NRE 4610 Introduction to Plasma Physics and Fusion Engineering (Elective)

Catalog Description: NRE 4610 Introduction to Plasma Physics and Fusion Engineering (3-0-3)
Prerequisite: senior standing in science or engineering
A first course in plasma physics and an introduction to magnetic confinement fusion: basic plasma physics, magnetic confinement concepts, fusion engineering and a review of the current status of fusion research.

Textbook: W. M. Stacey, *Fusion: An Introduction to the Physics and Technology of Magnetic Confinement Fusion, John Wiley, New York, 1981.*

Topics Covered:

1. Basic plasma properties
2. Single particle motions
3. Plasmas as fluids
4. Plasma equilibrium & stability
5. Confinement concepts
6. Plasma transport
7. Plasma heating
8. Plasma-wall interaction
9. Magnets
10. EnergysStorage and transfer
11. Interaction of radiation with matter
12. Blanket and shield
13. Tritium and vacuum
14. Fusion reactor design
15. Status of fusion R&D

Course Outcomes:

Outcome 1: To introduce the student to the plasma physics and engineering aspects of magnetic confinement fusion and how they interact in the design of a fusion device.

1.1 Students will demonstrate an understanding of the basic physics and engineering principles involved in magnetic fusion (topics 1-13 above)

1.2 Students will demonstrate an ability to apply the physics and engineering principles involved in magnetic fusion to determine the design parameters of a fusion device.

Outcome 2: To acquaint the student with the status and current leading issues in the development of fusion as an energy source

2.1 Students will demonstrate a knowledge of the leading issues and present status of fusion research.

Correlation between Course Outcomes and Program Educational Outcomes:

NRE 4610 Introduction to Plasma Physics and Fusion Engineering	Outcome a			Outcome b	Outcome c	Outcome d	Outcome e	Outcome f	Outcome g	Outcome h	Outcome i	Outcome j	Outcome k
Course Outcomes	i	ii	iii										
Course Outcome 1.1	x	x	x		x					x	x		x
Course Outcome 1.2	x	x	x		x					x	x		x
Course Outcome 2.1												x	

Prepared by: Weston Stacey
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