

PLASMA PHYSICS (PHYS-5150)

Spring 2018 Tentative Course Schedule

This class schedule is approximate and will be updated throughout the semester.

Week 1 – Jan. 16, 18

Introduction: What is Plasma? What is Plasma Physics?

Read: Chapters 1, 2

Week 2 – Jan. 23, 25

Applications of Plasma Physics: Solar Physics (Solar Corona), Space Physics (Earth Magnetosphere), Plasma Astrophysics

Problem set #1 due Thurs 1/25 - 5pm

Week 3 – Jan. 30, Feb. 1

Applications of Plasma Physics: Magnetic and Inertial Thermonuclear Fusion.

Problem set #2 due Thurs 2/1 - 5pm

Week 4 – Feb. 6, 8

Single Particle Motion: Gyro-motion in Magnetic Field, Drifts.

Read: Chapter 3

Problem set #3 due Thurs 2/8 - 5pm

Week 5 – Feb. 13, 15

Single Particle Motion: Magnetic Mirrors, Adiabatic Invariants.

Read: Chapter 3

Problem set #4 due Thurs 2/15 - 5pm

Week 6 – Feb. 20, 22

Hierarchy of Plasma Descriptions: Kinetic Theory.

Read: Chapter 5, sections 5.1-5.4

Problem set #5 due Thurs 2/22 - 5pm

Week 7 – Feb. 27, Mar. 1

Hierarchy of Plasma Descriptions: Two-Fluid Theory

Read: Chapter 6, sections 6.1-6.4

Problem set #6 due Thurs 3/1 - 5pm

Week 8 – Mar. 6, 8

Midterm Exam - in class Thursday March 8

Week 9 – Mar. 13, 15

Hierarchy of Plasma Descriptions: Single-Fluid Magnetohydrodynamics (MHD).

Read: Chapter 6, section 6.6

Problem set #7 due Thurs 3/15 - 5pm



Week 10 – Mar. 20, 22

Resistive and Ideal Magnetohydrodynamics, Frozen-in Law, magnetostatic equilibrium.

Read: Chapter 4, section 6.5

Problem set #8 due Thurs 3/22 - 5pm

Week 11 – Mar. 27, 29

Spring Break

Week 12 – Apr. 3, 5

Waves in Plasmas

Problem set #9 due Thurs 4/5 - 5pm

Week 13 – Apr. 10, 12

Waves in Plasmas (Cont'd)

Read: Section 5.5 and Chapters 8-9

Problem set #10 due Thurs 4/12 - 5pm

Week 14 – Apr. 17, 19

Plasma Instabilities: General Stability Principles, Several Important Fluid Instabilities

Read: Section 6.7

Problem set #11 due Thurs 4/19 - 5pm

Week 15 – Apr. 24, 26

Kinetic Plasma Instabilities, Landau Damping

Read: Chapter 8

Problem set #12 due Thurs 4/26 - 5pm

Week 16 – May 1, 3

Collisions, Diffusion, Resistivity

Review for the Final Exam

Read: Chapter 11

Final Exam: TBD (Sunday, May 6, 2018, 4:30 pm)

