MOHAWK VALLEY COMMUNITY COLLEGE
UTICA, NEW YORK

ENGINEERING, COMPUTER & PHYSICAL SCIENCES DEPARTMENT

COURSE OUTLINE

ENGINEERING SCIENCE DESIGN

ES 175

REVISED BY J. BIRT: CHANGED TEXTBOOK TO PETROSKI 12/2014
REVIEWED AND FOUND ACCEPTABLE BY J. BIRT 1/2016
REVIEWED AND FOUND ACCEPTABLE BY J. BIRT 1/2017
REVISED BY J. BIRT: MODIFIED FORMAT; ADDED REVIEW PAGE 4/2017
REVISED BY J. BIRT: EDITED OUTCOME 4 AND TOPICS FORMAT 1/2018
REVISED BY J. BIRT: EDITED OUTCOMES 2, 4, 5, 6 AND TOPICS 1/2019
REVISED BY J. BIRT: EDITED OUTCOME 3 AND TOPICS 1/2020
REVISED BY J. BIRT: EDITED FOR ONLINE DELIVERY 1/2021
REVISED BY J. BIRT: ADDED MATLAB REFERENCE 1/2022
REVISED BY J. BIRT: MODIFIED FORMAT, ADDED REVERSE ENGINEERING REFERENCE 1/2023

Catalog Description

ES175 Engineering Science Design C 2, P 3, Cr 3

This course covers project proposal writing, project costing, drawing preparation and project specifications, group dynamics, and making a product. The course practicum may include assignment to a practicing engineer. Required for Engineering Science Students after completing the equivalent of one full-time semester.

Prerequisite: ES161 Introduction to Engineering and Science

Materials

Required:

Invention by Design; How Engineers Get from Thought to Thing
Henry Petroski
Harvard University Press
ISBN 978-0674463684

Student Learning Outcomes

Upon successful completion of the course, the student will be able to:

1. Apply techniques of technical writing, including completion of an engineering project report.
2. Demonstrate techniques of public speaking, by preparing and giving a professional oral presentation.
3. Apply the concepts of open-ended design problems, project scheduling, team dynamics, and product risks.
4. Generate a design that meets the design constraints, capture design intent in technical documents, and evaluate the proposed design.
5. Produce a physical product and/or process according to the design requirements.
6. Gather data related to the performance of the product/process and perform appropriate data analysis.

Major Course Topics

Course Introduction
Overview of Development

Ethics
Social Context of Design

Specification Development
Product Documents

Technical Documentation
Solid Modeling
2D Drawings

Design Process

Scheduling - GANTT Charts, PERT Networks
Decision Matrices

Designing for Manufacturing and Production
Product Safety and Risk
Process Planning

Mathematical Models
Computer Modeling
Optimization Methods
MatLab Applications

Design Evaluation, Reverse Engineering

Verification of Models

Applied Engineering Design
Professional Practices