

ESG 100 INTRODUCTION TO ENGINEERING SCIENCE & DESIGN (REQUIRED)

Credit: 3

Contact Hours: 3 hour tutoring per week

COURSE CATALOG DESCRIPTION:

An overview of the development and application of engineering principles in response to social, industrial, and environmental problems. Engineering methods and theory through case studies and real-world applications. Introduction to modern engineering design and problem solving through discussion of design theory and tools with an emphasis on design for manufacturing and reliability, engineering ethics including value sensitive design, and participation in a design project.

PRE- OR COREQUISITE(S): none

TEXT(S) OR OTHER REQUIRED MATERIAL: *Engineering your Future*, Oakes and Leone

COURSE LEARNING OUTCOMES	SOS	ASSESSMENT TOOLS
Understanding the role of engineers in problem solving and design	a c e g	Portfolio assignment
How engineers apply some basic numerical concepts in problem solving	a e	Portfolio assignment
Understanding the role of engineering ethics and professionalism	f h	Portfolio assignment
The objectives and outcomes of the Engineering Science program and how they apply to the curriculum	i	Portfolio assignment
Understanding engineering design theory and its role in problem solving in relation to societal needs	c, k	Design project
Understanding the importance to engineers of lifelong learning	i, j	Portfolio assignment on emerging technology trends

COURSE TOPICS:

- Week 1. Course and ESG program introduction, including objectives and outcomes; introduction to electronic portfolios
- Week 2. Varieties of engineering, role of engineers in problem solving
- Week 3. Engineering problem solving via numerical methods; case studies from energy and environmental engineering
- Week 4. Value sensitive design and engineering; relationship to engineering ethics
- Week 5. Introduction to engineering design; needs analysis, development of specification, concept development
- Week 6. Introduction to engineering design; Concept selection, optimization and

prototyping (including intro to free form fabrication, 3D printing)
 Week 7. Principles of design for manufacturing; design for reliability
 Week 8. Introduction to design project (electric motor); discussion of electronics and materials
 Week 9. Work on design project; further discussion on engineering materials
 Week 10. Continue design project; introduction to testing, quality and failure analysis
 Week 11: Guest lectures on engineering economics and entrepreneurship
 Week 12: Technical communication skills; engineering professionalism
 Week 13: Introduction to emerging technology areas (nanotechnology, robotics, advanced manufacturing, new materials)
 Week 14: Final project presentations

CLASS/ LABORATORY SCHEDULE:

ESG Fall	100	INTRO ENGINEERING SCI DESIGN	LEC	1	MWF	10:30 AM	11:25 AM
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CURRICULUM

This course contributes 3 credit hours toward meeting the required 48 hours of engineering topics.

STUDENT OUTCOMES (SCALE 1-3):

A	B	C	D	E	F	G	H	I	J	K
3		2		3	2	2	2	2		

3 – Strongly supported

2 – Supported

1-Minimally supported

LEAD COORDINATOR(S) WHO PREPARED THIS DESCRIPTION AND DATE OF PREPARATION:

Gary Halada, SEP 15, 2016