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 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