

Engineering Science (ESCI)

ESCI 201 Statics 3 Credits (3,0)

Vector analysis of forces and moments in 2D and 3D systems. Center of mass, distributed forces, particle and rigid body equilibrium. Analysis of trusses, frames, internal forces, shear and moment distribution in beams. Centroids and moments of inertia.

Daytona Beach Prerequisites: (PHYS 150 or PHYS 226) and (ENGR 120 or ENGR 111 or ENGR 100)

Prescott Prerequisites: AE/ME students must have a C or better in MATH 242 and PHYS 161

Prescott Corequisites: MATH 243

Worldwide Prerequisites: PHYS 150 and ENGR 101W

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

ESCI 202 Solid Mechanics 3 Credits (3,0)

Stress and strain concepts for elastic materials. Failures due to stress and conformity to engineering standards. Stress and deformation in members subject to axial, torsional, bending, and combined loading. Vessels under pressure. Column stability.

Daytona Beach Prerequisites: ESCI 201

Prescott Prerequisites: AE/ME students must have a C or better in ESCI 201

Worldwide Prerequisites: ESCI 201

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

ESCI 204 Dynamics 3 Credits (3,0)

Kinematics and kinetics of particles and rigid bodies. Acceleration, velocity, position, work, energy, power, impulse, and momentum. Vector treatment.

Daytona Beach Prerequisites: (ENGR 115 or CPSC 223) and ESCI 201

Prescott Prerequisites: AE/ME students must have a C or better in ENGR 115 and ESCI 201

Worldwide Prerequisites: ESCI 201 and MATH 242

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

ESCI 206 Fluid Mechanics 3 Credits (3,0)

Fluid state characteristics. Fluid statics, kinematics of fluid motion. Flow of incompressible ideal fluid. Impulse-momentum principles. Similitude, dimensional analysis, fluid measurements.

Prescott Prerequisites: AE/ME students must have a C or better in ESCI 201 and MATH 242

Worldwide Prerequisites: ESCI 201 and PHYS 160

Corequisites: ESCI 208

Course Offered at: Prescott, Worldwide, Asia

ESCI 207 Fundamentals of Mechanics 3 Credits (3,0)

Vector analysis of forces and moments; static equilibrium systems; center of gravity. Kinematics, kinetics, work and energy, impulse, momentum.

Prerequisites: PHYS 161

Course Offered at: Prescott

ESCI 208 Thermodynamics 3 Credits (3,0)

Heat and work transformation governed by first and second laws of thermodynamics in closed and open systems. Evaluating properties of pure substances. Ideal gas behavior, thermodynamic cycles, entropy, and diagrams.

Daytona Beach Corequisites: PHYS 160

Prescott Prerequisites: AE/ME students must have a C or better in PHYS 161

Worldwide Prerequisites: PHYS 160

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

ESCI 299 Special Topics in Engineering Science 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in engineering science.

Course Offered at: Daytona Beach, Prescott, Worldwide

ESCI 306 Fiber Optics 3 Credits (3,0)

Optical fiber technology and applications: multimode and single-mode waveguides, light sources (LEDs and lasers), detectors. Applications to communications, sensors, aviation. Includes lab work, computer design, literature research.

Course Offered at: Prescott

ESCI 312 Energy Transfer Fundamentals 3 Credits (3,0)

First and second laws of thermodynamics for control masses and control volumes. Fundamentals of heat transfer: conduction, convection, radiation. Application of energy balances.

Prerequisites: PHYS 161

Course Offered at: Prescott

ESCI 315 Space Environment and Effects 3 Credits (3,0)

Space environment effects on spacecraft and design. Vacuum, neutral, plasma, radiation, and space debris environments. Radiation effects on electrical subsystems. Emphasis on space debris.

Prescott Prerequisites: AE/ME students must have a C or better in MATH 242 and PHYS 250 and Junior Standing

Course Offered at: Daytona Beach, Prescott

ESCI 320 Engineering Materials Science 2 Credits (2,0)

Properties and measurements of engineering materials. Structures and characteristics of metals, alloys, plastics, ceramics, composites. Equilibrium diagrams, processing of materials, corrosion.

Daytona Beach Prerequisites: COMM 221 and ESCI 202 and (CHEM 110 or CHEM 113 or CHEM 140)

Prescott Prerequisites: AE/ME students C or better in COMM 221 and ESCI 202 and (CHEM 110 or CHEM 113 or CHEM 140)

Worldwide Prerequisites: COMM 221 and ESCI 202 and CHEM 110

Corequisites: ESCI 320L

Course Offered at: Daytona Beach, Prescott, Worldwide

ESCI 320L Engineering Materials Science Laboratory 1 Credit (0,1)

Lab experiments and techniques in materials science, composites, solid mechanics.

Corequisites: ESCI 320

Course Offered at: Daytona Beach, Prescott, Worldwide

ESCI 322 Aerospace Engineering Failure 2 Credits (2,0)

Structural and material failure topics in aerospace: fatigue, fracture, thermomechanical failure, fastener failure, corrosion, impact damage. Statistical failure analysis, non-destructive evaluation, structural health monitoring.

Corequisites: ESCI 322L

Course Offered at: Prescott

ESCI 322L Aerospace Engineering Failure Laboratory 1 Credit (0,1)

Lab experiments complementing ESCI 322 topics. Case history inspection, failed components from service, experimental interpretation.

Corequisites: ESCI 322

Course Offered at: Prescott

ESCI 324 Measurements and Instrumentation 2 Credits (2,0)

Measurement and instrumentation methods; experimental design, data acquisition. Standalone equipment and data acquisition software use. Pre-assembled and open-ended experiments. Statistical methods, experimental uncertainty.

Daytona Beach Prerequisites: ELEC 327

Daytona Beach Corequisites: ESCI 324L

Prescott Prerequisites: AE/ME students C or better in PHYS 250L and COMM 221

Prescott Corequisites: ESCI 324L

Worldwide Prerequisites: ELEC 230/ELEC 230L or ELEC 327 and CESC 220/CESC 220L

Worldwide Corequisites: ESCI 324L

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

ESCI 324L Measurements and Instrumentation Laboratory 1 Credit (0,1)

Hands-on learning in measurements and instrumentation.

Corequisites: ESCI 324

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

ESCI 326 Engineering Materials and Structures 3 Credits (3,0)

Introduction to metal alloys and composites in aerospace. Deformation mechanisms of high-use alloys (e.g., titanium), directional tailoring of composites in material and structural properties.

Prerequisites: COMM 221 and ESCI 202 and ESCI 208

Course Offered at: Worldwide, Asia

ESCI 399 Special Topics in Engineering Science 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in engineering science.

Course Offered at: Daytona Beach, Prescott, Worldwide

ESCI 403 Heat Transfer 3 Credits (3,0)

One- and two-dimensional conduction heat transfer, steady and unsteady states. Introduction to finite-difference and finite-element methods. Free and forced convection, radiation heat transfer.

Daytona Beach Prerequisites: MECH 309 or ESCI 206 or AERO 307

Daytona Beach Corequisites: ESCI 320L

Prescott Prerequisites: AE/ME students must have a C or better in ESCI 206 and ESCI 208 and MATH 345

Worldwide Prerequisites: ESCI 206 and MATH 345

Course Offered at: Daytona Beach, Prescott, Worldwide

ESCI 412 Structural Dynamics 3 Credits (3,0)

Simple harmonic motion; undamped and damped free and forced vibration. Multiple degrees of freedom, torsional and transverse systems, dynamic damping, finite element modeling for analysis.

Course Offered at: Prescott

ESCI 413 Engineering Fundamental Review 1 Credit (1,2)

Review of fundamental engineering principles. Problem-solving sessions for National Fundamental Engineering (FE) or Engineering-in-Training (EIT) Exam preparation.

Prerequisites: Junior Standing

Course Offered at: Prescott

ESCI 414 High Temperature Turbine Materials 3 Credits (3,0)

Material systems for aircraft engines, industrial gas turbines, rocket motors. Ni-base superalloys, structural ceramics, life prediction methods: creep-rupture, oxidation, hot corrosion, thermal mechanical fatigue.

Corequisites: ESCI 320

Course Offered at: Prescott

ESCI 492 Engineering Fundamentals Practicum 3 Credits (3,0)

Review and practicum of fundamental engineering principles. Tutorial sessions and graded assignments for National FE Exam preparation. Intended for seniors or advanced juniors.

Course Offered at: Prescott

ESCI 499 Special Topics in Engineering Science 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in engineering science.

Course Offered at: Daytona Beach, Prescott