

ENGINEERING SCIENCE (ES)

College of Engineering and Mines (<https://www.uaf.edu/cem/>)
907-474-7730

ES F100L Makerspace Alaska - A Laboratory Introduction to Engineering

1 Credit

Offered Fall and Spring

Through hands-on projects, students will learn basic programming with a Raspberry Pi computer kit, basic computer-aided design for 3D printing and using a Laser Cutter. Students will develop leadership, team and communication skills needed to successfully complete project that utilize the engineering design and design thinking processes.

Prerequisites: placement into MATH F105.

Special Notes: In order to fulfill the GER Natural Sciences requirement, both ES F100X and ES F100L need to be completed; If only one course is completed, no credit is given to the GER Natural Sciences requirement.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 3 + 0

ES F100X Engineering Alaska - An Introduction to Engineering

3 Credits

Offered Fall and Spring

Overview of the engineering profession and introduction to the field of engineering with a focus on engineering in the remote and extreme conditions of Alaska. Basic science, mathematics and engineering concepts are applied to problem solving. Communication skills including communicating engineering calculations, word processing and use of spreadsheets are taught.

Prerequisites: placement into MATH F105.

Special Notes: In order to fulfill the GER Natural Sciences requirement, both ES F100X and ES F100L need to be completed; If only one course is completed, no credit is given to the GER Natural Sciences requirement.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 0 + 0

ES F101 Introduction to Engineering

3 Credits

Offered Fall and Spring

Overview of the engineering profession and introduction to the fields of engineering. Basic concepts from engineering, physics and mathematics applied to engineering problem solving. Basic skills required of engineers, including an introduction to engineering communications: word processing, descriptive geometry, orthographic and isometric drawings, graphs, computer graphics and use of spreadsheets.

Prerequisites: MATH F151X, MATH F152X, MATH F156X or placement into MATH F251X.

Lecture + Lab + Other: 2 + 2 + 0

ES F166 Electric Car Conversion

2 Credits

Offered As Demand Warrants

An introduction to the principles of electrical vehicle propulsion systems. Fundamentals of electrical motors, electrical motor controls, electrical energy storage systems and automotive power-train design. Students will conduct practical design projects culminating with a complete electric car conversion. Relevant codes and standards will be emphasized.

Lecture + Lab + Other: 1 + 3 + 0

ES F201 Computer Techniques

3 Credits

Offered Fall and Spring

Basic computer programming, in C/C++, with applications from all fields of engineering. Introduction to MATLAB.

Prerequisites: (MATH F151X; MATH F152X), MATH F156X or MATH F251X (MATH F251X may be taken concurrently).

Lecture + Lab + Other: 2 + 3 + 0

ES F208 Mechanics

4 Credits

Offered Fall and Spring

Engineering-oriented coverage of statics and dynamics. Vector methods used where appropriate.

Prerequisites: MATH F252X (may be taken concurrently); PHYS F211X (may be taken concurrently); ES F101, GE F101, MIN F110, PETE F101.

Lecture + Lab + Other: 3 + 3 + 0

ES F209 Statics

3 Credits

Offered Fall and Spring

Analyzes force systems in two and three dimensions; composing and resolving of forces and force systems; applies principles of equilibrium for various bodies and simple structures, friction, centroids, and moments of inertia. Applies concept of vector algebra wherever necessary.

Prerequisites: MATH F252X (may be taken concurrently); PHYS F211X (may be taken concurrently); PETE F101 or ES F101.

Lecture + Lab + Other: 3 + 0 + 0

ES F210 Dynamics

3 Credits

Introduces kinematics and kinetics of particles and rigid bodies' motion.

Applies principles of work and energy, impulse and momentum to particles and rigid bodies' motion. Applies concept of vector algebra wherever required.

Prerequisites: ES F209; MATH F252X.

Lecture + Lab + Other: 3 + 0 + 0

ES F301 Engineering Analysis

3 Credits

Offered Fall and Spring

Application of numerical tools, including software, to typical engineering design problems. Selected topics from all fields of engineering.

Prerequisites: MATH F302 (may be taken concurrently); ES F201.

Lecture + Lab + Other: 3 + 0 + 0

ES F307 Elements of Electrical Engineering

3 Credits

Offered Fall

Elementary circuits and theorems, natural, forced and steady state response, principles of electronics, circuit models and system parameters, elements of measurement and instrumentation, characteristics of DC machines, and AC machines and transformers.

Prerequisites: MATH F252X.

Lecture + Lab + Other: 3 + 0 + 0

ES F331 Mechanics of Materials

3 Credits

Offered Fall and Spring

Analysis of internal forces in members subjected to axial, torsional and flexural loads, singly and in combination. Stress-strain relationships and material property definitions; shear and moment diagrams, Mohr's Circle. Applications include beams, columns, connections and indeterminate cases.

Prerequisites: ES F208 or ES F209; MATH F252X.

Lecture + Lab + Other: 3 + 0 + 0

ES F341 Fluid Mechanics

4 Credits

Offered Fall and Spring

Statics and dynamics of fluids; energy and momentum principles. Dimensional analysis; flow in open channels, closed conduits and around submerged bodies.

Prerequisites: ES F208 or ES F210; MATH F252X.

Lecture + Lab + Other: 3 + 3 + 0

ES F346 Introduction to Thermodynamics

3 Credits

Offered Fall and Spring

Fundamental principles and elementary applications of thermodynamics, including the first and second laws of thermodynamics, and thermodynamic systems, properties, processes and cycles.

Prerequisites: MATH F252X; PHYS F211X.

Lecture + Lab + Other: 3 + 0 + 0