Engineering Science (ES)

Courses

ES A103 Engineering Graphics 3 Credits
Introduces the fundamentals of engineering graphics and provides training in visualization skills necessary for graphically presenting engineering ideas using standard drawing techniques and Computer Aided Design (CAD).
Prerequisites: MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C.

ES A208 Engineering Statics and Dynamics 5 Credits
Static and dynamic analysis of particles and rigid bodies. Statics topics covered include Newton's laws of motion, Newton's law of gravitational attraction, force and force systems, equilibrium, structural analysis, internal forces, friction, and center of gravity and centroid. Dynamics topics covered include particle and rigid body kinematics and kinetics, force and acceleration, work and energy, impulse and momentum, and vibrations.
Prerequisites: MATH A252 with a minimum grade of C and PHYS A211 with a minimum grade of C.

ES A209 Engineering Statics 3 Credits
Principles and analysis of static force systems, equilibrium, distributed forces, centroids, centers of gravity, moments of inertia, structures, friction, and virtual work.
Prerequisites: MATH A252 with a minimum grade of C and PHYS A211 with a minimum grade of C and PHYS A211L with a minimum grade of C.

ES A210 Engineering Dynamics 3 Credits
Kinematics and kinetics of particles and rigid bodies with applications of Newton's second law and principles of work-energy, impulse-momentum, and vibration.
Prerequisites: ES A209 with a minimum grade of C.

ES A302 Engineering Data Analysis 3 Credits
Introduces concepts of probability and statistics needed to solve various engineering problems.
Prerequisites: MATH A252 with a minimum grade of C and (ENGR A161 with a minimum grade of C or EE A261 with a minimum grade of C).

ES A309 Elements of Electrical Engineering 3 Credits
Electrical fundamentals: elementary circuit analysis, network theorems, steady state, and transient analysis of DC circuits with resistors and one energy storage device (L or C). Steady state analysis of AC circuits with resistors, capacitors, and inductors using complex number and phasor representation. Power in DC and AC circuits. Transformers, meters, and applications of simple electrical components and circuits.
Prerequisites: PHYS A212 and MATH A302 or concurrent enrollment.

ES A311 Mechanics of Materials 3 Credits
Stress-strain relations, axially loaded and torsional members, review of shear and bending moment diagrams for beams, flexural and shearing stresses, deflections of beams, plane stress, combined stresses, buckling of columns, elementary design of beams and columns.
Prerequisites: ES A209 with a minimum grade of C and MATH A302 with a minimum grade of C or concurrent enrollment.

ES A341 Fluid Mechanics 3 Credits
Introduction to physical properties and behavior of fluids. Topics include hydrostatics and dynamics of liquids and gases, dimensional analysis, fluid forces on immersed bodies, pipe flow, fluid machinery, and open channel flow.
Prerequisites: ES A209 with a minimum grade of C and (ES A302 with a minimum grade of C or concurrent enrollment or MATH A302 with a minimum grade of C or concurrent enrollment).

ES A341L Fluid Mechanics Laboratory 1 Credit
Provides supplemental explanation and practical exercises applying physical properties and behavior of fluids, including hydrostatics, fluid forces, pipe flow, fluid machinery, and open channel flow.
Prerequisites: ES A341 with a minimum grade of C or concurrent enrollment.

ES A346 Introduction to Thermodynamics 3 Credits
Fundamental principles and elementary applications of thermodynamics, including the first and second laws of thermodynamics, and thermodynamic systems, properties, processes and cycles.
Prerequisites: (CHEM A106 with a minimum grade of C or PHYS A211 with a minimum grade of C) and MATH A252 with a minimum grade of C.

ES A411 Northern Design 3 Credits
Introduction to design and maintenance of facilities in northern climates to construct sustainable, energy-efficient and durable buildings and infrastructure suitable for the unique needs of northern inhabitants.
Registration Restrictions: Senior standing or graduate standing in an accredited program in architecture or engineering, or instructor permission.