Mechanical Engineering Courses

Courses

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

Principles of mechanics, vectors, force systems, equilibrium of particles and rigid bodies, force analysis of truss structures, distributed forces, centroids, and friction.
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.
1 Credit Hour
1 Total Contact Hour
0 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.
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 2132. Additive Manufacturing Lab.
Additive manufacturing processes are studied.
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (CHEM 1305 w/C or better)

MECH 2133. Metal Casting Lab.
Metal casting processes are studied.
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (CHEM 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.

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)

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.

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

Prerequisite(s): (MECH 1321 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.

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.
An introduction to dynamics (kinematics and kinetics) of particles and rigid bodies, work and energy, impulse and momentum.

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

Prerequisite(s): (MECH 1321 w/C or better)

MECH 2342. Electro Mechanical Systems.

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.

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.
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 2324 w/C or better)

MECH 3113. Thermo-fluid Lab.
Hands on experiences related to solic mechanics.
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 solic mechanics.
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 2322 w/C or better)

MECH 3305. Mechanical Engineering Lab I.
Mechanical Engineering Laboratory I (2-3) Theory and fundamentals of the measurement of mechanical and thermal properties and the application of these measurements to processes. This includes the study of various types of measurement devices from traditional gages to modern computer-based data acquisition systems. The application of these measurement techniques are practiced through various laboratory problems.
3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours
Prerequisite(s): (MATH 2326 w/C or better ) AND (BE 2377 w/C or better ) AND (BE 3373 w/C or better ) AND (BE 2375 w/C or better)

MECH 3312. Thermodynamics.
Continuation of MECH 2311. Application of principles of cycles and reactive systems; energy relationships and equilibrium requirements.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2311 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.
3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 2311 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.

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

Prerequisite(s): (MECH 2311 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.

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.

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

Prerequisite(s): (MECH 2322 w/C or better AND MECH 2331 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.

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

Prerequisite(s): (MECH 2340 w/C or better ) AND (MECH 2342 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.

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 3354. Fluid Mechanics.
Fluid Mechanics (3-0) 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.

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

Prerequisite(s): (BE 2375 w/C or better ) OR (MECH 3375 w/C or better ) AND (MATH 2326 w/C or better)
MECH 3363. Intro/Computer Aided Manufacturin...
Introduction to Computer Aided Manufacturing (2-3) Geometric modeling theory for computer aided drafting and manufacturing, parametric representation of analytical and synthetic curves and surfaces; fundamentals of modeling solids, cutting tool fundamentals, practice using commercial computer aided modeling software, class project requiring students to design a mechanical component and create the necessary code for input to a numerically controlled machine tool used in its manufacture.
3 Credit Hours
5 Total Contact Hours
2 Lecture Hours
0 Other Hours
Prerequisite(s): (BE 2338 w/C or better ) AND (IE 3126 w/C or better)

MECH 3365. Dynamic Response.
Dynamic Response (3-0) Fundamentals of vibration theory and system response. Single and multiple degrees of freedom, damping, isolation.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (BE 2338 w/C or better ) OR (MECH 2338 w/C or better ) AND (MATH 2326 w/C or better)

MECH 3376. Thermodynamics II.
Thermodynamics II (3-0) Continuation of BE 2375. Application of principles of cycles and reactive systems, energy relationships, and equilibrium requirements.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (BE 2375 w/C or better ) OR (MECH 3375 w/C or better)

MECH 4106. Mechanical Engineering Lab II.
Mechanical Engineering Lab II (0-3) A continuation of the Mechanical Engineering Lab series, with practical measurement problems in mechanical engineering.
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 3305 w/D or better)

MECH 4107. Mechanical Engineering Lab III.
Mechanical Engineering Lab III (0-3) A continuation of the Mechanical Engineering Lab series, with practical measurement problems in mechanical engineering.
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour
Prerequisite(s): (MECH 4106 w/D or better)
MECH 4111. Controls Laboratory.
Controls Laboratory (0-3) Experiments including spring-mass-damped systems, internal structural damping, forced vibrations, open and closed loop pneumatic systems, servomotor control, stepper motor control and control simulator.
1 Credit Hour
3 Total Contact Hour
0 Lecture Hour
3 Lab Hour
0 Other Hour

Prerequisite(s): (MECH 4311 w/C or better)

MECH 4175. Undergrad Research in ME.
Undergraduate Research in Mechanical Engineering (0-0-1) Supervised individual private instruction on research project. May be repeated for credit as topic varies.
1 Credit Hour
1 Total Contact Hour
0 Lecture Hour
0 Lab Hour
1 Other Hour

MECH 4195. Senior Prof. Orientation.
Senior Professional Orientation (1-0) Introduction to the engineering profession with emphasis on job placement, professional ethics and an engineering field examination.
1 Credit Hour
1 Total Contact Hour
0 Lecture Hour
0 Lab Hour
1 Other Hour

Classification Restrictions:
Restricted to class of JR,SR

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

Classification Restrictions:
Restricted to class of JR,SR

MECH 4296. 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.
2 Credit Hours
2 Total Contact Hours
0 Lecture Hours
0 Lab Hours
2 Other Hours

Classification Restrictions:
Restricted to class of JR,SR
MECH 4311. Automatic Controls.
Automatic Controls (3-0) A study of classical control theory including transfer function, stability and time response, error analysis and sensitivity functions, root locus. Nyquist diagrams and Bode Plots; the analog computer as a simulation tool particularly as pertains to nonlinear control systems. Also, an introduction to modern control theory is presented.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3365 w/D or better)

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.
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.
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.
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.
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)
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.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (MECH 3334 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.
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 4355. Gas Dynamics.
Gas Dynamics (3-0) A study of the flow of compressible fluids. One-dimensional steady flow, supersonic flow, normal and oblique shock, flow with heating and cooling, measurement of fluid properties and flow parameters.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (BE 2375 w/C or better) AND (MECH 3354 w/C or better)

MECH 4364. Mechanical Design I.
Mechanical Design I (2-3) Stress analysis, deflection analysis, strength of mechanical elements, design of screws, fasteners and joints, clutches, brakes and couplings, shafting.
3 Credit Hours
5 Total Contact Hours
3 Lab Hours
2 Lecture Hours
0 Other Hours
Prerequisite(s): (BE 2434 w/C or better)

MECH 4366. Senior Design Project.
Conceptual preliminary and final design solutions to engineering problems by students in teams.
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 4368. Environmental Control Engr.
Environmental Control Engineering (3-0) A study of theory and practice leading to the design of heating and air conditioning systems to control building environment for human comfort.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
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.

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.

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

Classification Restrictions:
Restricted to class of JR,SR

Engineering Problems Seminar (0-0-3) Original investigation of special problems in the student's field; the problems to be selected by the student with approval of the department chairperson.

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

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

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.

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.

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.
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.
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 4466. Senior Design.
Senior Design (2-6) Conceptual, preliminary and final design solutions to engineering problems by students in teams.
4 Credit Hours
8 Total Contact Hours
6 Lab Hours
2 Lecture Hours
0 Other Hours