

**NE / ECE / Physics 525 Introduction to Plasmas
Syllabus, Spring 2008**

Class times: MWF 1:20-2:10 PM, 3534 EH

Office hours: MR 10:30-11:30 AM,
W 9:30-11:00 AM

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Course Home Page: <http://ecow.engr.wisc.edu/cgi-bin/get/ne/525/sovinec/>

Textbook: *Introduction to Plasma Physics and Controlled Fusion*, (2nd ed., Vol. 1), F. F. Chen, Plenum

NOTE: Lectures and readings (skim before and review after) will be complementary.

Other References: *Physics of High Temperature Plasmas*, G. Schmidt, Academic Press

Principles of Plasma Physics, N. Krall and A. Trivelpiece, San Francisco Press

NRL Plasma Formulary, <http://wwwppd.nrl.navy.mil/nrlformulary/index.html>

Grading: 40% Homework, 30% Midterm quizzes, and 30% Final exam (5/17)

Quizzes: In class, two at 45 minutes each, scheduled during Weeks 6 and 12.

Homework: Assignments will be distributed and collected on a weekly basis with exceptions around quizzes. Note that the degree of difficulty among problems will vary.

Lecture Schedule (somewhat flexible)

Week	Topics	Reading
1 1/23-1/25	Background, Plasma Characteristics	App. A, Ch. 1
2 1/28-2/1	Shielding, Single-Particle Motion	Sect. 1.4, 2.1-2.2
3 2/4-2/8	Inhomogeneity, Adiabatic Inv.	Sect. 2.3-2.8
4 2/11-2/15	Fluid Eqns., Drifts	Sect. 3.1-3.5
5 2/18-2/22	Plasma Appr., Waves: general	Sect. 3.6, 4.1-4.2
6 2/25-2/29	Quiz 1 2/25 Waves: B=0	Sect. 4.3-4.8
7 3/3-3/7	Waves: EM Dielectric Tensor	App. B, Sect. 4.9-4.11
8 3/10-3/14	Waves: electromagnetic, MHD	Sect. 4.12-4.18
9 3/24-3/28	Diffusion: coll. with neutrals	5.1-5.5
10 3/31-4/4	Diffusion: fully ionized 1 fluid	Sect. 5.6-5.10
11 4/7-4/11	Equilibrium and stability	Sect. 6.1-6.5, 6.7
12 4/14-4/18	Streaming and drift waves Quiz 2 4/18	Sect. 6.6, 6.8
13 4/21-4/25	Kinetic Theory: Basics	Sect. 7.1-7.3
14 4/28-5/2	Kinetic Theory: Damping, BGK	Sect. 7.4, 7.5.2, 7.7, 7.9
15 5/5-5/9	Nonlinear Effects: Sheaths+	Sect. 8.1-8.3