ES - ENGINEERING SCIENCE (ES)

ES 201 - Conservation & Accounting Principles 4 Credits

Hours: 4R-0L-4C
Term Available: F,W
Graduate Studies Eligible: No
Prerequisites: (MA 113 or MA FTC) and PH 111 and EM 121

A common framework for engineering analysis is developed using the concepts of a system, accounting and conservation of extensive properties, constitutive relations, constraints, and modeling assumptions. Conservation equations for mass, charge, momentum and energy, and an entropy accounting equation are developed. Applications taken from all engineering disciplines stress constructing solutions from basic principles. Students may not receive credit towards graduation for both ES 201 and any of BE 132 or CHE 201.

ES 213 - Electrical Systems 3 Credits

Hours: 3R-0L-3C
Term Available: W,S
Graduate Studies Eligible: No
Prerequisites: MA 113 and PH 112 and (EM 121 or EM 120 or CHE 110 or EP 180 or ENGD 215 or BE 132 or OE 172)

Circuit elements, Kirchhoff's laws, equivalent circuits, voltage and current dividers, and analysis techniques for both DC and the phasor domain. AC circuits and power. Operational amplifiers.

ES 213L - Electrical Systems Lab 1 Credit

Hours: 0R-3L-1C
Term Available: W,S
Graduate Studies Eligible: No
Prerequisites: ES 213 (may be taken concurrently)

Circuit elements, Kirchhoff's laws, equivalent circuits, voltage and current dividers, and analysis techniques for both DC and the phasor domain. AC circuits and power. Operational amplifiers.

ES 214 - Mechanical Systems 4 Credits

Hours: 4R-0L-4C
Term Available: W,S
Graduate Studies Eligible: No
Prerequisites: (ES 201 or BE 132) and (ME 123 or BE 100 or CSSE 120 or ENGD 120) and MA 221
Notes: Grade of C or higher required in ES 201 and BE 132

Conservation and accounting equations applied to mechanical systems. Kinematics and kinetics of particles and rigid bodies undergoing planar motion. Modeling and numerical simulation of dynamic systems. Students may not receive credit towards graduation for both ES 214 and EM 202. Prereq Notes: Grade of C or higher required in ES201 and BE132

ES 305 - System Dynamics 4 Credits

Hours: 3R-3L-4C
Graduate Studies Eligible: No
Prerequisites: (ECE 203 or ENGD 120 or ENGD 112 or (ES 213 and ES 213L)) and MA 222 and ES 214

Conservation and accounting principles are used to model engineering systems comprising mechanical, electrical, fluid, and thermal elements. Dynamic behavior and performance criteria are characterized in the time and frequency domains. Topics include block diagrams, deriving and solving differential equations of motion, experimental parameter identification and model validation, teaming, and reporting engineering results.

ES 312 - Fluid Systems 4 Credits

Hours: 3R-3L-4C
Graduate Studies Eligible: No
Prerequisites: ES 201 or CHE 201

Extend the conservation and accounting framework to examine fluid motion. Topics include dimensional analysis, pressure variation in both stationary and moving fluids, viscous effects including boundary layers, laminar and turbulent flow, and compressibility effects. Applications include similitude, lift and drag, pipe flow, nozzle and diffuser flow. Fundamental concepts are enriched by laboratory experiences. Students may not receive credit towards graduation for both ES 312 and any of EM 301 or CHE 301.