and principles of operation of wind turbines, wind resource prospecting, wind turbine siting and layout, economics of wind power generation, and introduction to design of wind turbines.
Prerequisite: (CIVE 260 or MECH 262) and (MATH 261).
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 421 and MECH 481A5.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 422 Fundamentals of Wind Energy Credits: 3 (3-0-0)
Course Description: Fundamental concepts and principles of operation of wind turbines, wind resource prospecting, wind turbine siting and layout, economics of wind power generation, and introduction to design of wind turbines.
Prerequisite: (CIVE 260 or MECH 262) and (MATH 261).
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 421 and MECH 481A5.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Course Description</th>
<th>Registration Information</th>
<th>Term Offered</th>
<th>Grade Mode</th>
<th>Special Course Fee</th>
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</thead>
<tbody>
<tr>
<td>MECH 424</td>
<td>Advanced Dynamics</td>
<td>3 (3-0-0)</td>
<td></td>
<td>The fundamentals of kinematics and dynamics of rigid bodies with applications to mechanical engineering. Hamilton’s principle and Lagrange’s equations for lumped-parameter extended bodies and distributed systems.</td>
<td>Traditional</td>
<td>Spring</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 425</td>
<td>Mechanical Engineering Vibrations</td>
<td>4 (3-2-0)</td>
<td>MECH 331 or MECH 331A and MECH 331B.</td>
<td>Vibrations applied to rotating machinery and structures. SDOF and MDOF systems, mode shapes, vibration measurements and control. Hands-on lab.</td>
<td>Yes.</td>
<td>Fall</td>
<td>No.</td>
<td>Yes.</td>
</tr>
<tr>
<td>MECH 426</td>
<td>Advanced Machine Design</td>
<td>3 (3-0-0)</td>
<td></td>
<td>Advanced design of mechanical components to avoid / control failure during operation. Design and implementation of specific machine components for real-world applications, including correlations with advanced materials and advanced computational tools.</td>
<td>No.</td>
<td>Fall</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 428</td>
<td>Probabilistic Design</td>
<td>3 (3-0-0)</td>
<td>(MATH 261 and MECH 325) and (MECH 231 or STAT 315).</td>
<td>Modeling of uncertainty, probability distributions, determination of distributions from observed data, fundamental reliability analysis methods, Monte-Carlo simulation, reliability-based design, topology optimization, generative design, design for manufacturing, prognostics fundamentals.</td>
<td>No.</td>
<td>Fall</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 431</td>
<td>Metals and Alloys</td>
<td>3 (3-0-0)</td>
<td>MECH 331 or MECH 331A and MECH 331B.</td>
<td>Engineering metals and alloys, modification of properties by alloying, plastic deformation, and heat treatment. Fundamentals of physical metallurgy.</td>
<td>Traditional</td>
<td>Fall</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 432</td>
<td>Engineering of Nanomaterials</td>
<td>3 (3-0-0)</td>
<td></td>
<td>Structure, properties, and processing of extremely small (10 to the minus 9 m) synthetic and natural materials.</td>
<td>No.</td>
<td>Fall (even years)</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 433</td>
<td>Materials Selection for Mechanical Design</td>
<td>3 (3-0-0)</td>
<td>MECH 334.</td>
<td>Procedures for selecting the optimal material(s) for mechanical engineering design under multiple constraints, including reliability, safety, functionality, cost, and environmental impact.</td>
<td>No.</td>
<td>Fall</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 435</td>
<td>Internal Combustion Engines</td>
<td>3 (2-0-1)</td>
<td></td>
<td>Application of thermodynamics, heat transfer, and fluid mechanics to internal combustion engines.</td>
<td>No.</td>
<td>Fall</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 436</td>
<td>Aerospace Propulsion</td>
<td>3 (3-0-0)</td>
<td></td>
<td>Basic concepts of aerospace propulsion. Foundational concepts of thermodynamics, compressible flow, and boundary layer theory. Characteristics, operation and analysis of air breathing and rocket propulsion applications.</td>
<td>No.</td>
<td>Fall</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 437</td>
<td>Aeronautics</td>
<td>3 (3-0-0)</td>
<td></td>
<td>Thermodynamics and fluid mechanics principles applied to the mechanics, aerodynamics, performance, stability, and control of airplanes.</td>
<td>No.</td>
<td>Fall</td>
<td>No.</td>
<td>No.</td>
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<tr>
<td>MECH 438</td>
<td>Building Energy Systems</td>
<td>3 (3-0-0)</td>
<td></td>
<td>Comfort, psychrometrics, loads, solar radiation, heating and cooling system design, transport, solar system design, economics.</td>
<td>No.</td>
<td>Spring</td>
<td>No.</td>
<td>No.</td>
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</tbody>
</table>
MECH 464  Injection Molding  Credits: 3 (3-0-0)  
Course Description: Part design, material selection, mold design, processing, post-processing operations, and cost estimation for injection molding.  
Prerequisite: (MECH 200 or MECH 200A) and (MECH 301A) and (MECH 331 or MECH 331A and MECH 331B).  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  

MECH 468  Space Propulsion and Power Engineering  Credits: 3 (3-0-0)  
Course Description: Orbital mechanics and space missions; chemical, nuclear, and electric rockets; nuclear heat sources; thermoelectric and photovoltaic devices.  
Prerequisite: ECE 204 and MECH 337 and MECH 342.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  

MECH 470  Biomedical Engineering  Credits: 3 (3-0-0)  
Also Offered As: BIOM 470.  
Course Description: Engineering application in human/animal physiology, diagnosis of disease, treatment, rehabilitation, human genome manipulation.  
Prerequisite: (MATH 155 or MATH 160) and (PH 141).  
Registration Information: Credit not allowed for both MECH 470 and BIOM 470.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  

MECH 476  Mechanical Engineering Data Analysis in R  Credits: 3 (3-0-0)  
Course Description: The use of the R language for data analysis in mechanical engineering, including data cleaning and manipulation, exploratory data analysis and visualization, and applications related to sampling and measurement, calibration, figures of merit, and modeling.  
Prerequisite: MECH 201.  
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 476 and MECH 481A6.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  

MECH 477  Algorithms in Scientific Computing  Credits: 3 (3-0-0)  
Course Description: Numerical methods for scientific computing relevant to problems arising in mechanical and aerospace engineering, with an emphasis on applications, mathematical principles and algorithms, code development, and tool building.  
Prerequisite: MATH 340 or MATH 345.  
Term Offered: Spring (even years).  
Grade Mode: Traditional.  
Special Course Fee: No.  

MECH 478  Computational Fluid Dynamics  Credits: 3 (3-0-0)  
Course Description: Introduction to fundamentals of numerical analysis, ordinary differential equations and partial differential equations related to fluid mechanics. Study of error control, stability considerations, and convergence issues. Application of modern CFD software including geometry building, mesh generation, solution methods, and flow analysis and visualization.  
Prerequisite: MECH 342.  
Registration Information: Sections may be offered: Online.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  

MECH 486A  Engineering Design Practicum: I  Credits: 4 (1-6-0)  
Course Description: Capstone engineering design project; transition experience to the mechanical engineering profession in industry and graduate education.  
Prerequisite: (MECH 301 or MECH 301B, may be taken concurrently and MECH 301A) and (MECH 307) and (MECH 324, may be taken concurrently or MECH 325, may be taken concurrently) and (MECH 331 or MECH 331A and MECH 331B) and (MECH 344).  
Registration Information: Must register for lecture and laboratory.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Traditional.  
Special Course Fee: Yes.  

MECH 486B  Engineering Design Practicum: II  Credits: 4 (1-6-0)  
Course Description: Capstone engineering design project; transition experience to the mechanical engineering profession in industry and graduate education.  
Prerequisite: MECH 301B and MECH 324 and MECH 325 and MECH 338 and MECH 486A.  
Registration Information: Must register for lecture and laboratory.  
Term Offered: Spring.  
Grade Mode: Traditional.  
Special Course Fee: Yes.  

MECH 495  Independent Study  Credits: Var[1-18] (0-0-0)  
Course Description:  
Prerequisite: None.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

MECH 498A  Engineering Research Practicum: I  Credits: 4 (1-6-0)  
Course Description: Capstone engineering research project; transition experience to graduate research and education.  
Prerequisite: (MECH 301 or MECH 301A and MECH 301B, may be taken concurrently) and (MECH 307) and (MECH 324, may be taken concurrently or MECH 325, may be taken concurrently) and (MECH 331 or MECH 331A and MECH 331B) and (MECH 344).  
Registration Information: Must register for lecture and laboratory.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  

MECH 498B  Engineering Research Practicum: II  Credits: 4 (1-6-0)  
Course Description: Capstone engineering research project; transition experience to graduate research and education.  
Prerequisite: MECH 301B and MECH 324 and MECH 325 and MECH 338 and MECH 498A.  
Registration Information: Must register for lecture and laboratory.  
Term Offered: Spring.  
Grade Mode: Traditional.  
Special Course Fee: No.  

MECH 502  Advanced/Additive Manufacturing Engineering  Credits: 3 (3-0-0)  
Course Description: Materials, controls, and mechanics applied to additive manufacturing; rapid prototyping; direct digital manufacturing.  
Prerequisite: (MECH 202) and (MECH 331 or MECH 331A and MECH 331B).  
Registration Information: Sections may be offered: Online.  
Term Offered: Spring.  
Grade Mode: Traditional.  
Special Course Fee: No.
MECH 505  Steam Power Plants  Credits: 3 (3-0-0)
Course Description: Technology review and application of engineering sciences and economics to the analysis and design of vapor power generation systems. Vapor power cycles, steam generation, and auxiliary systems associated with power plants. Overall design of power plants as well as component design. Fossil fuel and nuclear energy systems are considered.
Prerequisite: MECH 337.
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. Sections may be offered: Online. Required field trips. Credit not allowed for both MECH 505 and MECH 581A3.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 507  Laser Diagnostics for Thermosciences  Credits: 3 (3-0-0)
Course Description: Basics of optics, spectroscopy, and lasers. Physics and applications of laser diagnostic techniques used in thermosciences.
Prerequisite: PH 142.
Registration Information: Sections may be offered: Online.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 509  Design and Analysis in Engineering Research  Credits: 3 (3-0-0)
Course Description: Design, model building, analysis and reporting in engineering and manufacturing research and experimentation.
Prerequisite: MATH 340 and STAT 315.
Registration Information: Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 513  Simulation Modeling and Experimentation  Credits: 3 (3-0-0)
Course Description: Logic/analytic modeling in simulations. Event and transient entity-based simulation languages. Simulation design, experimentation and analysis.
Prerequisite: STAT 315.
Registration Information: Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 515  Advanced Topics in Mechanical Vibrations  Credits: 3 (2-2-0)
Course Description: Structural modal analysis, rotordynamics, and torsional vibrations. Lectures are supported with practical application labs.
Prerequisite: MECH 324.
Registration Information: Junior standing. Must register for lecture and laboratory.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 516  Life Cycle and Techno-Economic Assessment  Credits: 3 (3-0-0)
Course Description: Techniques for effective sustainability assessment of engineering process and products, including factors such as upstream energy and material burdens, model boundaries, sensitivity analysis, end of life, material and energy recycling, scalability, and optimization. Engineering process models will be used to assess technologies through economic feasibility and life cycle impacts.
Prerequisite: (MECH 331 or MECH 331A and MECH 331B) and (MECH 344).
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 516 and MECH 681A3.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 517  Chemical Rocket Propulsion  Credits: 3 (3-0-0)
Course Description: Principles of chemical rocket propulsion theory, including practical applications of rocket propulsion system design and analysis.
Prerequisite: MECH 342.
Registration Information: Credit not allowed for both MECH 517 and MECH 581A4.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 518  Orbital Mechanics  Credits: 3 (3-0-0)
Course Description: Orbital elements, motion, and analyses, including the design and characterization of the common orbit regimes and orbital maneuver options and design. Emphasis on developing technical analytical capabilities, engineering judgement, and intuitive understanding of orbital maneuvers.
Prerequisite: MATH 340 and PH 142.
Restriction: Must be a: Graduate.
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 518 and MECH 580B3.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 519  Aerospace Vehicles Trajectory and Performance  Credits: 3 (3-0-0)
Course Description: Trajectory modeling physics and philosophy, and implementation of theories to create and optimize trajectories to several orbits. Launch vehicle conceptual design and sizing, optimal staging, and definition of margins and prediction of mission losses.
Prerequisite: MATH 340 and PH 142.
Restriction: Must be a: Graduate.
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 519 and MECH 580B4.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 520  Finite Element Analysis in Mechanical Engr  Credits: 3 (3-0-0)
Course Description: Application of FEA as a tool to analyze mechanical engineering problems.
Prerequisite: (CIVE 360) and (MATH 340 or MATH 530).
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.
MECH 524 Principles of Dynamics  Credits: 3 (3-0-0) 
Course Description: Kinematics and dynamics of rigid body motion; Lagrangian and Hamiltonian formulations of mechanics; applications to engineering problems. 
Prerequisite: MECH 324. 
Restriction: Must be a: Graduate. 
Registration Information: Sections may be offered: Online. 
Term Offered: Fall. 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 525 Cell and Tissue Engineering  Credits: 3 (3-0-0) 
Also Offered As: BIOM 525. 
Course Description: Cell and tissue engineering concepts and techniques with emphasis on cellular response, cell adhesion kinetics, and tissue engineering design. 
Prerequisite: BC 351 or BMS 300 or BMS 500 or BZ 310 or NB 501. 
Registration Information: Credit only allowed for one of the following: MECH 525, BIOM 525, and CBE 525. Sections may be offered: Online. 
Term Offered: Spring (even years). 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 527 Hybrid Electric Vehicle Powertrains  Credits: 3 (3-0-0) 
Course Description: Hybrid powertrains and modeling including vehicle dynamics, internal combustion engine, electric motor, energy storage, and control. 
Prerequisite: MECH 307. 
Term Offered: Fall. 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 529 Advanced Mechanical Systems  Credits: 3 (3-0-0) 
Course Description: Modeling, analysis, and synthesis of practical mechanical devices in which dynamic response is dominant consideration. 
Prerequisite: MECH 307. 
Registration Information: Sections may be offered: Online. 
Term Offered: Fall. 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 530 Advanced Composite Materials  Credits: 3 (3-0-0) 
Course Description: Materials aspects of advanced composite constituents and how their combination yields synergistic results. 
Prerequisite: (CIVE 360) and (MECH 331 or MECH 331A and MECH 331B). 
Term Offered: Fall. 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 531 Materials Engineering  Credits: 3 (3-0-0) 
Also Offered As: BIOM 531. 
Course Description: Selection of structural engineering materials by properties, processing, and economics; materials for biomedical and biotechnology applications. 
Prerequisite: MECH 331 or MECH 331A and MECH 331B or MECH 431. 
Registration Information: Credit not allowed for both BIOM 531 and MECH 531. Sections may be offered: Online. 
Term Offered: Spring. 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 532 Materials Issues in Mechanical Design  Credits: 3 (3-0-0) 
Also Offered As: BIOM 532. 
Course Description: Failure mechanisms from materials viewpoint with emphasis on use in design. Fracture, creep, fatigue, and corrosion. 
Prerequisite: MECH 331 or MECH 331A and MECH 331B. 
Registration Information: Credit not allowed for both BIOM 532 and MECH 532. Sections may be offered: Online. 
Term Offered: Fall. 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 533 Composites Product Development  Credits: 3 (2-2-0) 
Course Description: Practical application of advanced fiber reinforced materials in mechanical design, including composite constituent materials selection, performance, analysis, and manufacturing. 
Prerequisite: (CIVE 360) and (MECH 331 or MECH 331A and MECH 331B). 
Registration Information: Graduate standing. Must register for lecture and laboratory. Credit not allowed for both MECH 533 and MECH 580A6. 
Term Offered: Fall. 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 534 Energy & Env. Impacts of Transportation  Credits: 3 (3-0-0) 
Course Description: Energy use and environmental impacts of the transportation sector. Topics include vehicle design, dynamics and efficiency; combustion and emission formation; internal combustion engines, fuel cells, batteries, and powertrains; conventional and alternative fuels; travel demand and modes; and life cycle analysis and criteria pollutant emissions. 
Prerequisite: MECH 337. 
Restriction: Must be a: Graduate. 
Registration Information: Graduate standing. Sections may be offered: Online. Credit not allowed for both MECH 534 and MECH 580A8. 
Term Offered: Spring. 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 535 Mechanics of Composite Materials  Credits: 3 (3-0-0) 
Course Description: Classical lamination theory of fiber-reinforced composite materials; Mechanical behavior of composite laminates and honeycomb structures; Failure modes and failure criteria. Design of composite structures; Computer modeling of composites. 
Prerequisite: (MATH 340 and MECH 325) and (MECH 331 or MECH 331A and MECH 331B). 
Registration Information: Sections may be offered: Online. 
Term Offered: Spring (even years). 
Grade Mode: Traditional. 
Special Course Fee: No. 

MECH 537 Processing of Polymer Composites  Credits: 3 (3-0-0) 
Course Description: Basic principles of the processing science of polymer composites, physical and chemical phenomena that occur during manufacturing processes, and solutions to address issues that arise. 
Prerequisite: (CIVE 360) and (MECH 331 or MECH 331A and MECH 331B). 
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 537 and MECH 581A9. 
Term Offered: Spring (odd years). 
Grade Mode: Traditional. 
Special Course Fee: No.
MECH 538  Mechanical Engineering Thermodynamics  Credits: 3 (3-0-0)
Course Description: First and second laws of thermodynamics applied to engineering devices and systems. Introduction to exergy, equilibrium, chemical reactions, thermodynamic relations, and special topics.
Prerequisite: MECH 337.
Restriction: .
Registration Information: Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 539  Advanced Fluid Mechanics  Credits: 3 (3-0-0)
Course Description: Kinematics, Navier-Stokes equations, vorticity, viscous flows, scaling analysis, boundary layers, secondary flows, entropy generation and transport, stability and transition, turbulence.
Prerequisite: CIVE 300 or MECH 342.
Registration Information: Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 543  Biofluid Mechanics  Credits: 3 (3-0-0)
Course Description: Fluid dynamic concepts for understanding fluid motion in living organs/organisms; advanced research applications.
Prerequisite: (BMS 421 or CBE 331 or CIVE 300 or MECH 342) and (BMS 300 and PH 121 or PH 141 and BMS 300 or BMS 420).
Restriction: Must be a: Graduate.
Registration Information: Graduate standing. Sections may be offered: Online.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 544  Advanced Heat Transfer  Credits: 3 (3-0-0)
Course Description: Fundamentals and engineering applications of heat transfer including conduction, convection, and radiation.
Prerequisite: MECH 344.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 551  Physical Gas Dynamics I  Credits: 3 (3-0-0)
Course Description: Characteristics of real gases in reacting and nonequilibrium systems; equilibrium air; statistical mechanics, chemical thermodynamics.
Prerequisite: MECH 342.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 552  Applied Computational Fluid Dynamics  Credits: 3 (3-0-0)
Course Description: Introductory theory of CFD, formulation of engineering problems for CFD analyses, mesh generation, solver settings, and postprocessing.
Prerequisite: CIVE 300 or CBE 331 or MECH 342.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 553  Industrial Engines  Credits: 3 (3-0-0)
Course Description: Technology review, and application of engineering sciences and economics to the analysis and design of large industrial engines. Combustion cycles, fuels, emissions control, and auxiliary systems associated with industrial engines are examined. Study overall systems design of engines as well as application requirements and design limitations.
Prerequisite: MECH 337.
Restriction: Must be a: Graduate.
Registration Information: Sections may be available: Online. Credit not allowed for MECH 553 and MECH 580B1.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 557  Turbomachinery  Credits: 3 (3-0-0)
Course Description: Application of fundamental principles of thermodynamics and fluid mechanics to turbomachinery. Topics include types of turbomachines, selection of an appropriate fluid machinery, derivation of energy transfer equations, engineering analysis and design, and performance characteristics.
Prerequisite: MECH 337 and MECH 342.
Registration Information: Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 558  Combustion  Credits: 3 (3-0-0)
Course Description: Combustion processes: explosions, detonations, flame propagation, ignition, generation of pollutants in moving and stationary energy conversion systems.
Prerequisite: MECH 342.
Registration Information: Sections may be offered: Online.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 564  Fundamentals of Robot Mechanics and Controls  Credits: 3 (3-0-0)
Course Description: Kinematics of robots, controls for robots.
Prerequisite: MECH 417.
Registration Information: Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 567  Broad-Beam Ion Sources  Credits: 3 (3-0-0)
Course Description: Physical processes in broad-beam electron-bombardment ion sources for space propulsion and ion machining applications.
Prerequisite: MATH 340.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 568  Computational Methods for Mechanical Eng.  Credits: 3 (3-0-0)
Course Description: Fundamental principles which provide the foundation for the software and algorithms used in Mechanical Engineering.
Prerequisite: MATH 450 or MATH 451.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MECH 569 Micro-Electro-Mechanical Devices Credits: 3 (3-0-0)
Also Offered As: ECE 569.
Course Description: Micro-electro-mechanical processes and applications in sensors, optics, and structures.
Prerequisite: MECH 344 with a minimum grade of C or ECE 331 with a minimum grade of C.
Registration Information: Credit not allowed for both ECE 569 and MECH 569. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 570 Bioengineering Credits: 3 (3-0-0)
Also Offered As: BIOM 570.
Course Description: Physiological and medical systems analysis using engineering methods including mechanics, fluid dynamics, control electronics, and signal processing.
Prerequisite: CBE 332 or ECE 311 or MECH 331A.
Registration Information: Sections may be offered: Online. Credit not allowed for both BIOM 570 and MECH 570.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 573 Structure and Function of Biomaterials Credits: 3 (3-0-0)
Also Offered As: BIOM 573.
Course Description: Structure-function relationships of natural biomaterials; application to analysis of biomimetic materials and biomaterials used in medical devices.
Prerequisite: MECH 331 or MECH 331A and MECH 331B.
Registration Information: Sections may be offered: Online. Credit not allowed for both BIOM 573 and MECH 573.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 574 Bio-Inspired Surfaces Credits: 3 (3-0-0)
Also Offered As: BIOM 574.
Course Description: Analysis of surface functionalities of various biological species; identification of design principles.
Prerequisite: MECH 342 and CHEM 111.
Registration Information: Sections may be offered: Online. Credit not allowed for both BIOM 574 and MECH 574.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 575 Solar and Alternative Energies Credits: 3 (3-0-0)
Course Description: Solar radiation, flat-plate collectors, energy storage, space heating and cooling, power generation, applications, simulation.
Prerequisite: MECH 337 and MECH 342 and MECH 344.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 576 Quantitative Systems Physiology Credits: 4 (4-0-0)
Also Offered As: BIOM 576.
Course Description: Quantitative, model-oriented approach to cellular and systems physiology with design examples from biomedical engineering.
Prerequisite: BMS 300 and CHEM 113 and MATH 340 and PH 142.
Registration Information: Credit not allowed for both BIOM 576 and MECH 576. Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 577 Aerosol Physics and Technology Credits: 3 (3-0-0)
Course Description: Aerosols and their applications in science and engineering, air pollution control, atmospheric science, and public health. Topics cover the physical and chemical principles underlying the behavior of particles suspended in air, including particle size, aerodynamics, motion of particles in a force field, particle size statistics, and optical and electrical properties.
Prerequisite: PH 141.
Registration Information: Senior standing. Sections may be offered: Online.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 578 Musculoskeletal Biosolid Mechanics Credits: 3 (3-0-0)
Also Offered As: BIOM 578.
Course Description: Application of engineering concepts to quantify the mechanical behavior of load-bearing biological tissues and orthopaedic implant performance.
Prerequisite: CIVE 360.
Registration Information: Graduate standing. Sections may be offered: Online. Credit not allowed for both BIOM 578 and MECH 578.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 579 Cardiovascular Biomechanics Credits: 3 (3-0-0)
Also Offered As: BIOM 579.
Course Description: Bio-mechanical principles and approaches applied in cardiovascular research.
Prerequisite: MATH 340 and PH 142.
Restriction: Must be a: Graduate.
Registration Information: Graduate students only. Sections may be offered: Online. Credit allowed for only one of the following: BIOM 579, BIOM 581A8, MECH 579, or MECH 581A8.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 628 Applied Fracture Mechanics Credits: 3 (3-0-0)
Course Description: Stress distribution near cracks; energy criteria for fracture; design criteria; fracture toughness testing.
Prerequisite: CIVE 560.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 630 Biologically Inspired Robotics Credits: 3 (3-0-0)
Course Description: Analysis of various locomotion methods (e.g. terrestrial, aquatic, and aerial) found in animals or insects and examination of a variety of biologically inspired robots utilizing these locomotion capabilities.
Prerequisite: MECH 564.
Restriction: Must be a: Graduate, Professional.
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 630 and MECH 681A4.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.
MECH 631  Defects in Crystals  Credits: 3 (3-0-0)
Also Offered As: MSE 631.
Course Description: Mechanics, thermodynamics and kinetics of defects in crystalline solids including point defects, dislocations, and grain boundaries.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Sections may be offered: Online. Credit allowed for only one of the following: MECH 631, MSE 631, or MECH 681A2.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 657  Advanced Computational Gas Dynamics  Credits: 4 (3-2-0)
Course Description: Advanced computational algorithms for gas dynamics.
Prerequisite: MECH 568.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 661  Theory/Control of Internal Combustion Engines  Credits: 3 (3-0-0)
Course Description: Theory and applications of internal combustion engines. Alternative fuels, engine control, and pollution prevention.
Prerequisite: MECH 437.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 671  Orthopedic Tissue Biomechanics  Credits: 3 (3-0-0)
Also Offered As: BIOM 671.
Course Description: Linear elastic, finite deformation, and viscoelastic theories applied to the mechanical behavior of orthopedic tissues (bone, tendon, cartilage).
Prerequisite: CIVE 560.
Restriction: Must be a: Graduate, Professional.
Registration Information: Credit not allowed for both BIOM 671 and MECH 671.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 684  Supervised College Teaching  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 692  Seminar  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 695A  Independent Study: Bioengineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 695B  Independent Study: Energy Conversion  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 695C  Independent Study: Environmental Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 695D  Independent Study: Heat and Mass Transfer  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 695E  Independent Study: Industrial and Systems Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 695F  Independent Study: Mechanics and Design  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.
MECH 695G  Independent Study: Computer-Assisted Engineering  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

MECH 695H  Independent Study: Robotics  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

MECH 695I  Independent Study: Solar Engineering  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

MECH 695J  Independent Study: Computational Fluids  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

MECH 695K  Independent Study: Materials  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

MECH 695L  Independent Study: Plasma Engineering  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

MECH 695M  Independent Study: Motorsport Engineering  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

MECH 699A  Thesis: Bioengineering  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: S/U Sat/Unsat Only.  
Special Course Fee: No.  

MECH 699B  Thesis: Energy Conversion  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: S/U Sat/Unsat Only.  
Special Course Fee: No.  

MECH 699C  Thesis: Environmental Engineering  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: S/U Sat/Unsat Only.  
Special Course Fee: No.  

Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: S/U Sat/Unsat Only.  
Special Course Fee: No.  

MECH 699E  Thesis: Industrial and Systems Engineering  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: S/U Sat/Unsat Only.  
Special Course Fee: No.  

MECH 699F  Thesis: Mechanics and Design  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: S/U Sat/Unsat Only.  
Special Course Fee: No.  

Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: S/U Sat/Unsat Only.  
Special Course Fee: No.  

MECH 699H  Thesis: Robotics  Credits: Var[1-18]  (0-0-0)  
Course Description:  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: S/U Sat/Unsat Only.  
Special Course Fee: No.
MECH 699I  Thesis: Solar Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 699J  Thesis: Computational Fluids  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 699K  Thesis: Materials  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 699L  Thesis: Plasma Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 699M  Thesis: Motorsport Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 699N  Thesis: Aerospace Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 699O  Thesis: Advanced Manufacturing  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 778  Advanced Computational Modeling of Fluids  Credits: 3 (3-0-0)
Course Description: Advanced topics in computational fluid dynamics, finite element methods, and linear/nonlinear engineering optimization techniques.
Prerequisite: MECH 568.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 784  Supervised College Teaching  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799A  Dissertation: Bioengineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799B  Dissertation: Energy Conversion  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799C  Dissertation: Environmental Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799D  Dissertation: Heat and Mass Transfer  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799E  Dissertation: Industrial and Systems Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799F  Dissertation: Mechanics and Design  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799H  Dissertation: Robotics  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799I  Dissertation: Solar Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799J  Dissertation: Computational Fluids  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799K  Dissertation: Materials  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MECH 799L  Dissertation: Plasma  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MECH 799M  Dissertation: Motorsport Engineering  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.