

## ESG 316 Engineering Science Design II: Methods (Required)

### Course Catalog description:

Design and design- planning methods are developed from the conceptual stages through the application stages using lecture and laboratory. Includes synthesis, optimization, modeling, and simulation and systems engineering. Case studies illustrate the design process. Students undertake a number of laboratory projects employing various design tools. Laboratory fee required.

*4 credits*

**Pre- or Corequisite(s):** ESG major; U2 standing or higher, ESG217 Engineering Science Design I; AMS 161 Applied Calculus II or MAT127 Calculus C or MAT132 Calculus II or MAT142 Honors Calculus II

**Text(s) or other required material:** None

### Course learning outcomes:

1. Teach the student the tools needed to be proficient in engineering design software “Solid Works” and give a broad perspective on what good engineering design entails.
2. Show the students the multiple steps of engineering design from object concept to implementation through hands-on approach.

### Topics Covered:

Weeks 1-2. Review of design, fundamentals; statistical process control, Introduction to computer accounts, setup (week 2)

Weeks 2-3. Introduction to modeling and simulation, Finite element analysis using Microsoft Excel spreadsheets

Weeks 3-5. Materials selection, Introduction to basic AutoCAD

Weeks 5-6. Further topics in engineering economics, Using AutoCAD to draw a vacuum assembly, using multiple views

Weeks 7-8. Optimization, Three dimensional representation in AutoCAD; modeling, rendering, mesh

Weeks 9-11. Engineering statistics, Optimization using Algor (MECH/E)

Weeks 12-13. Reliability theory, Finish optimization; begin work on design drawings for final project

Weeks 14-15. Communication in engineering, Final project drawings; rapid prototyping for final presentation

### Class/ Laboratory Schedule:

ESG	316	Engnrmg Sci Design II: Methods	LEC	1	TUTH	6:50 PM	8:10 PM
			REC	R01	RECW	3:50 PM	4:45 PM
			LAB	L01	W	5:20 PM	8:20 PM
			REC	R02	RECM	3:50 PM	4:45 PM
			LAB	L02	M	5:20 PM	8:20 PM

**Contribution of Course to **meet requirement of Criterion 5:** Students learn how to effectively read and understand engineering drawings and develop communication skills and drawing techniques using hand drawings and CAD.**

**Relationship of course to program outcomes:** Students understand proper drawing techniques and CAD skills are sufficient to provide detailed drawings of designs. Oral and written communications are enhanced through class assignments and homework improving writing and public speaking.

**Person(s) who prepared this description and date of preparation:** Frank Szalajda, PE-instructor 6-14-09

