Mechanical Engineering Courses

Courses

An introduction to solid modeling concepts and software, dimensioning, and basic computer-aided engineering.
Department: Mechanical Engineering
3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours

Mechanics I Statistc: Principles of mechanics, vectors, force systems, equilibrium of particles and rigid bodies, force analysis of truss structures, distributed forces, centroids, and friction. [Common Course Number ENGR 2301]
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MATH 1411 w/C or better AND PHYS 2420 w/C or better)

MECH 2103. Engineering Computations.
Programming related to Engineering problem solving.
Department: Mechanical Engineering
1 Credit Hour
4 Total Contact Hour
3 Lab Hour
1 Lecture Hour
0 Other Hour
Prerequisite(s): (MATH 1312 w/C or better)

MECH 2131. Manufacturing Engineering Lab.
Basic, automated, and advanced manufacturing concepts. Shop demonstration and practices. Prerequisite: MECH 1305 with a grade of C or better.
Department: Mechanical Engineering
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 1305 w/C or better ) OR (BE 1301 w/C or better)

MECH 2132. Additive Manufacturing Lab.
Additive manufacturing processes are studied.
Department: Mechanical Engineering
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 1305 w/C or better)
MECH 2133. Metal Casting Lab.
Metal casting processes are studied.
**Department:** Mechanical Engineering

1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour

**Prerequisite(s):** (MECH 1305 w/C or better)

MECH 2134. Intelligent Manufacturing Lab.
Intelligent Manufacturing Lab: Practice in the use of sensors during a manufacturing process to enable information enabled manufacturing decisions to provide new information about the process, improve quality or enable the manufacture of otherwise impossible devices.

**Department:** Mechanical Engineering

1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour

**Prerequisite(s):** (MECH 1305 w/C or better)

MECH 2311. Intro to Thermal-fluid Sci.
An introduction to basic concepts of thermodynamics and fluid mechanics to include properties, property relationships, states, and fluids. Presentation of the basic equations of thermal-fluid science, continuity, first and second laws of thermodynamics, and momentum. Prerequisite: MATH 1312 with a grade of "C" or better.

**Department:** Mechanical Engineering

3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours

**Prerequisite(s):** (MATH 1312 w/C or better ) OR (MATH 2313 w/C or better ) OR (MATH 2326 w/C or better)

Mechanics of Materials: Determination of stresses, deflections, and stability of deformable bodies, including axial loading, torsion, beam bending, column buckling, and principal and compound stresses and matrix structural analysis. [Common Course Number ENGR 2332]

**Department:** Mechanical Engineering

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

**Prerequisite(s):** (MECH 1321 w/C or better ) OR (BE 2434 w/C or better AND CE 2315 w/C or better)

MECH 2331. Matl & Manufacturing Processes.
Properties of engineering materials and failure theories. Introduction to manufacturing processes, manufacturing equipment and quality assurance. Prerequisite: CHEM 1305 with a grade of C or better.

**Department:** Mechanical Engineering

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

**Prerequisite(s):** (CHEM 1305 w/C or better)
MECH 2340. Mechanics II -Dynamics.
Mechanics II Dynamics: An introduction to dynamics (kinematics and kinetics) of particles and rigid bodies, work and energy, impulse and momentum.
[Common Course Number ENGR 2302]
Department: Mechanical Engineering
3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 1321 w/C or better ) OR (BE 2434 w/C or better ) OR (CE 2315 w/C or better)

MECH 2342. Electro Mechanical Systems.
Electro Mechanical Systems: Circuit equations and network theorems. Introduction to digital logic circuits. Motors and generators. Principles of sensing, actuation, and control. Prerequisite: [Common Course Number ENGR 2305]
Department: Mechanical Engineering
3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours
Prerequisite(s): (MATH 1312 w/C or better ) OR (MATH 2313 w/C or better ) OR (MATH 2326 w/C or better)

MECH 2351. Engineering Analysis I.
Introduction to basic applications of mathematical principles and computational techniques to analyze and solve engineering problems; basics of differential equations; uses of mathematical software and programming languages for modeling and solving engineering problems. Prerequisite: MATH 1312 with a grade of C or better.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MATH 1312 w/C or better ) OR (MATH 2313 w/C or better ) OR (MATH 2326 w/C or better)

MECH 3103. Mechatronics Lab.
Computer controlled machines are studied. These include robots, drones and other important machines. Hands on experiences help students relate theory to practice.
Department: Mechanical Engineering
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 2324 w/C or better ) OR (BE 2377 w/C or better ) OR (EE 2350 w/C or better)

MECH 3113. Thermo-fluid Lab.
Hands on experiences related to solid mechanics.
Department: Mechanical Engineering
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 2311 w/C or better)
MECH 3123. Solid Mechanics Lab.
Hands on experiences related to solid mechanics.
Department: Mechanical Engineering
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 2322 w/C or better ) OR (BE 2303 w/C or better ) OR (CE 2334 w/C or better)

MECH 3312. Thermodynamics.
Continuation of MECH 2311. Application of principles of cycles and reactive systems; energy relationships and equilibrium requirements.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2311 w/C or better ) OR (BE 2375 w/C or better)

MECH 3313. Thermo-Fluids Lab.
A continuation of the Mechanical Engineering Lab series with practical measurement problems in the thermo-fluid area. Prerequisite: MECH 2311 with a grade of "C" or better.
Department: Mechanical Engineering
3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2311 w/C or better ) OR (BE 2375 w/C or better)

MECH 3314. Fluid Mechanics.
Fluid properties, fluid statics, fluid flow concepts and basic equations, dimensional analysis and dynamic similitude, viscous effects, fluid resistance, laminar and turbulent boundary layers, flow-through pipes.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2311 w/C or better ) OR (BE 2375 w/C or better)

MECH 3323. Solid Mechanics Lab.
Displacement, velocity, acceleration, force, torque, strain, and stress measurements. Data acquisition, processing, and analysis. Statistical analysis of experimental data. Prerequisite: MECH 2322 with a grade of "C" or better.
Department: Mechanical Engineering
3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2322 w/C or better)
MECH 3334. Mechanical Design.
Stress analysis, deflection analysis, and strength of mechanical elements; design of screws, fasteners, and joints; clutches, brakes, couplings, and shafting.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2331 w/C or better ) AND (MECH 2322 w/C or better ) OR (BE 2303 w/C or better ) OR (CE 2334 w/C or better)

MECH 3345. System Dynamics.
Kinematics of single and multiple degree of freedom systems; vibrations, kinematic simulation software, and an introduction to control systems.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2340 w/C or better ) OR (BE 2338 w/C or better ) AND (MECH 2342 w/C or better ) OR (BE 2377 w/C or better ) OR (EE 2350 w/C or better)

MECH 3352. Engineering Analysis II.
Concepts and modeling of ordinary and partial differential equations for a variety of engineering phenomena using finite difference, finite volume, and finite element techniques. Introduction to statistics, data analysis, and probability theories.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MATH 2326 w/C or better)

MECH 4196. Independent Study.
This course is intended to fulfill the requirements for any special topics for which the department does not have an established course on the subject area. The content and the goal of the course will be worked out between an instructor and the student. A substantial final report and presentation will be required. Prerequisite: Departmental approval. Restricted to class of JR and SR.
Department: Mechanical Engineering
1 Credit Hour
1 Total Contact Hour
0 Lab Hour
0 Lecture Hour
1 Other Hour
Classification Restrictions:
Restricted to class of JR,SR

MECH 4315. Heat Transfer.
Introduction to heat transfer by conduction, convection, and radiation; steady and transient states; steady periodic states; heat transfer in engineering apparatuses.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3312 w/D or better AND MECH 3314 w/D or better)
MECH 4316. Thermal System Design.
Design, analysis, and optimization of fluid flow, heat transfer and energy processes of ducts and piping, heat exchangers, fluid machinery, power
generation and environmental control systems. Use of computational fluid dynamics (CFD) tools to synthesize thermo-fluid system designs. Prerequisite:
MECH 4315.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 4315 w/D or better)

MECH 4326. Finite Element Analysis.
Introduction to finite element methods, discretization of governing equations and solution algorithms. Analysis of solid mechanics and structural
problems using existing FEA computer programs. Prerequisites: MECH 2351 with a grade of "C" or better, and MECH 3334.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2351 w/C or better AND MECH 3334 w/D or better)

MECH 4330. Dynamic Systems Simulation.
Computational problems in the simulation of Dynamic Systems are covered.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3345 w/D or better AND MECH 3352 w/D or better)

MECH 4332. MECH Comp App Vision Robotics.
Mechanical Computational Applications in Vision and Robotics: Computational methods applicable to Mechanical Engineering problems. Vision
processing, robotics, autonomous systems, drones, machine intelligence and control.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3345 w/D or better)

MECH 4334. Mechanical Systems Control.
Mechanical Systems Control: Theory and application of control to Mechanical Systems. Feedback, feedforward, PID and other controls used in
Mechanical Engineering. Applications to drones, aircraft, missiles, robots and autonomous vehicles.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 4334 w/D or better)
Design process and methodology from concept through analysis, layout, and report. Types of design problems, human element in design, computer aid in design, specification development, concept generation, concept evaluation, product generation, function and performance evaluation, design for manufacturing, design for assembly, design for life-cycle, sustainability, final product, documentation, ethics, safety, and economics. Prerequisite: MECH 3334.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3334 w/D or better)

Communications and Mechanical Sensor Protocols: Theory of standard communication protocols and the sensors/actuators that use them for the control of Mechanical Systems. The course will enable the selection and operation of devices used in autonomous mechanical systems.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3345 w/D or better)

MECH 4346. Mechatronics.
The integration of electronics and use of digital controls and microcontroller technology with mechanical systems; microprocessor control, control theory, actuators, and sensors. Prerequisite: MECH 3345.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3345 w/D or better)

MECH 4366. Senior Design Project.
Conceptual preliminary and final design solutions to engineering problems by students in teams. Prerequisite: Must be in the final semester and have a 2.0 GPA in the major.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (CE 2326 w/C or better AND MECH 4336 w/D or better)

MECH 4369. Engineering Practice.
A group project in mechanical engineering comprising the design, analysis, manufacturing and testing of an equipment or system stemming from a mutual student-department interest. A substantial final report and presentation containing drawings, calculations, specifications, manufacturing process, and test results must be produced. A successful demonstration of the operation of the designed system is also required. Prerequisite: Departmental approval required. Restricted to level of UG.
Department: Mechanical Engineering
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
0 Lecture Hours
3 Other Hours
**MECH 4370. Pre-Professional Experiences.**
Co-operative work study/internship/job training with mechanical engineering companies and national laboratories. Intended for mechanical engineering students who have completed at least one full semester of upper level mechanical engineering courses. It can be used for a maximum of 3 credit hours towards technical electives. Prerequisite: Departmental approval required. Restricted to class of JR, SR.

**Department:** Mechanical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**Classification Restrictions:**
Restricted to class of JR, SR

**MECH 4392. Special Topics in Computation.**
Special topics in the area of Computation applied to Mechanical Engineering Problems.

**Department:** Mechanical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**MECH 4393. Special Topics in Elect-Mech.**
Special topics in the area of Electro-Mechanical Design are covered.

**Department:** Mechanical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (MECH 3345 w/D or better)

**MECH 4394. Special Topics in Therm Fluid.**
Special topics in the area of Fluid and Thermal Design are covered.

**Department:** Mechanical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (MECH 3312 w/C or better)

**MECH 4395. Special Topics in Mech. Engr..**
Special Topics in Mechanical Engineering (3-0) Selected topics of current interest in Mechanical Engineering. Prerequisite: Senior standing in Engineering.

**Department:** Mechanical Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours
MECH 4396. Independent Study.
This course is intended to fulfill the requirements for any special topics for which the department does not have an established course on the subject area. The content and the goal of the course will be worked out between an instructor and the student. A substantial final report and presentation will be required. Prerequisite: Departmental approval required. Restricted to class of JR, SR.

Department: Mechanical Engineering

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
0 Lecture Hours
3 Other Hours

Classification Restrictions:
Restricted to class of JR, SR