Department of Mechanical Engineering

Engineering Building, Room A101
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engr.colostate.edu/me (http://www.engr.colostate.edu/me/)

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Undergraduate

Majors

- Major in Mechanical Engineering (http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/mechanical-engineering-major/)
- Advanced Manufacturing Concentration (http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/mechanical-engineering-major-advanced-manufacturing-concentration/)
- Aerospace Engineering Concentration (http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/mechanical-engineering-major-aerospace-engineering-concentration/)
- Major in Biomedical Engineering combined with Mechanical Engineering (http://catalog.colostate.edu/general-catalog/colleges/engineering/biomedical/mechanical-dual-degree-program/)

Graduate

Graduate Programs in Mechanical Engineering

Programs are offered leading to the Master of Science, Master of Engineering (see specializations below), and Doctor of Philosophy. Students interested in graduate work should refer to the Graduate and Professional Bulletin (http://catalog.colostate.edu/general-catalog/graduate-bulletin/) and the Department of Mechanical Engineering (http://www.engr.colostate.edu/me/).

Certificates

- Advanced Engineering (http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/advanced-manufacturing-certificate/)
- Aerospace Engineering (http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/aerospace-engineering-certificate/)

Master’s Programs

- Master of Science in Mechanical Engineering, Plan A (http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/plan-a-mechanical-engineering-ms/)
- Master of Science in Mechanical Engineering, Plan B (http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/plan-b-mechanical-engineering-ms/)
- Master of Engineering, Plan C, Advanced Manufacturing Specialization (http://catalog.colostate.edu/general-catalog/colleges/engineering/me/me-advanced-manufacturing-specialization/)
- Master of Engineering, Plan C, Aerospace Engineering Specialization (http://catalog.colostate.edu/general-catalog/colleges/engineering/me/aerospace-engineering-specialization/)
- Master of Engineering, Plan C, Engineering Management Specialization (http://catalog.colostate.edu/general-catalog/colleges/engineering/me/plan-c-me-engineering-management-specialization/) (No new students are being accepted to this program of study.)
- Master of Engineering, Plan C, Mechanical Engineering Specialization (http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/plan-c-me-mechanical-engineering-specialization/)

Ph.D.

- Ph.D. in Mechanical Engineering

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: Yes.

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: (MECH 103) and (MATH 159 or MATH 160) 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 182A Study Abroad--Germany: Introduction to Mechanical Engineering Credits: 3 (0-0-3)
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 not allowed for both MECH 103 and MECH 182A.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 200 Introduction to Manufacturing Processes Credits: 3 (2-2-0)
Course Description: Engineering drawings, materials, manufacturing, and safety. Hand tools, cutting, drilling, the lathe, mill and numerical control.
Prerequisite: MECH 105.
Registration Information: Mechanical Engineering and Biomedical Engineering-Mechanical Engineering dual majors only. Must register for lecture and laboratory. Credit not allowed for both MECH 200 and MECH 200A. Credit not allowed for both MECH 200 and MECH 200B.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

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. Must register for lecture and laboratory. Credit not allowed for both MECH 200 and MECH 200A. Sections may be offered as Mixed Face-to-Face or 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 and MECH 200B, may be taken concurrently) and (MECH 201).
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 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 291 Special Topics in Mechanical Engineering Credits: 1 (0-0-1)
Course Description: A special topic in the field of mechanical engineering. The topic will vary from semester to semester.
Prerequisite: MECH 200B, may be taken concurrently (MECH 301 and MECH 301A) or (MECH 301A and MECH 302).
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: Yes.

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 microstructure.
Prerequisite: CHEM 111 and CHEM 112 and MECH 231.
Registration Information: Mechanical engineering and biomedical engineering-mechanical engineering dual majors only. Sections may be offered: Online. Credit not allowed for both MECH 331 and MECH 331A.
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: Mechanical engineering and biomedical engineering-mechanical engineering dual majors only. Sections may be offered: Online. Credit not allowed for both MECH 331 and MECH 331B.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

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: No.

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: Yes.

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. Credit not allowed for both MECH 303 and MECH 403.
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.
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 424 Advanced Dynamics  Credits: 3 (3-0-0)
Course Description: 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.
Prerequisite: MECH 324.
Registration Information: Sections may be offered: Online.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 425 Mechanical Engineering Vibrations  Credits: 4 (3-2-0)
Course Description: Vibrations applied to rotating machinery and structures. SDOF and MDOF systems, mode shapes, vibration measurements and control. Hands-on lab.
Prerequisite: MECH 324.
Registration Information: Must register for lecture and laboratory.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: Yes.

MECH 426 Advanced Machine Design  Credits: 3 (3-0-0)
Course Description: 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.
Prerequisite: MECH 325 and MECH 331.
Registration Information: Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MECH 428 Probabilistic Design Credits: 3 (3-0-0)
Course Description: 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.
Prerequisite: (MATH 261 and MECH 325) and (MECH 231 or STAT 315).
Registration Information: Sections may be offered: Online.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 431 Metals and Alloys Credits: 3 (3-0-0)
Course Description: Engineering metals and alloys, modification of properties by alloying, plastic deformation, and heat treatment. Fundamentals of physical metallurgy.
Prerequisite: MECH 331.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 432 Engineering of Nanomaterials Credits: 3 (3-0-0)
Course Description: Structure, properties, and processing of extremely small (10 to the minus 9 m) synthetic and natural materials.
Prerequisite: MECH 331.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MECH 434 Materials Selection for Mechanical Design Credits: 3 (3-0-0)
Course Description: Procedures for selecting the optimal material(s) for mechanical engineering design under multiple constraints, including reliability, safety, functionality, cost, and environmental impact.
Prerequisite: MECH 325 and MECH 331.
Registration Information: Sections may be offered: Online. Credit not allowed for both MECH 434 and MECH 481A3.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 437 Internal Combustion Engines Credits: 3 (2-0-1)
Course Description: Application of thermodynamics, heat transfer, and fluid mechanics to internal combustion engines.
Prerequisite: MECH 344.
Registration Information: Must register for lecture and recitation.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 440 Aeronautics Credits: 3 (3-0-0)
Course Description: Thermodynamics and fluid mechanics principles applied to the mechanics, aerodynamics, performance, stability, and control of airplanes.
Prerequisite: MECH 342.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 463 Building Energy Systems Credits: 3 (3-0-0)
Course Description: Comfort, psychrometrics, loads, solar radiation, heating and cooling system design, transport, solar system design, economics.
Prerequisite: MECH 344.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

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).
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 466 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 467 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: 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 331B and MECH 344 and MECH 331A).
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.
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 (even 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: No.

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 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: 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.
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 431.
Registration Information: Credit not allowed for both MECH 531 and BIOM 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.
Registration Information: Credit not allowed for both MECH 532 and BIOM 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: MECH 331 and CIVE 360.
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.
Registration Information: Sections may be offered: Online.
Term Offered: Spring (even years).
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: MECH 331 and CIVE 360.
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.
Registration Information: Sections may be offered: Online.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Course Description</th>
<th>Prerequisite</th>
<th>Term Offered</th>
<th>Grade Mode</th>
<th>Special Course Fee</th>
<th>Registration Information</th>
<th>Also Offered As</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH 558</td>
<td>Combustion</td>
<td>3 (3-0-0)</td>
<td>Combustion processes: explosions, detonations, flame propagation, ignition, generation of pollutants in moving and stationary energy conversion systems.</td>
<td>MATH 450 or MATH 451</td>
<td>Fall</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>No.</td>
</tr>
<tr>
<td>MECH 564</td>
<td>Fundamentals of Robot Mechanics and Controls</td>
<td>3 (3-0-0)</td>
<td>Kinematics of robots, controls for robots.</td>
<td>MECH 417</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Credit not allowed for both MECH 570 and MECH 564.</td>
<td>No.</td>
</tr>
<tr>
<td>MECH 567</td>
<td>Broad-Beam Ion Sources</td>
<td>3 (3-0-0)</td>
<td>Physical processes in broad-beam electron-bombardment ion sources for space propulsion and ion machining applications.</td>
<td>MATH 340</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>No.</td>
</tr>
<tr>
<td>MECH 568</td>
<td>Computational Methods for Mechanical Eng.</td>
<td>3 (3-0-0)</td>
<td>Fundamental principles which provide the foundation for the software and algorithms used in Mechanical Engineering.</td>
<td>MATH 450 or MATH 451</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>No.</td>
</tr>
<tr>
<td>MECH 569</td>
<td>Micro-Electro-Mechanical Devices</td>
<td>3 (3-0-0)</td>
<td>Micro-electro-mechanical processes and applications in sensors, optics, and structures.</td>
<td>MECH 344 with a minimum grade of C or ECE 331 with a minimum grade of C.</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Credit not allowed for both ECE 569 and MECH 569. Sections may be offered: Online.</td>
<td>No.</td>
</tr>
<tr>
<td>MECH 570</td>
<td>Bioengineering</td>
<td>3 (3-0-0)</td>
<td>Physiological and medical systems analysis using engineering methods including mechanics, fluid dynamics, control, electronics, and signal processing.</td>
<td>MECH 307 and MECH 324.</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>BIOM 570.</td>
</tr>
<tr>
<td>MECH 573</td>
<td>Structure and Function of Biomaterials</td>
<td>3 (3-0-0)</td>
<td>Structure-function relationships of natural biomaterials; application to analysis of biomimetic materials and biomaterials used in medical devices.</td>
<td>MATH 342 and CHEM 111.</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>BIOM 573.</td>
</tr>
<tr>
<td>MECH 574</td>
<td>Bio-Inspired Surfaces</td>
<td>3 (3-0-0)</td>
<td>Analysis of surface functionalities of various biological species; identification of design principles.</td>
<td>MATH 342 and CHEM 111.</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>No.</td>
</tr>
<tr>
<td>MECH 575</td>
<td>Solar and Alternative Energies</td>
<td>3 (3-0-0)</td>
<td>Solar radiation, flat-plate collectors, energy storage, space heating and cooling, power generation, applications, simulation.</td>
<td>MATH 340 and MATH 342 and MECH 344.</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>No.</td>
</tr>
<tr>
<td>MECH 576</td>
<td>Quantitative Systems Physiology</td>
<td>4 (4-0-0)</td>
<td>Quantitative, model-oriented approach to cellular and systems physiology with design examples from biomedical engineering.</td>
<td>MATH 340 and MATH 342 and MECH 344.</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>BIOM 576.</td>
</tr>
<tr>
<td>MECH 577</td>
<td>Aerosol Physics and Technology</td>
<td>3 (3-0-0)</td>
<td>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.</td>
<td>PH 141</td>
<td>Spring</td>
<td>Traditional</td>
<td>No.</td>
<td>Sections may be offered: Online.</td>
<td>BIOM 573.</td>
</tr>
</tbody>
</table>

*Registration Information: Credit not allowed for both BIOM 573 and MECH 576. Sections may be offered: Online.*
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.
Grade Mode: Traditional.
Special Course Fee: No.

MECH 658  Advanced Combustion Theory and Modeling  Credits: 3 (3-0-0)
Course Description: Asymptotic structure of flames, limit phenomena and multi-phase combustion.
Prerequisite: MECH 558.
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: None.
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: None.
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: 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 699M 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 699N 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.