Engineering Science (ES)

College of Engineering and Mines
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
Grading System: Letter Grades with option of Plus/Minus

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
Grading System: Letter Grades with option of Plus/Minus

ES F186 Applied Engineering Mathematics
4 Credits
Offered Fall
Fundamental mathematics topics appearing in first- and second-year engineering classes. All content is taught within the context of an engineering application. Specific topics include applications of algebra, trigonometry, vectors, sinusoids, linear systems, complex numbers, derivatives and integrals.
Prerequisites: Appropriate score on the math placement test and high school trigonometry; or MATH F151X and MATH F152X; or MATH F156X.
Cross-listed with MATH F186.
Lecture + Lab + Other: 4 + 1 + 0
Grading System: Letter Grades with option of Plus/Minus

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 ES/MATH F186.
Lecture + Lab + Other: 2 + 3 + 0
Grading System: Letter Grades with option of Plus/Minus

ES F208 Mechanics
4 Credits
Offered Fall and Spring
Engineering-oriented coverage of statics and dynamics. Vector methods used where appropriate.
Prerequisites:(ES F186/MATH F186 or MATH F251X); PHYS F211X (may be taken concurrently); ES F100X, GE F101, MIN F110 or PETE F101.
Lecture + Lab + Other: 3 + 3 + 0
Grading System: Letter Grades with option of Plus/Minus

ES F209 Statics
3 Credits
Offered Fall
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 F100X.
Lecture + Lab + Other: 3 + 0 + 0
Grading System: Letter Grades with option of Plus/Minus

ES F210 Dynamics
3 Credits
Offered Spring
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
Grading System: Letter Grades with option of Plus/Minus

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
Grading System: Letter Grades with option of Plus/Minus

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
Grading System: Letter Grades with option of Plus/Minus

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
Grading System: Letter Grades with option of Plus/Minus

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
Grading System: Letter Grades with option of Plus/Minus

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
Grading System: Letter Grades with option of Plus/Minus