

PHY 293F – PARTICLES AND WAVES
DEPARTMENT OF PHYSICS, UNIVERSITY OF TORONTO
FALL 2009

This course will be taught as two halves: waves (11 Sept. - 23 Oct.) and particles (26 Oct. - 4 Dec.). The individual syllabi for the two halves are given on the following pages. The general course, tutorial and practical laboratory information is given on this page.

COURSE WEBSITE: <http://www.physics.utoronto.ca/~phy293h1f/>
Main page of website will be used for class announcements

LECTURES: 3 hours/week; Mon 15:00-17:00, Tue 15:00-17:00 and Fri 15:00-17:00 in MP 203

COURSE EVALUATION:

- 5 % Problem sets (best 7 out of 8)
- 30 % 2 Midterm Tests (each 50 minutes)
- 20 % Practicals
- 45 % Final Exam (2 hours)

TESTS AND EXAM:

- Midterm Test 1: Thursday October 8 at 9:30-10:20 AM; Rooms EX310/EX320
- Midterm Test 2: Thursday November 19 at 9:30-10:20 AM; Room EX200
- Final Exam: TBA (time to be scheduled by Faculty during Dec. exam period)

TUTORIALS (Beginning Thursday 17 September, led by teaching assistants in rooms listed):

Section 01:	Thu	12:00 – 13:00	BA2159
Section 02:	Thu	12:00 – 13:00	WB144
Section 03:	Thu	12:00 – 13:00	BA2195
Section 04:	Thu	12:00 – 13:00	BA2185
Section 05:	Thu	16:00 – 17:00	HA410
Section 06:	Thu	16:00 – 17:00	BA3004
Section 07:	Thu	16:00 – 17:00	BA3008
Section 08:	Thu	16:00 – 17:00	BA3012

PRACTICALS WEBSITE: <http://www.physics.utoronto.ca/~phy225h/web-pages/phy225.htm>

Alternate weeks in room MP222 with starting dates indicated below

Section PRA 01:	Wed. Sept.16	9:00 – 12:00
Section PRA 02:	Wed. Sept.23	9:00 – 12:00
Section PRA 03:	Wed. Sept.16	14:00 – 17:00
Section PRA 04:	Wed. Sept.23	14:00 – 17:00

PROBLEM SETS:

- Problem sets will be posted on the course website approximately a week prior to the due date. No paper copies of the problem set will be distributed in class. Problem sets are to be handed in to the course drop box in the basement of the McLennan Physical Labs at 5 PM on the Monday following their assignment. Late problem sets (those received after 5:10 PM) will not be accepted.
- Only one question (or sometimes two) will be selected from the problem set for marking by the teaching assistants.
- The best seven marks of the eight problem sets will be used to determine the final mark.

PHY293F – WAVES SECTION

LECTURER: Prof. William Trischuk

Office / Tel.: Room MP 814 / 416 978 8095

E-mail: william@physics.utoronto.ca

Office hours: By appointment – or announced in Class prior to midterm/final

EMAIL POLICY: I will reply **only** to emails concerning the physics content of the course or to setup an appointment to discuss physics or other course related matters. If I get multiple questions on the same topic I will post an answer on my bulletin board. I **will not** answer administrative questions by email. Please see me before/after class, or better during office hours, if you have non-physics questions.

TEXTBOOK: The required textbook for the oscillations part of the course is The Physics of Vibrations and Waves (Sixth Edition) by H.J. Pain. This is the text that was used in PHY290F, a quarter course that included this material in the fall of 2008. Used copies should be available. Copies will also be available in the bookstore.

TENTATIVE COURSE OUTLINE:

What follows is the outline I've set for myself. Since this is the first time I'm teaching this material your mileage may vary. I reserve the right to re-order topics and/or stretch things out as we go. I plan to post some notes after each lecture, but they will not be finalized until after I've given them at least once. So I won't be able to post them any earlier. Sorry. Similarly problem sets will be posted on the day they are going out. Not before.

Lecture Date	Topic	Textbook Reference
September 11	Examples of Oscillations in Nature	
September 14	Simple Harmonic Oscillations	Ch 1, pp 1-12
September 15	Damped Oscillations	Ch 2, pp 35-41
September 18	Energy and Q-value of Oscillators	Ch 2, pp 41-49
September 21	Forced Oscillators	Ch 3, pp 53-60
September 22	Resonant Oscillations	Ch 3, pp 61-71
September 25	Coupled Oscillations	Ch 4, pp 79-85
September 28	Eigenmodes of a String	Ch 4, pp 86-95
September 29	The Wave Equation	Ch 5, pp 107-114
October 2	Reflection, Transmission, Impedance	Ch 5, pp 117-123
October 5	Standing Waves on a String	Ch 5, pp 124-132
October 6	Longitudinal Waves	Ch 6, pp 151-158
October 9	Reflection and Transmission of Wave packets	Ch 6, pp 159-163
October 13	Fourier Series	Ch 10, pp 267-271
October 16	Application to a Triangular String	Ch 10, pp 271-275
October 19	Fourier Series for Square Pulse	Ch 10, pp 275-281
October 20	Reserve	
October 23	Review/Summary	

PHY293 – PARTICLES SECTION

LECTURER: Prof. Kaley Walker (coordinator)

Office / Tel.: Room MP 712 / 416 978 8218

E-mail: kwalker@atmosp.physics.utoronto.ca

Office hours: TBD

EMAIL POLICY: I will reply to email inquiries from students within two business days (i.e. excluding weekends). I **will not** answer detailed questions about physics problems by e-mail, as these are better addressed by coming to see me during office hours or by appointment.

TEXTBOOK (copies available on short-term loan from Physics and Gerstein libraries):

- *An Introduction to Thermal Physics* (1st edition), Daniel V. Schroeder (Addison Wesley Longman, 2000)
- Additional books on Statistical Mechanics are available on short-term loan from the Physics and Gerstein libraries – listed under PHY293

TENTATIVE COURSE OUTLINE:

This course will generally follow the textbook and will cover most of Chapters 1-3 and 6-7. No prior knowledge of statistical physics is assumed. However, I will assume that you are familiar with thermodynamic functions such as entropy, etc. Some knowledge of quantum mechanics would be helpful but not required. We will review what is required during the course.

- For each lecture listed below, the corresponding section(s) in the textbook are given.
1. Overview of statistical mechanics
 2. Temperature and review of thermodynamics (1.1 – 1.4; 1.6)
 3. Two-state system and multiplicity (2.1 – 2.3)
 4. Large systems and multiplicity (2.4)
 5. Entropy (2.6)
 6. Temperature and entropy (3.1 – 3.2)
 7. Paramagnetism (3.3)
 8. Pressure and thermodynamic identity (3.4)
 9. Boltzmann factor and partition function (6.1)
 10. Paramagnetism revisited (6.2)
 11. Partition function and free energy (6.5 – 6.6)
 12. Ideal gas (6.7)
 13. Blackbody radiation (7.4)
 14. Blackbody radiation continued (7.4)
 15. Debye theory of solids (7.5)
 16. Chemical potential and Gibbs factor (7.1)
 17. Quantum statistics (7.2)
 18. Degenerate Fermi gases (7.3)