ME 362 – NUCLEAR FUSION AND RADIATION

https://www.lehigh.edu/~eus204/teaching/ME362/ME362.html

Instructor: Prof. Eugenio Schuster

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Class Times: Tuesday/Thursday: 10:45 AM to 12:00 PM

Office Hours: After class and by appointment

Location: Packard Lab 503

Assistants: Franco Galfrascoli (e-mail: galfrascoli at lehigh.edu)
Room 501, Packard Laboratory, 610-758-3707

Course Description: Structure of the nucleus. Elementary quantum theory. Nuclear forces. Nuclear energy release: Fission vs. Fusion. Fusion reactions. Plasmas for fusion. Power balances in fusion plasmas. Magnetic and inertial confinement fusion concepts. Magnetic equilibrium configurations and limitations. The tokamak. Emerging and alternative concepts. Fusion reactor economics. Radioactive decays. Interactions of nuclear radiation (charged alpha and beta particles, gammas and neutrons) with matter. Natural and man-made radiation sources. Energy deposition and dose calculations. Radiation protection procedures and regulations. Theory of α, β, γ, and neutron detectors. Applications in dosimetry, imaging and spectroscopy.

Textbooks: REQUIRED: "Fundamentals of Nuclear Science and Engineering," Third Edition, J. K. Shultis and R. E. Faw, CRC Press, 2016, ISBN-13: 978-1498769297, ISBN-10: 1498769292.

"Principles of Fusion Energy: An Introduction to Fusion Energy for Students of Science and Engineering," Harms, Schoepf, Miley, & Kingdon, World Scientific, 2000, ISBN-10: 9812380337.

Grading: Weekly Homework – 15%
Hourly Exams – 50%
Final Exam – 35%

Homework Guidelines: Due one week after being assigned
NO lateness (must be returned on due date before class)
Solutions have to be comprehensible to be marked highly
Solutions of ALL the problems will be available on the web site

Assignments must be students' **own work!** Cases of copying, cheating and fraud will be treated as **ACADEMIC DISHONESTY**. Students can discuss the assignments, but they must then solve the problems by themselves.

Classroom Guidelines: No texting. No web browsing. NO CELL PHONES.