# ENGINEERING MECHANICS MINOR

## Description

This minor is for engineering majors ONLY.

The College of Engineering enables its students to participate in this approved minor subject to the following conditions:

1. A minor will not reduce or alter the existing course or degree requirements for students electing to pursue a minor.
2. A student's minor program must be organized and approved by an advisor prior to the submission of the senior check to the department chair or head.
3. The minor must be approved by the advisor, the department chair or head, the Dean, and the cognizant program offering the minor.
4. Minors on the Lincoln or Omaha campuses may be added by approval of the College of Engineering Curriculum Committee and faculty.

## College Requirements

### College Admission

#### College Entrance Requirements

Students must meet both the University and College of Engineering entrance requirements.  The following includes both the University and College of Engineering entrance requirements.

Students must have high school credit for (one unit is equal to one high school year):

1. Mathematics – 4 units: 2 of algebra, 1 of geometry, and 1 of precalculus and trigonometry
2. English – 4 units
3. Natural sciences – 3 units that must include 1 unit of physics and 1 unit of chemistry (chemistry requirement waived for students in construction management or computer science)
4. Foreign language – 2 units of a single foreign language
5. Social studies – 3 units
6. Students having a composite ACT score of 28 or greater (or equivalent SAT score) will be admitted to the College of Engineering even if they lack any one of the following: trigonometry, chemistry, or physics. Students without test scores who are missing a full unit of trigonometry/pre-calculus/calculus or chemistry or physics will be evaluated through College Review.
7. Students having an ACT score of 19 or less in English (or equivalent SAT score) or a grade lower than B in high school English, must take ENGL 150 Writing and Inquiry or ENGL 151 Writing for Change.

A total of 16 units is required for admission.

Engineering requires that student performance meet one of the following standards: composite ACT of 24, SAT of 1180, ACT Math subscore of 24, SAT Math subscore of 580, or a 3.5 cumulative GPA.

Any domestic first-year student who does not gain admission to Engineering but does gain admission to the University of Nebraska-Lincoln (UNL) will be reviewed through College Review. College Review is conducted through the College Review Committee which considers factors beyond standardized testing. Any first-year student who is not admitted through college review is placed in Pre-Engineering (PENG) with the Exploratory and Pre-Professional Advising Center (Explore Center). Students in the Explore Center can transfer to the College of Engineering once college admission requirements are met.

Students for whom English is not their language of nurture must meet the minimum English proficiency requirements of the University.

Students who lack entrance units may complete precollege training by Independent Study through the University of Nebraska–Lincoln Office of On-line and Distance Education, in summer courses, or as a part of their first or second semester course loads while in the Explore Center or other colleges at UNL.

Students should consult their advisor, their department chair, or Engineering Student Services (ESS) if they have questions on current policies.

### Other Admission Requirements

Students who transfer to the University of Nebraska–Lincoln from other accredited colleges or universities and wish to be admitted to the College of Engineering (COE) must meet COE first-year student entrance requirements, have a minimum cumulative GPA of 2.5, and be calculus-ready. Students not meeting either of these requirements must enroll in the Explore Center or another University college until they meet COE admission requirements. Students transferring from UNO, UNL, or UNK to the College of Engineering must be in good academic standing with their institution.

The COE accepts courses for transfer for which a C or better grade was received from colleges outside of the NU system. Although the University of Nebraska–Lincoln and the College of Engineering in general accepts C- and D grades from the University of Nebraska Kearney and the University of Nebraska Omaha, not all majors in the COE accept such low grades. Students must conform to the requirements of their intended major and, in any case, are strongly encouraged to repeat courses with a grade of C- or less.

Students who were previously admitted to COE and are returning to the College of Engineering must demonstrate a cumulative GPA of 2.5 to be readmitted to COE.

## College Degree Requirements

### Grade Rules

#### Grade Appeals

In the event of a dispute involving any college policies or grades, the student should appeal to their instructor, and appropriate department chair or school director (in that order). If a satisfactory solution is not achieved, the student may appeal their case through the College Academic Appeals Subcommittee.

## Catalog Rule

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted at the University of Nebraska–Lincoln. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at Nebraska in the College of Engineering. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for

degree requirements may not be more than 10 years old at the time of graduation.

Students who have transferred from a community college may be eligible to fulfill the requirements as stated in the catalog for an academic year in which they were enrolled at the community college prior to attending the University of Nebraska-Lincoln.#This decision should be made in consultation with the student's College of Engineering academic advising team (e.g., ESS professional advisor and the chief faculty advisor for the student's declared degree program).#The chief faculty advisor has the final authority for this decision. Eligibility is based on a) enrollment in a community college during the catalog year the student wishes to utilize, b) maintaining continuous enrollment of at least 12 credit hours per semester at the previous institution for at least 2 semesters, and c) continuous enrollment at the University of Nebraska-Lincoln within 1 calendar year from the student's last term at the previous institution. #Students must complete all degree requirements from a single catalog year and within the timeframe allowable for that catalog year.

# Requirements for Minor Offered by Department

Twelve (12) credit hours beyond the regular undergraduate engineering mechanics sequence (MECH 223 Engineering Statics, MECH 325 Mechanics of Elastic Bodies, and MECH 373 Engineering Dynamics). These may be chosen from the following courses with content in engineering mechanics:

| MECH 416 | Engineering Acoustics | 3 |
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| MECH 448 | Advanced Mechanics of Materials | 3 |
| MECH 449 | Advanced Dynamics | 3 |
| MECH 451 | Introduction to Finite Element Analysis | 3 |
| MECH 452 | Experimental Stress Analysis I | 3 |
| MECH 454 | Introduction to Continuum Modeling | 3 |
| MECH 475 | Introduction to Mechanical Vibrations | 3 |
| MECH 480 | Numerical Methods in Engineering | 3 |
| MECH 491 | Special Topics in Engineering Mechanics | 1-6 |

## Grade Rules

### Pass/No Pass
No course taken Pass/No Pass will be counted toward the minor.

**MECH 100 Introduction to Mechanical Engineering**
**Description:** Overview of mechanical engineering. Introduction to problem layout, and development of basic skills required to solve mechanical engineering problems. Collection, manipulation and presentation of engineering data.
**Credit Hours**: 1
**Max credits per semester:** 1
**Max credits per degree:** 1
**Grading Option:** Graded

**MECH 130 Introduction to Geometric Modeling and Mechanical Design Practices**
**Description:** Principles and accepted practices of geometric design. Computer generation of 2D and 3D models for mechanical systems. Introduction to engineering design practices such as specifications, dimensioning, and tolerance.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 230; MECH 342; MECH 381
**Course and Laboratory Fee:** $25

**MECH 200 Engineering Thermodynamics**
**Prerequisites:** MECH 223.
**Description:** First and Second Laws of Thermodynamics, properties of gases and vapors, and cycles. Sources of energy and its conversion to work.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR
**Prerequisite for:** AGEN 344, BSEN 344; AREN 310; AREN 404; MECH 300; MECH 330; MECH 446; MECH 446H; MECH 487

**MECH 200H Honors: Engineering Thermodynamics**
**Prerequisites:** Good standing in the University Honors Program or by permission; PHYS 212; MECH 223. Credit toward the degree cannot be earned in both MECH 200 and MECH 200H.
**Description:** First and Second Laws of Thermodynamics, properties of gases and vapors, and cycles. Sources of energy and its conversion to work. Honors students will be expected to study beyond the students in the normal sections and do a special project.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR
**Prerequisite for:** AGEN 344, BSEN 344; AREN 310; AREN 404; MECH 300; MECH 330; MECH 446; MECH 446H; MECH 487

**MECH 220 Statics**
**Prerequisites:** MATH 106.
**Description:** Fundamental concepts, equilibrium of force systems, analysis of simple frames and trusses. Centroid and moments of inertia and friction.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 324
**Course and Laboratory Fee:** $10

**MECH 223 Engineering Statics**
**Prerequisites:** MATH 107 (grade of C or better), PHYS 211 (grade of C or better)
**Description:** Action of forces on engineering structures and machines. Force systems, static equilibrium of frames and machines. Friction, center of gravity, moment of inertia, vector algebra.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR
**Prerequisite for:** AGEN 324, BSEN 324; BSEN 410; CIVE 310; CIVE 310H; CIVE 361; CIVE 371; MATL 260; MATL 360; MECH 200; MECH 200H; MECH 324; MECH 325; MECH 325H; MECH 373; MECH 373H

**MECH 223H Honors: Engineering Statics**
**Prerequisites:** Good standing in the University Honors Program or by permission; MATH 107 and PHYS 211. Credit toward the degree cannot be earned in both MECH 223 and MECH 223H.
**Description:** Bodies in equilibrium. Vector algebra, equivalent force systems, distributed loads, and center of gravity. Analysis of trusses, frames, and machines. Friction, wedges, crews, and belts. Area moments of inertia.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** AGEN 324, BSEN 324; CIVE 310; CIVE 310H; CIVE 361; CIVE 371; MATL 260; MATL 360; MECH 200; MECH 200H; MECH 324; MECH 325; MECH 325H; MECH 373; MECH 373H

**MECH 230 Introduction to Mechanical Engineering Design**
**Prerequisites:** MECH 130, MECH 325
**Description:** Introduction to formalized engineering design processes and methodology, selection of common mechanical components, and practice of teamwork and problem solving in the context of mechanical engineering.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR
**Prerequisite for:** MECH 446; MECH 446H

**MECH 250 Mechanics I**
**Prerequisites:** PHYS 211.
**Notes:** Parallel: MATH 208. For electrical engineering majors.
**Description:** Force actions in static coplanar systems with applications to engineering structures and machines. Resultants, moments, couples, equivalent force systems, vector algebra. Static equilibrium conditions and equations.
**Credit Hours**: 2
**Max credits per semester:** 2
**Max credits per degree:** 2
**Grading Option:** Graded
**Prerequisite for:** MECH 351

**MECH 300 Thermal Systems and Design**
**Prerequisites:** MECH 200, CSCE 155N
**Description:** Applications of control-volume analysis (mass, energy, and momentum), both transient and steady; mixtures of gases and vapors; introduction to combustion; thermodynamic relations and establishment of data banks of thermal properties; applications of computer-aided engineering to processes and cycles; methodologies and case studies for thermal systems design; execution of small-scaled design projects.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** SPRING

**MECH 310 Fluid Mechanics**
**Prerequisites:** MECH 373; MATH 221
**Notes:** Parallel: MECH 200, or BSEN 244 or by permission for non-ME students.
**Description:** Fluid statics, equations of continuity, momentum, and energy dimensional analysis and dynamic similitude. Applications to: flow meters; fluid pumps and turbines; viscous flow and lubrication; flow in closed conduits and open channels. Two-dimensional potential flow.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR
**Prerequisite for:** AGEN 325, BSEN 325; AGEN 344, BSEN 344; CIVE 310L; CIVE 351; MECH 311; MECH 380; MECH 446; MECH 446H

**MECH 310H Honors: Fluid Mechanics**
**Prerequisites:** MECH 373; MATH 221. Credit toward the degree cannot be earned in MECH 310 and MECH 310H.
**Notes:** Parallel: MECH 200, or BSEN 244 or by permission for non-ME students.
**Description:** Fluid statics, equations of continuity, momentum, and energy dimensional analysis and dynamic similitude. Applications to: flow meters; fluid pumps and turbines; viscous flow and lubrication; flow in closed conduits and open channels. Two-dimensional potential flow. Advanced topics/project.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR
**Prerequisite for:** MECH 380; MECH 446H

**MECH 311 Fluid Mechanics Laboratory**
**Prerequisites:** MECH/CIVE 310 or parallel.
**Description:** Fluid mechanics experiments and demonstrations. Conservation principles; determination of fluid properties, velocity, pressure, and flow measurements; pipe flow; open channel flow; and instrumentation techniques.
**Credit Hours**: 1
**Max credits per semester:** 1
**Max credits per degree:** 1
**Grading Option:** Graded
**Course and Laboratory Fee:** $20

**MECH 318 Applied Linear Algebra and Computational Methods**
**Prerequisites:** MATH 208; MATH 221 or parallel; CSCE 155N or equivalent.
**Notes:** This course is a substitute for MATH 314 for mechanical engineering students.
**Description:** Application-based linear algebra concepts and introduction to numerical computations using Matlab. Topics include: linear systems and numerical solvers; eigenvalue and eigenvector computations; methods for root finding and curve fitting; norms and convergence of numerical methods; numerical integration, differentiation, and initial-value ODE problems.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR

**MECH 321 Engineering Statistics and Data Analysis**
**Prerequisites:** MATH 208
**Description:** An applications-oriented course for formulating and solving engineering statistical problems. Includes Descriptive statistics, probability distributions, variability, sampling, confidence intervals, tests of significance, basics of statistical process control, and design of experiments.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** BLAW 371H; BLAW 372; CIVE 950; ECEN 850, ECEN 450; ECON 311A; ECON 311B; ECON 312A; ECON 312B; ECON 315; ECON 417; MECH 343; MECH 380; MRKT 350

**MECH 324 Strength of Materials**
**Prerequisites:** MECH 220 or MECH 223.
**Notes:** For students in architecture and construction management.
**Description:** Stress and strain analysis in elastic materials. Use of properties of materials in the analysis and design of welded and riveted connections, statically determinate and indeterminate flexure members, columns. Combined stresses, axial, eccentric and torsional loading. Observations of laboratory tests for axially loaded specimens. Introduction to shear and moment diagrams.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 325 Mechanics of Elastic Bodies**
**Prerequisites:** MECH 223 (grade of C or better), MATH 208
**Description:** Concept of stress and strain considering axial, torsional, and bending forces. Shear and moments. Introduction to combined stresses and column theory.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** AGEN 443; CIVE 331; CIVE 341; CIVE 342; MECH 230; MECH 330; MECH 343; MECH 370; MECH 910

**MECH 325H Honors: Mechanics of Elastic Bodies**
**Prerequisites:** Good standing in the University Honors Program or by permission; MECH 223 or 223H; MATH 208. Credit toward the degree cannot be earned in both MECH 325 and MECH 325H.
**Description:** Introduction to the mechanics of elastic bodies. Concepts of stress and strain. Extension, bending, and torsion. Shear and moment diagrams. Principal stresses. Deflection of statically determinate and indeterminate beams. Buckling of columns. Special advanced topics.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** AGEN 443; CIVE 331; MECH 230; MECH 330; MECH 343; MECH 370

**MECH 330 Mechanical Engineering Analysis**
**Prerequisites:** MATH 221; CSCE 155N; MECH 325; MECH 373; MECH 200.
**Description:** Conceptual modeling of mechanical engineering systems. Analytical exploration of engineering behavior of conceptual models. Case studies drawn from mechanical engineering problems.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 350

**MECH 342 Kinematics and Dynamics of Machinery**
**Prerequisites:** BSEN 130 or MECH 130; MECH 373
**Description:** Analysis of the motions of linkage and cam mechanisms. Methods of design of linkage and cam mechanisms. Gear theory. Analysis and design of ordinary and planetary gear trains. Determination of static and dynamic forces in machines. Balancing of machines. Flywheel design. Dynamics of cam mechanisms. Vibration of machines.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 343; MECH 488
**Course and Laboratory Fee:** $5

**MECH 343 Elements of Machine Design**
**Prerequisites:** MECH 325; MECH 342 or parallel; MATL 360; MECH 321 or STAT 380 or parallel.
**Description:** Design of machine elements under different conditions of loading. Design work includes a project of broader scope (done primarily out of class) requiring a breadth of knowledge. Failure theories for static and dynamic loading of bolts, springs, bearings, and shafts.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** SPRING

**MECH 350 Introduction to Dynamics and Control of Engineering Systems**
**Prerequisites:** MECH 373; ECEN 211; CSCE 155N; MATH 314 or parallel.
**Description:** Unified treatment of the dynamics and control of engineering systems. Emphasis on physical aspects, formulation of mathematical models, application of various mathematical methods, and interpretation of results in terms of the synthesis and analysis of real systems.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR
**Prerequisite for:** MECH 380; MECH 446; MECH 446H

**MECH 351 Mechanics II**
**Prerequisites:** MECH 250.
**Notes:** For electrical engineering majors.
**Description:** Application of Newton's laws to engineering problems involving coplanar kinematics and kinetics of particles. Work, energy, impulse, and momentum. Conservative systems. Periodic motion.
**Credit Hours**: 2
**Max credits per semester:** 2
**Max credits per degree:** 2
**Grading Option:** Graded

**MECH 370 Manufacturing Methods and Processes**
**Prerequisites:** MATL 360; and MECH 325.
**Description:** Introduction to traditional and modern manufacturing processes and methods to include: foundry; forming processes; welding; metal removal theory and practices; modern manufacturing systems and automation; and economics of process selection.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 373 Engineering Dynamics**
**Prerequisites:** MECH 223 (grade of C or better), MATH 208.
**Description:** Force action related to displacement, velocity, and acceleration of rigid bodies. Kinematics of plane motion, kinetics of translation and rotation. Mass moment of inertia, vibration, work, energy and power, impulse and momentum.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** BSEN 410; MECH 310; MECH 310H; MECH 330; MECH 342; MECH 350

**MECH 373H Honors: Engineering Dynamics**
**Prerequisites:** Good standing in the University Honors Program or by permission; MECH 223 or 223H; MATH 208. Credit toward the degree cannot be earned in both MECH 373 and MECH 373H.
**Description:** Motion of particles and rigid bodies under the action of forces and moments. Kinematics of plane motion: displacement, velocity, and acceleration. Kinetics of translation and rotation; work, energy and power; impulse, momentum and impact. Introduction to vibration analysis.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 310; MECH 310H; MECH 330; MECH 342; MECH 350

**MECH 380 Mechanical Engineering Measurements**
**Prerequisites:** ECEN 231; JGEN 200 or JGEN 300 or JGEN 120 or ENGL 151; MECH 321 or STAT 380 or parallel; MECH 350 and MECH 310, or parallel.
**Description:** Theory, statistics, applications and design of mechanical engineering experiments.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR
**Prerequisite for:** MECH 487; MECH 488
**Course and Laboratory Fee:** $20

**MECH 381 Elements of Computer-Aided Design**
**Prerequisites:** MATH 221; MECH 130 or CSCE 155N
**Description:** Principles and techniques currently used for the computer-aided design (CAD). Applications of interactive graphics devices for drafting, design, and analysis. Modelling and analogy of engineering systems. Elementary finite element, Bode, and numerical analyses. CAD case studies and term project.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Course and Laboratory Fee:** $25

**MECH 399 Undergraduate Research and Thesis**
**Prerequisites:** Permission.
**Description:** Engineering design or laboratory investigation that an undergraduate is qualified to undertake.
**Credit Hours**: 1-5
**Min credits per semester:** 1
**Max credits per semester:** 5
**Max credits per degree:** 6
**Grading Option:** Graded
**Course and Laboratory Fee:** $25

**MECH 403 Internal Combustion Engines**
**Crosslisted with:** MECH 803
**Prerequisites:** MECH 300 or equivalent.
**Description:** Basic cycle analysis and engine types, fundamental thermodynamics and operating characteristics of various engines are analyzed, combustion processes for spark and compression-ignition engines, fuels, testing procedures, and lubrication systems are evaluated. Emphasis on the thermodynamic evaluation of the performance and understanding the basic operation of various engine types.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 404 Theory of Combustion**
**Crosslisted with:** MECH 804
**Prerequisites:** MECH 300 and MECH 420/MECH 820.
**Description:** Stoichiometric analysis of combustion processes. Energy transfer, flame propagation, and transformation velocities during combustion. Combustor applications and design considerations. Emission formation and methods of control.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 904

**MECH 405 Turbomachinery**
**Crosslisted with:** MECH 805
**Prerequisites:** MECH 300 and MECH 310/CIVE 310
**Description:** Thermodynamic analysis and design of axial and radial flow turbines, compressors, and pumps. Fundamentals of the operating characteristics and performance parameters of turbomachines will be evaluated. Cavitation and blade element theory.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 406 Air Conditioning Systems Design**
**Crosslisted with:** MECH 806
**Prerequisites:** MECH 300 or equivalent.
**Description:** Application of thermodynamic and fluid dynamic principles to the design of air conditioning systems. Comprehensive design project is an integral part of the course.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 407 Power Plant Systems Design**
**Crosslisted with:** MECH 807
**Prerequisites:** MECH 300 or equivalent.
**Description:** Application of thermodynamic and fluid dynamic principles to the design of Power Plants. Comprehensive design project is an integral part of the course.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 408 Heat Exchanger Design**
**Crosslisted with:** MECH 808
**Prerequisites:** MECH 300 or equivalent.
**Description:** Design methodology for various heat exchangers employed in mechanical engineering. Introduction to computer-aided design as applied to heat exchangers. Practical exercises in actual design tasks.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 413 Aerodynamics**
**Crosslisted with:** MECH 813
**Prerequisites:** MECH 200 and MECH 310/CIVE 310.
**Description:** Subsonic and supersonic air flow theory, dynamics of flight, performance parameters, rotoranalysis, and special topics.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 414 Compressible Flow**
**Crosslisted with:** MECH 814
**Prerequisites:** MECH 300 and MECH 310/CIVE 310.
**Description:** Analysis of the flow of compressible fluids by means of the momentum equation, continuity equation, and the laws of thermodynamics and some application of thermodynamic laws to incompressible fluids.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 415 Two-Phase Flow**
**Crosslisted with:** MECH 815
**Prerequisites:** MECH/CIVE 310; MECH 380 or parallel.
**Description:** Transport phenomena of homogeneous and heterogeneous types of mixtures such as solid-liquid, liquid-liquid, and liquid-gas. Properties of components and mixtures. Flow induced vibrations and parameter distributions. Optimization and design problems in multiphase systems.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 416 Engineering Acoustics**
**Crosslisted with:** MECH 816
**Prerequisites:** MECH 310 and MATH 221/MATH 821.
**Description:** Transverse and longitudinal traveling waves. Acoustic wave equation of fluids. The reflection, transmission, radiation, reception, absorption, and attenuation of sound. Acoustic cavities and waveguides. Sound propagation in pipes, resonators and filters.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 420 Heat Transfer**
**Crosslisted with:** MECH 820
**Prerequisites:** MECH 310
**Description:** Heat transfer by conduction, convection, and radiation. Correlation of theory with experimental data and engineering design.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 404, MECH 804; MECH 487; MECH 922; MECH 923; MECH 924

**MECH 421 Elements of Nuclear Engineering**
**Crosslisted with:** MECH 821, ENGR 421
**Prerequisites:** ENGR 300 or ENGR 301 or ENGR 310; MATH 208/ MATH 208H; and PHYS 212/PHYS 212H
**Description:** Survey of nuclear engineering concepts and applications. Nuclear reactions, radioactivity, radiation interaction with matter, reactor physics, risk and dose assessment, applications in medicine, industry, agriculture, and research.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** ENGR 410; ENGR 420

**MECH 422 Industrial Quality Control**
**Crosslisted with:** MECH 822
**Prerequisites:** MECH 321 or STAT 380
**Description:** Statistical process control and quality assurance techniques in manufacturing. Control charts, acceptance sampling, and analyses and design of quality control systems.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR

**MECH 424 Laser Material Processing with Compressible Flow Perspective**
**Crosslisted with:** MECH 824
**Prerequisites:** Permission.
**Description:** Fundamentals of laser material processing. Laser material interactions from the compressible flow perspective. Analytical, semi-analytical, and numerical approaches.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 425 Solar Energy Engineering**
**Crosslisted with:** MECH 825
**Prerequisites:** MECH 420 or permission.
**Description:** Conversion of solar energy into more useful forms with emphasis on environmental heating and cooling applications. Includes solar energy availability, solar collectors and design, solar systems and their simulation and solar economics.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 426 Heat Transfer at Nanoscales and in Ultrashort Time Domains**
**Crosslisted with:** MECH 826
**Prerequisites:** MECH 420.
**Description:** Heat transfer in nanoscale and nanostructured materials. Heat transfer in ultrafast laser materials processing.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 428 Analysis of Thermal Data**
**Crosslisted with:** MECH 828
**Prerequisites:** MECH 420 or parallel.
**Description:** Indirect measurement of thermal properties and heat flux are explored with various methods, and optimization, with examples drawn from engineering practice.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** FALL/SPR

**MECH 431 Computational Heat Transfer and Fluid Flow**
**Crosslisted with:** MECH 831
**Prerequisites:** MECH 310; MATH 314; MECH 420 or parallel.
**Description:** Finite difference methods for steady and transient diffusion and convection-diffusion problems. Finite volume technique for the solution of multi-dimensional fluid flow, and heat and mass transfer problems.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 932

**MECH 433 Microscale Transport Phenomena in Biosystems**
**Crosslisted with:** MECH 833
**Prerequisites:** MECH 310
**Notes:** Knowledge of engineering mathematics to describe physical systems, especially transport phenomena
**Description:** An introduction to transport phenomena with an emphasis on applying the principles of mass transfer and fluid dynamics to microscale biosystems including microorganisms. Topics include Brownian motion, diffusion-based mass transfer, cellular receptors, Taylor dispersion, bacterial diffusion, chemotaxis, low Reynolds number fluid dynamics, hydrodynamics of swimming microorganisms, surface tension and microfluidics.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 434 Facility Planning and Design**
**Notes:** introductory knowledge of ergonomics
**Description:** Design, analysis and layout of facilities: queuing, material handling systems, material flow analysis, systematic layout planning and design of warehouse facilities.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 435 Introduction to Cell Mechanics**
**Crosslisted with:** MECH 835
**Notes:** Knowledge of calculus and basic physics to describe physical systems
**Description:** An introduction to cell mechanics with an emphasis on application of fundamental mechanics and various experimental methods to understanding cell mechanics. Topics include cell structure, basic solid/fluid/statistical mechanics, biopolymer mechanics, cytoskeletal network mechanics, cellular adhesion and motility, and mechanobiology.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 436 Introduction to Continuum Biomechanics**
**Crosslisted with:** MECH 836
**Prerequisites:** Senior or graduate student standing
**Notes:** MATH 314 and MECH 325 are recommended.
**Description:** An introduction to continuum biomechanics with an emphasis on soft tissues. Case studies covering diverse applications of biomechanics in biology and medicine, including in the areas of mechanobiology, medical devices, and tissue engineering. Continuum mechanics concepts include kinematics, kinetics, balance laws, and constitutive relations. Includes some programming in MATLAB.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 437 Biomedical Device Design**
**Crosslisted with:** MECH 837
**Prerequisites:** MECH 223, MECH 373
**Notes:** basic understanding of solid mechanics
**Description:** Design of devices intended for use in biomedical environments. Introduction to modeling of the bio-environment, bio-materials, and material selection. Overview of design methodologies and strategies used in biomedical device design from a material properties perspective. Introduction to federal regulation and other pertinent issues.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Offered:** SPRING

**MECH 438 Mechanics of Biomaterials**
**Crosslisted with:** MECH 838
**Prerequisites:** MECH 325 or AGEN/BSEN 324 or parallel
**Description:** Theory, application, simulation, and design of biomaterials that apply mechanical principles for solving medical problems (case studies in artery, brain, bone, etc.). Tentative Topics include Mechanical characterization of biomaterials; Bio-manufacturing a tissue; Function-structure relationship; Design and analysis of medical implants; Active response of biomaterials: growth and remodeling mechanism; Cellular behavior and measurements, etc.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded with Option

**MECH 439 Biomaterial Surface Patterning**
**Crosslisted with:** MECH 839
**Description:** Biomaterials, biocompatibility, and biomaterial surface characteristics (chemistry, surface energy, topography, wettability, etc.). Protein adsorption on biomaterials. Microscale and nanoscale chemical patterning; anisotropic and isotropic micro/nanotopography; cell sensing and response to patterned substrates.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 442 Intermediate Kinematics**
**Crosslisted with:** MECH 842
**Prerequisites:** MECH 342.
**Description:** Analytical cam design. Geometry of constrained plane motion and application to the design of mechanisms. Analysis and synthesis of pin-jointed linkage mechanisms.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 943

**MECH 444 Intermediate Dynamics of Machinery**
**Crosslisted with:** MECH 844
**Prerequisites:** MECH 342 and MECH 350.
**Description:** Fundamentals of vibration, vibration and impact in machines, balance of rotors, flexible rotor dynamics and instabilities, parametric vibration, advanced dynamics and design of cam mechanisms, and dynamics of flywheel.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 445 Mechanical Engineering Design Concepts**
**Crosslisted with:** MECH 845
**Prerequisites:** MECH 200, MECH 342, MECH 350, and MECH 310/CIVE 310.
**Description:** Development of design concepts. Introduction to synthesis techniques and mathematical analysis methods. Applications of these techniques to mechanical engineering design projects.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 945
**Course and Laboratory Fee:** $20

**MECH 446 Mechanical Engineering Design I**
**Prerequisites:** BSEN 206, MECH 200, MECH 230, MECH 310, MECH 350, professional admission to Mechanical Engineering BS program
**Notes:** This course should be taken in the fall semester of the final full academic year, followed immediately by MECH 447 in the spring semester.
**Description:** The first of two courses in the capstone sequence. Practical application of the engineering design process in a team project focused on a mechanical engineering problem, including design reviews and reports.
**Credit Hours**: 2
**Max credits per semester:** 2
**Max credits per degree:** 2
**Grading Option:** Graded
**Offered:** FALL
**Prerequisite for:** MECH 447; MECH 447H
**ACE:** ACE 10 Integrated Product
**Course and Laboratory Fee:** $15
**Experiential Learning:** Student Teaching/Education Practicum

**MECH 446H Honors: Mechanical Engineering Design I**
**Prerequisites:** BSEN 206, MECH 200, MECH 230, MECH 310, MECH 350, professional admission to Mechanical Engineering BS program. Credit toward the degree cannot be earned in both MECH 446 and MECH 446H.
**Notes:** This course should be taken in the fall semester of the final full academic year, followed immediately by MECH 447H in the spring semester.
**Description:** The first of two courses in the capstone sequence. Practical application of the engineering design process in a team project focused on a mechanical engineering problem, including design reviews and reports.
**Credit Hours**: 2
**Max credits per semester:** 2
**Max credits per degree:** 2
**Grading Option:** Graded
**Offered:** FALL
**Prerequisite for:** MECH 447H
**ACE:** ACE 10 Integrated Product
**Experiential Learning:** Student Teaching/Education Practicum

**MECH 447 Mechanical Engineering Design II**
**Prerequisites:** MECH 446, professional admission to Mechanical Engineering BS program
**Description:** Definition, scope, analysis, synthesis, and the design for the solution of a comprehensive engineering problem in any major area of mechanical engineering.
**Credit Hours**: 2
**Max credits per semester:** 2
**Max credits per degree:** 2
**Grading Option:** Graded
**ACE:** ACE 10 Integrated Product
**Course and Laboratory Fee:** $15
**Experiential Learning:** Student Teaching/Education Practicum

**MECH 447H Honors: Mechanical Engineering Design II**
**Prerequisites:** MECH 446 or MECH 446H, professional admission to Mechanical Engineering BS program. Credit toward the degree cannot be earned in both MECH 447 and MECH 447H.
**Description:** Definition, scope, analysis, synthesis, and the design for the solution of a comprehensive engineering problem in any major area of mechanical engineering.
**Credit Hours**: 2
**Max credits per semester:** 2
**Max credits per degree:** 2
**Grading Option:** Graded
**Offered:** SPRING
**ACE:** ACE 10 Integrated Product
**Experiential Learning:** Student Teaching/Education Practicum

**MECH 448 Advanced Mechanics of Materials**
**Crosslisted with:** MECH 848
**Prerequisites:** MECH 373, MECH 325.
**Description:** Stresses and strains at a point. Theories of failure. Thick-walled pressure vessels and spinning discs. Torsion of noncircular sections. Torsion of thin-walled sections, open, closed, and multicelled. Bending of unsymmetrical sections. Cross shear and shear center. Curved beams. Introduction to elastic energy methods.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 915; MECH 930; MECH 933; MECH 935; MECH 937; MECH 938; MECH 939; MECH 940; MECH 941; MECH 952

**MECH 449 Advanced Dynamics**
**Crosslisted with:** MECH 849
**Prerequisites:** MECH 373 and MATH 221/821.
**Description:** Particle Dynamics usung Newton's laws, energy principles, momentum principles. Rigid body dynamics using Euler's equations and Lagrange's equations. Variable mass systems. Gyroscopic motion.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 915; MECH 935

**MECH 450 Mechanical Engineering Control Systems Design**
**Crosslisted with:** MECH 850
**Prerequisites:** MECH 350.
**Description:** Applications of control systems analysis and synthesis for mechanical engineering equipment. Control systems for pneumatic, hydraulic, kinematic, electromechanical, and thermal systems.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Course and Laboratory Fee:** $20

**MECH 451 Introduction to Finite Element Analysis**
**Prerequisites:** Open to College of Engineering Students only.
**Description:** Matrix methods of analysis. Finite element stiffness method. Computer programs. Applications to structures and soils. Introduction to finite element analysis of fluid flow.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Course and Laboratory Fee:** $25

**MECH 452 Experimental Stress Analysis I**
**Crosslisted with:** MECH 852
**Prerequisites:** MECH 325.
**Description:** Investigation of the basic theories and techniques associated with the analysis of stress using mechanical strain gages, electric strain gages, brittle lacquer, photoelasticity, and membrane analogy.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 952
**Course and Laboratory Fee:** $25

**MECH 453 Robotics: Kinematics and Design**
**Crosslisted with:** MECH 853
**Prerequisites:** MECH 350.
**Description:** Robotics synthesize some aspects of human function by the use of mechanisms, sensors, actuators, and computers.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 454 Introduction to Continuum Modeling**
**Crosslisted with:** MECH 854
**Prerequisites:** MATH 221/821, MECH 325 and MECH 373
**Description:** Basic concepts of continuum modeling. Development of models and solutions to various mechanical, thermal and electrical systems. Thermo-mechanical and electro-mechanical coupling effects. Differential equations, dimensional methods and similarity.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 455 Vehicle Dynamics**
**Crosslisted with:** MECH 855
**Prerequisites:** MECH 343 and MECH 350.
**Description:** Introduction to basic mechanics governing automotive vehicle dynamic acceleration, braking, ride, handling and stability. Analytical methods, including computer simulation, in vehicle dynamics. The different components and subsystems of a vehicle that influence vehicle dynamic performance.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Course and Laboratory Fee:** $20

**MECH 456 Dynamics of Internal Combustion Engines**
**Crosslisted with:** MECH 856
**Prerequisites:** MECH 342 and MECH 343.
**Description:** Basics of design of the internal combustion engines. Design of various engine parts such as pistons, connecting rods, valve trains, crankshafts, and the vibration dampers. Dynamics of the engine. The vibration of the crankshaft assembly and the valve train. Balancing of the engines.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 457 Mechatronic Systems Design**
**Crosslisted with:** MECH 857
**Prerequisites:** ECEN 231; MECH 350 or parallel.
**Notes:** Lab sessions allow for constructing mechatronic systems. Lab time arranged. A comprehensive design project included.
**Description:** Theory, application, simulation, and design of systems that integrate mechanical, computer, and electronic components.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 958

**MECH 458 Digital Control of Mechanical Systems**
**Crosslisted with:** MECH 858
**Prerequisites:** MECH 450
**Description:** Introduction to digital measurement and control of mechanical systems. Applications of analysis and synthesis of discrete time systems.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Course and Laboratory Fee:** $20

**MECH 470 Theory and Practice of Materials Processing**
**Crosslisted with:** MECH 870
**Prerequisites:** MECH 370
**Description:** Theory, practice and application of conventional machining, forming and non-traditional machining processes with emphasis on tool life, dynamics of machine tools and adaptive control.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** MECH 970

**MECH 472 Additive Manufacturing**
**Crosslisted with:** MECH 872
**Prerequisites:** MECH 370 or parallel
**Description:** In-depth exploration of the physics governing metal additive manufacturing: (1) powder handling and laser-material interaction; (2) melt pool dynamics, defect mechanisms, and microstructure evolution; (3) residual stress development and strategies for post-processing. Emphasis on how these principles affect the quality and properties of additively manufactured metals.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 474 Manufacturing Systems I**
**Crosslisted with:** MECH 874
**Prerequisites:** MECH 370 or equivalent.
**Description:** Principles of automated production lines; analysis of transfer lines; group technology; flexible manufacturing systems; and just-in-time; and optimization strategies for discrete parts manufacturing.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 475 Introduction to Mechanical Vibrations**
**Crosslisted with:** MECH 875
**Prerequisites:** MECH 373 and MATH 221
**Description:** Review of rigid body dynamics; equations of motion, free vibration, damping; linear response of one, two, and multi-degree of freedom systems; forced vibrations, harmonic, periodic, impulse, and general responses; resonance and vibration isolation; rotating imbalance; Fourier transforms, digitization and analysis of experimental data.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded with Option
**Prerequisite for:** MECH 975
**Course and Laboratory Fee:** $25

**MECH 476 Manufacturing Information Systems**
**Crosslisted with:** MECH 876
**Prerequisites:** Senior standing; CSCE 155A, CSCE 155E, CSCE 155H, CSCE 155N, or CSCE 155T or equivalent
**Description:** An exploration of information systems and their impact in a manufacturing environment. Software, hardware, database systems, enterprise resource planning, networking, and the Internet.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded

**MECH 480 Numerical Methods in Engineering**
**Crosslisted with:** MECH 880
**Prerequisites:** MATH 221/MATH 821; CSCE 155N. Credit toward the degree may be earned in only one of the following: CSCE440/MATH 440 and MECH 480
**Notes:** MATH 314 recommended.
**Description:** Numerical algorithms and their convergence properties in: solving nonlinear equations; direct and iterative schemes for linear systems of equations; eigenvalue problems; polynomial and spline interpolation; curve fitting; numerical integration and differentiation; initial and boundary values problems for Ordinary Differential Equations (ODEs) and systems of ODEs with applications to engineering; finite difference methods for partial differential equations (potential problems, heat-equation, wave-equation).
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded
**Prerequisite for:** CHME 496, CHME 896; MECH 851; MECH 888
**Course and Laboratory Fee:** $25

**MECH 483 Engineering Analysis with Finite Elements**
**Crosslisted with:** MECH 883
**Prerequisites:** MECH 310; MECH 343; MECH 350; MECH 420 or parallel
**Description:** Analysis of engineering systems using finite elements; a critical and challenging task performed during the design process for many engineering systems. Four very distinct domains are studied: Structural stress analysis, heat transfer, fluid flow, and modal analysis.
**Credit Hours**: 3
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded with Option

**MECH 487 Thermal Fluids Laboratory**
**Prerequisites:** MECH 200 and MECH 380; MECH 420/820 or parallel.
**Description:** Design, execution, and evaluation of physical experiments in the areas of thermodynamics, fluid mechanics, and heat transfer.
**Credit Hours**: 2
**Max credits per semester:** 2
**Max credits per degree:** 2
**Grading Option:** Graded with Option
**Course and Laboratory Fee:** $30

**MECH 488 Kinematics and Machine Design Laboratory**
**Prerequisites:** MECH 342; MECH 380 or parallel.
**Description:** Design projects and physical experiments in the area of machine design and kinematics.
**Credit Hours**: 2
**Max credits per semester:** 2
**Max credits per degree:** 2
**Grading Option:** Graded
**Course and Laboratory Fee:** $30

**MECH 491 Special Topics in Engineering Mechanics**
**Crosslisted with:** MECH 891
**Prerequisites:** Permission.
**Description:** Treatment of special topics in engineering mechanics by experimental, computational and/or theoretical methods. Topics vary from term to term.
**Credit Hours**: 1-6
**Min credits per semester:** 1
**Max credits per semester:** 6
**Max credits per degree:** 6
**Grading Option:** Graded
**Course and Laboratory Fee:** $25

**MECH 492 Special Topics**
**Crosslisted with:** MECH 892
**Description:** Special topics in mechanical engineering and related areas.
**Credit Hours**: 1-6
**Min credits per semester:** 1
**Max credits per semester:** 6
**Max credits per degree:** 24
**Grading Option:** Graded

**MECH 494 Independent Study**
**Crosslisted with:** MECH 894
**Prerequisites:** Permission
**Description:** Faculty-supervised independent study.
**Credit Hours**: 1-6
**Min credits per semester:** 1
**Max credits per semester:** 6
**Max credits per degree:** 24
**Grading Option:** Graded

**MECH 498 Research**
**Crosslisted with:** MECH 898
**Description:** Faculty-supervised research.
**Credit Hours**: 0-6
**Min credits per semester:**
**Max credits per semester:** 6
**Max credits per degree:** 6
**Grading Option:** Graded

**MECH 499H Honors Thesis**
**Prerequisites:** Senior standing in mechanical engineering; admission to the University Honors Program.
**Description:** Honors thesis research project meeting the requirements of the University Honors Program. Independent research project executed under the guidance of a member of the faculty of the Department of Mechanical Engineering which contributes to the advancement of knowledge in the field. Culminates in the presentation of an honors thesis to the department and college.
**Credit Hours**: 1-3
**Min credits per semester:** 1
**Max credits per semester:** 3
**Max credits per degree:** 3
**Grading Option:** Graded