

Introduction to Controlled Fusion Nuclear Engineering 180 Fall Semester 2005

Edward C. Morse

Class meets at 3:30 to 5:00 PM, Tuesdays and Thursdays, Rm. 3102 Etcheverry.

Text: *Fusion Research*, Vol. 1, by T. Dolan. (Available as reprint at Vik Copy)

Additional Text: *Introduction to Plasma Physics*, by R. Goldston

Schedule of Lectures and Reading Assignments: (Homework to be announced)

Date	Week	Lecture Topics	Reading
30 August	1	Introduction to Fusion Breakeven and Lawson Criterion Fusion Confinement Concepts	Dolan Ch. 1 pp. 01-15 Dolan Ch. 2 pp. 16-30
6 September	2	Plasma Fundamentals Particle Orbits	Goldston Ch. 1 pp.1-19 Goldston Chs. 2,3 pp.21-48
13 September	3	Fusion Nuclear Reactions Fusion Reactivities Driven Fusion Systems	Dolan Ch. 2 pp. 31-47

20 September	4	Bremsstrahlung Atomic Physics Synchrotron Radiation	Dolan Ch. 3 pp 49-72 Goldston Ch. 10 pp.147-164
27 September	5	Reactor Power Balance	Dolan Ch. 4 pp. 73-99
4 October	6	MHD Equilibrium Introduction to Tokamak	Dolan Ch. 8 pp. 168-179 Goldston Ch. 9 pp. 129-143
11 October	7	First Exam MHD Waves MHD Instabilities	Dolan Ch. 8 pp. 179-197
18 October	8	Plasma Waves Laser-Plasma Interaction	Goldston Ch. 16 pp. 257-268
25 October	9	Coulomb Collisions Braginskii Transport	Dolan Ch. 8 pp. 204-215 Goldston Ch. 11 pp. 165-184
1 November	10	Fast Ion Collisions Resistive MHD	Goldston Ch. 14 pp. 229-246 Goldston Ch. 20 pp. 337-361
8 November	11	Second Exam ICF Target Physics Heavy Ion Fusion	Notes
15 November	12	Nonlinear Plasma Physics Plasma Heating	Dolan Ch. 9 pp. 217-235
22 November	13	Ion Beam Technology Thanksgiving Holiday	
29 November	14	Fusion Technology Superconducting Magnets Lasers	
6 December	15	Alternate Magnetic Concepts Course Review	Notes

General Information Regarding Course:

- Final Examination is Tuesday 12/20/05 12:30-3:30pm, room TBA.
- Homework is due one week after it is assigned. It has a prorated grade based upon timeliness, and has no value one week after the due date (i. e. after solution set is available).
- The course NE 120 should be taken concurrently for those wishing to take NE 280 in the spring. Undergraduates may take course 280 if they have completed other undergraduate requirements and have an A average in 180.
- Seniors should consider application for the MFE Fusion Technology or Fusion Science Fellowship programs if they plan to continue their studies of fusion in graduate school.
- Instructor's office hours are 2:00 to 3:00 Wednesdays, in room 4161 Etcheverry. Other office hours can be arranged by appointment.