

# EML: Engineering: Mechanical Courses

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## Courses

### **EML 3011 Mechanics of Materials**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: EGM 2500 AND EGN 3365\* AND EML 3022 AND EML 3172L\*

Strength and elastic deflection of engineering materials due to loads applied axially, in torsion, in bending, and in shear. Combined stresses and principal stresses. Applications to design of beams and shafts. Computer simulation of stress under loading.

### **EML 3015 Thermal Fluid Systems I**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: (PHY 2048 OR PHY 2048C) AND (MAC 2312)

Introduction to thermodynamics including the first and second laws of thermodynamics as well as power and refrigeration cycles. Fundamentals of heat transfer including an introduction to conduction, convection, and radiation.

### **EML 3016 Thermal Fluid Systems II**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: EML 3015 AND EML 3016L\* AND MAP 2302

Further study of thermal fluid systems including an introduction to fluid mechanics. Fluid statics, Bernoulli and energy equations, open and closed flow, drag and lift. Heat transfer via convection and radiation.

### **EML 3016L Thermal Fluid Systems II lab**

College of Sci and Engineering, Department of Mechanical Engineering

1 sh (may not be repeated for credit)

Prerequisite: EML 3016\*

Laboratory experiments related to thermodynamics, fluid mechanics, and heat transfer. Thermal systems measurement devices, performance characteristics and design of engineering experiments.

### **EML 3022 Computer Aided Design and Modeling**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: MAC 2311\*

Introduction to industry standards for graphical representation of objects and simulation of processes utilizing 2D presentations and 3D modeling.

### **EML 3172L Mechanics of Materials lab**

College of Sci and Engineering, Department of Mechanical Engineering

1 sh (may not be repeated for credit)

Prerequisite: EML 3011\*

Laboratory experiments in materials science, material processing, material stress, strain and bending.

### **EML 3500 Machine Design**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: EML 3011 AND EML 3172L

Design of machine elements including fasteners, bearings, gears and other power transmission components.

### **EML 3960 Certified Solidworks Professional Exam Prep**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: EML 3022

Covers the topics necessary to pass the Certified Solidworks Professional Exam.

### **EML 4081 Non-Destructive Evaluation**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: EML 3011 AND PHY 2048

Non-destructive evaluation (NDE) techniques with emphasis on recent advancements in the field. Introduction to the field of NDE. Overview of common NDE techniques, such as visual inspection, eddy current, X-ray, and ultrasonics. Recent development and research areas in NDE.

### **EML 4225 Dynamic Systems**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: EGM 3344 AND EGM 3401 AND MAP 2302

Introduction to modeling and control of dynamic physical systems, vibration analysis, and design of control systems.

### **EML 4321 Manufacturing Processes**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: EML 3011

An integrated treatment of the analysis of traditional and non-traditional manufacturing processes.

### **EML 4722 Computational Fluid Dynamics**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Prerequisite: EML 3016\*

Fluid kinematics, differential formulation of conservation laws for fluid mechanics, numerical schemes for discretizing differential equations, turbulence models, simulation of laminar and turbulent flows using modern tools.

**EML 4804 Mechatronic Systems**

College of Sci and Engineering, Department of Electrical & Computer Engineer

3 sh (may not be repeated for credit)

Prerequisite: (EEL 4834 OR COP 3014) AND (PHY 2049) AND (EML 4804L\*)

This course introduces and demonstrates the synergistic combination of mechanical engineering, electrical and electronics engineering, control engineering, and programming to solve engineering problems and build intelligent systems.

**EML 4804L Mechatronic Systems lab**

College of Sci and Engineering, Department of Electrical & Computer Engineer

1 sh (may not be repeated for credit)

Prerequisite: EML 4804\*

This is an introduction to Mechatronics by lab experience for interfacing of mechanical and electrical systems. It provides instruction and practical exercises in C programming, microcontroller programming, interfacing with sensors and actuators, data acquisition, communication, and closed-loop control.

**EML 4905 Directed Study**

College of Sci and Engineering, Department of Mechanical Engineering

1-12 sh (may be repeated indefinitely for credit)

**EML 4940 Engineering Internship**

College of Sci and Engineering, Department of Mechanical Engineering

1 sh (may be repeated for up to 3 sh of credit)

Practical and significant discipline applicable engineering based work experience under approved industrial supervision. Graded on a satisfactory / unsatisfactory basis only. Permission from department co-op advisor is required.

**EML 4948 Co-Op Work Experience**

College of Sci and Engineering, Department of Mechanical Engineering

1 sh (may be repeated for up to 4 sh of credit)

Practical co-op work under approved industrial supervision. Grading is on satisfactory / unsatisfactory basis only. Permission is required.

**EML 4961 Fundamentals of Engineering - Mechanical Exam Prep**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

Review of all areas of the Fundamentals of Engineering - Mechanical Exam. This course will prepare students to pass the exam.

**EML 5546 Composite Materials**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

This course is an introduction to composite materials and their applications. Properties and microstructure of high-strength fiber materials (glass, carbon, polymer, ceramic fibers) and matrix materials (polymer, metal, ceramic, and carbon matrices) will be analyzed. Additionally, specific strength and stiffness of high-performance composites, design of composite structures and components, and manufacturing processes will be examined.

**EML 5570 Principles of Fracture Mechanics**

College of Sci and Engineering, Department of Mechanical Engineering

3 sh (may not be repeated for credit)

This course will investigate topics related to fracture analysis of mechanical structures. Topics include brittle and ductile fracture, linear elastic fracture mechanics and determination of stress intensity, elastic-plastic fracture, J-integral, and fatigue failure.

**EML 6237 Advanced Solid Mechanics**

College of Sci and Engineering, Department of Electrical & Computer Engineer

3 sh (may not be repeated for credit)

This course covers stress analysis of mechanical structures. Topics include unsymmetrical bending, three-dimensional stress-strain, torsion, rotational stress, thin walled pressure vessels, beams on elastic foundations, and stress concentrations.

**EML 6805 Foundations for Robotics**

College of Sci and Engineering, Department of Intelligent Systems & Robotics

3 sh (may not be repeated for credit)

This course is focused on robot modeling. It addresses fundamental concepts of robot kinematics including forward kinematics, inverse kinematics, and differential kinematics. In addition, it deals with robot dynamics, trajectory generation, and tracking. Advanced topics on high-level control such as admittance and impedance will also be covered. Students are expected to have a background in linear algebra, knowledge of computational logic and logic-based programming.

**EML 6938 Special Topics in Robotics**

College of Sci and Engineering, Department of Intelligent Systems & Robotics

3 sh (may be repeated for up to 9 sh of credit)

Prerequisite: EEE 6772 OR EML 6805

In this course the student will acquire a robust understanding of the foundations and fundamental results in a specific area of interest in the field of robotics. Examples include human agent/robot teamwork, multivariable Linear Control Systems, humanoid robots, wearable robotics, human assistive devices, guidance and path planning, fault detection and isolation, autonomous navigation and obstacle avoidance, human-friendly industrial robotics and automation, social robotics, field robotics, robotics for education and training and rehabilitation robotics.