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Undergraduate Bulletin



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Course Descriptions - Rose-Hulman/Foundation-Coalition Sophomore Engineering Curriculum

Curriculum Structure

The Rose-Hulman / Foundation Coalition Sophomore Engineering Curriculum consists of eight courses (30 credit hours) taken over the three quarters of the sophomore year. As shown below the courses are listed as either mathematics (MA) or engineering science (ES) courses:

FALL QUARTER	12 Credit
Hours MA 221 Differential Equations & Matrix Algebra I (4)	
ES 201 Conservation & Accounting Principles (4)	
ES 203 Electrical Systems (4)	
WINTER QUARTER	10 Credit
Hours MA 222 Differential Equations & Matrix Algebra II (4)	
ES 202 Fluid & Thermal Systems (3)	
ES 204 Mechanical Systems (3)	
SPRING QUARTER	8 Credit Hours
MA 223 Statistics for Engineers (4)	
ES 205 Analysis & Design of Engineering Systems (4)	
TOTAL	30 Credit Hours

Curriculum Goals

This set of courses has been designed so that students who participate in this program should

- develop a strong background in engineering science,
- develop an understanding of modeling,
- be able to apply a common problem-solving approach built around the application of conservation and accounting principles and constitutive relations,
- continue to develop effective communication skills,
- be proficient in applying standard statistical procedures and quality control concepts,
- develop a strong background in mathematics,
- be encouraged to be inquisitive and self-motivated learners,
- develop an appreciation for engineering as a profession and begin to develop an identity as an engineer,
- be able to work effectively in teams and recognize the importance of individual responsibility in team efforts,
- be able to apply computer tools appropriately,
- be comfortable working with ambiguity,
- be familiar with the overall design process,
- be able to locate and retrieve both technical and non-technical information,
- be introduced to safe and effective use of instruments,
- appreciate the role of creativity in engineering,
- develop a recognition of the benefits of the new curriculum, and
- be encouraged to have fun learning.

Each course in the curriculum has been developed around a set of course goals and objectives that support these seventeen curriculum goals.

ES 201 Conservation & Accounting Principles 4R-0L-4C F,W Pre: MA 113, PH 111 Co: MA 221

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.

ES 202 Fluid & Thermal Systems 2 2/3R-1L-3C W,S Pre: ES 201 with a grade of C or better

Conservation and accounting equations applied to fluid and thermal systems. Fluid and thermodynamic properties of pure substances. Open and closed systems hydrostatics. Dimensional analysis. Mechanical energy balance and pipe flow. Lift and drag.

ES 203 Electrical Systems 3R-3L-4C F,W,S Pre: MA 113, PH 113

Circuit elements. Kirchhoff's laws. Equivalent circuits and voltage and current dividers. Operational amplifiers. First, second, and higher order circuits. Transient and steady-state behavior. AC circuits and power.

ES 204 Mechanical Systems 2 2/3R-1L-3C W,S Pre: ES 201 with a grade of C or better Co: ES 202

Conservation and accounting equations applied to mechanical systems. Kinematics and kinetics of particles in space and of rigid bodies in plane motion.

ES 205 Analysis & Design of Engineering Systems 3R-3L-4C S,F Pre: ES 202, ES 203 with a grade of C or better, ES 204, MA 222

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.