ME 461: Introduction to Nuclear Engineering

Course description:	Applied nuclear physics; application to the nuclear fuel cycle and nuclear reactor core design; nuclear reactor systems and safety.
Number of credits:	3
Course Coordinator:	J. Leachman
Prerequisites by course:	Certified major in engineering or physical sciences; senior standing; MATH 315
Prerequisites by topic:	Science/engineering background in lower-division math, chemistry, and physics
Postrequisites:	None
Textbooks/other required materials:	1. LaMarsh, J. and Barata, A. *Introduction to Nuclear Engineering.* Prentice Hall, 2001, 3/e.
Course objectives:	1. Energy from Nuclear Fission 2. Nuclear Reactions and Radiations 3. Neutron Transport Behavior 4. Nuclear Design Basics 5. Nuclear Steam Supply System 6. Radiation Protection and Shielding 7. General Nuclear Power Reactor Safety, Security and Environment Protection
Topics covered:	1. Atomic & Nuclear Physics 2. Interaction of Radiation and Matter 3. Nuclear Reactors & Power 4. Nuclear Fuel Cycle 5. Neutron Diffusion and Moderation 6. Nuclear Reactor Theory 7. Time-dependent Reactor 8. Reactor Heat Removal 9. Radiation Protection and Shielding 10. Nuclear Power Plant Licensing
Expected student outcomes:	1. An understanding of nuclear energy fundamentals, nuclear fissions, and fission reactors. 2. An understanding of nuclear reactions and radiations, and reactor heat generation. 3. An understanding of neutron transport behavior. 4. An understanding of a nuclear steam supply system, nuclear safety,

nuclear fuel cycle.

5. An understanding of radiation protection and ability to perform shielding calculations for a simple reactor system.
6. A general understanding of nuclear power plant systems, licensing, design, operation & maintenance, safety, and security.
7. Ability to perform a general design and nuclear safety analysis for a simple reactor system.

Class schedule: Two 75-minute or three 50-minute lecture sessions per week, for one semester

Laboratory schedule: None

Contribution to meeting the professional component: Engineering Topics

Relationship of course to student outcomes:
3 strongly supported; 2 supported; 1 minimally supported

Student Outcomes Pre-Fall 2018 (ABET EC2000)

a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
3		3	1	3	3	2	3	2	2	2

Student Outcomes Fall 2018 forward (ABET EC2019)

1	**2**	**3**	**4**	**5**	**6**	**7**
3	3	2	3	1	1	2

Prepared by: Andrea Butcherite and J. Leachman *Date:* May 30, 2018