

**PHYSICS 222 - SYLLABUS
FALL 2009**

LECTURER: **Professor Paul C. Canfield**
59 Physics 294-6270
canfield@ameslab.gov

LECTURE HOURS: MWF 1:10-2:00 PM
 MWF 2:10-3:00 PM

OFFICE HOURS: Wednesday, 3:10 PM. – 5:00 PM (or by appointment).

All lectures are held in Physics Room 5

COURSE SECRETARY: Deb Schmidt
12 Physics 294-4936 debs@iastate.edu

LAB COORDINATOR: Paula Herrera-Siklody siklody@iastate.edu

TEXTBOOK: *University Physics* (**12th Edition**), Young and Freedman (Pearson, Addison Wesley 2008)

ADDITIONAL MATERIALS: Physics 222 Laboratory Manual (University Bookstore)

IMPORTANT NOTE: The course will use the Tycho system at the University of Illinois for homework, grade book keeping, announcements, material posting and webpage in general:

<http://wug.physics.uiuc.edu/cc/IAState/Phys222/fall/>

Your Logon is your ISU NetID + “isu”. (Example: If you ISU NetID is “cy123”, then your Tycho logon is “cy123isu”). Everyone’s initial password is “password”. Students should change their password (see Gradebook link). This password is independent of any ISU passwords and can even be unique to this site.

Log in for the course web page as soon as possible after the first class. If you experience any problem, please send an email to Paula Herrera (siklody@iastate.edu).

THIS COURSE HAS TWO EVENING EXAMS. Note the exam dates of

- **Thursday, October 1 8:00 pm – 10:00 pm**
- **Thursday, November 5 8:00 pm – 10:00 pm**

MAKE NO OTHER PLANS FOR THESE EVENINGS.

Date	Class (lecture/recitation)	Assignments	Quizzes
M Aug 24	1. Density, pressure, Pascal's law		
T Aug 25	Worksheet 1: Fluid statics	Read: 14.1, 14.2 No written.	No quiz
W Aug 26	2. Buoyancy, surface tension,	Read: 14.3, 14.4	
R Aug 27		Online 0	
F Aug 28	3. Bernoulli's equation	Read: 14.4, 14.5	
M Aug 31	4. Kepler's laws.	Read: 12.1-12.6 Online 1a	
T Sep 1	Worksheet 2: Fluid dynamics	Written 1	Q1: Lect. 1-3
W Sep 2	5. Newton's law of gravity		
R Sep 3		Online 1b	
F Sep 4	6. Electric charge; Coulomb's law	Read: 21.1-21.3	
M Sep 7	NO CLASSES UNIVERSITY HOLIDAY	Online 2a	
T Sep 8	Worksheet 3: Coulomb's law	Written 2	Q2: Lect. 4-5
W Sep 9	7. Electric Field	Read: 21.4-21.5	
R Sep 10		Online 2b	
F Sep 11	8. Electric field lines and dipole	Read: 21.6-21.7	
M Sep 14	9. Electric flux; Gauss's law	Read: 22.1-22.3 Online 3a	
T Sep 15	Worksheet 4: Electric fields	Written 3	Q3: Lect. 6-7
W Sep 16	10. Examples of Gauss's law	Read: 22.4-22.5	
R Sep 17		Online 3b	
F Sep 18	11. Electrical Potential	Read: 23.1-23.3	
M Sep 21	12. Equipotentials	Read: 23.3-23.5 Online 4a	
T Sep 22	Worksheet 5: Electric potential	Written 4	Q4: Lect. 8-10
W Sep 23	13. Capacitors	Read: 24.1-24.2	
R Sep 24		Online 4b	
F Sep 25	14. Energy Storage & Dielectrics	Read: 24.3-24.5	
M Sep 28	15. Current; Resistance; Ohm's law	Read: 25.1-25.3 Online 5a	
T Sep 29	Worksheet 6: Capacitance	Written 5	Q5: Lect. 11-12
W Sep 30	16. Resistors; Circuits; Power	Read: 25.4-25.5, 26.1, 26.2	
R Oct 1	THURSDAY OCT 1 8:00 – 10:00 PM FIRST EVENING EXAM (LECTURES 1-14)	Online 5b due on Monday Oct 5	
F Oct 2	NO LECTURE		

M Oct 5	17. Real batteries; electrical instruments	Read: 25.4-25.5 Online 5b Online 6a	
T Oct 6	Worksheet 7: Circuits	Written 6	Q6: Lect. 15-16
W Oct 7	18. Kirchhoff's rules	Read: 26.1, 26.2	
R Oct 8		Online 6b	
F Oct 9	19. RC circuits	Read: 26.3-26.4	
M Oct 12	20. Magnetic field, field lines and moving charges	Read: 27.1 – 27.4 Online 7a	
T Oct 13	Worksheet 8: RC circuits	Written 7	Q7: Lect. 17-18
W Oct 14	21. Applications. Force on a current.	Read: 27.5 – 27.6	
R Oct 15		Online 7b	
F Oct 16	22. Force on a current loop. Magnetic field by a moving charge.	Read: 27.7; 28.1, 28.2	
M Oct 19	23. Magnetic field by a current. Dipole-dipole interaction. Magnetic materials.	Read: 28.3 – 28.6 Online 8a	
T Oct 20	Worksheet 9: Magnetic field	Written 8	Q8: Lect. 19-21
W Oct 21	24. Ampere's law and applications	Read: 28.6, 28.7	
R Oct 22		Online 8b	
F Oct 23	25. Induction, Faraday's law, Lenz's law	Read: 29.1 – 29.4	
M Oct 26	26. Induced fields, displacement current	Read: 29.4, 29.5, 29.7 Online 9a	
T Oct 27	Worksheet 10: Induction.	Written 9	Q9: Lect. 22-24
W Oct 28	27. Inductors, stored energy, LR circuit	Read: 30.1 – 30.4	
R Oct 29		Online 9b	
F Oct 30	28. LR, LC, and LRC circuits	Read: 30.4 – 30.6	
M Nov 2	29. AC circuits, phasors, LRC circuit again	Read: 31.1 – 31.3 Online 10a	
T Nov 3	Worksheet 11: Inductors	Written 10	Q10: Lect. 25-26
W Nov 4	30. AC power, resonance, transformers	Read: 31.4 – 31.6	
R Nov 5	THURSDAY NOV 5 8:00 – 10:00 PM SECOND EVENING EXAM (LECTURES 15-28)	Online 10b due on Monday Nov 9	
F Nov 6	NO LECTURE		

M Nov 9	31. Electromagnetic waves, Maxwell's equations		Read: 32.1 – 32.3 Online 10b Online 11a	
T Nov 10	Worksheet 12: AC circuits		Written 11	Q11: Lect. 27-28
W Nov 11	32. Energy, momentum and standing waves		Read: 32.4 – 32.5	
R Nov 12			Online 11b	
F Nov 13	33. Reflection, refraction, total internal reflection		Read: 33.1 – 33.3	
M Nov 16	34. Dispersion, polarization, Huygen's principle		Read: 33.4, 33.5, 33.7 Online 12a	
T Nov 17	Worksheet 13: Reflection and refraction. Polarization		Written 12	Q12: Lect. 29-30
W Nov 18	35. Plane surfaces and spherical mirrors		Read: 34.1, 34.2	
R Nov 19			Online 12b	
F Nov 20	36. Spherical and thin lenses		Read: 34.3, 34.4	
NOVEMBER 23 – NOVEMBER 27 THANKSGIVING BREAK				
M Nov 30	37. Camera, eye, magnifier	MAKE-UP LAB WEEK	Read: 34.5 – 34.7 Online 13a	
T Dec 1	Worksheet 14: Geometrical optics.		Written 13	Q13: Lect. 31-33
W Dec 2	38. Review of classical waves		Read: 15.2 – 15.4, 15.6, 15.7, 16.6	
R Dec 3			Online 13b	
F Dec 4	39. Interference and phasors.		Read: 35.1 – 35.3	
M Dec 7	40. Thin films and interferometers		Read: 35.4 – 35.5 Online 14a	
T Dec 8	Worksheet 15: Interference		Written 14	Q14: Lect. 34-38
W Dec 9	41. Single and double slit diffraction		Read: 36.1 – 36.4	
R Dec 10			Online 14b	
F Dec 11	42. Diffraction grating, X-rays, resolving power		Read: 36.5 – 36.7	

EXAMS

- **MID-SEMESTER EXAMS: This course has evening exams**, see the ISU Bulletin and/or the following ISU web-page: <http://www.iastate.edu/~registrar/exams/nitexam.html>. Note the exam dates:

Thursday, October 1 8:00 pm – 10:00 pm

Thursday, November 5 8:00 pm – 10:00 pm

on the schedule above, **and make no other plans for these evenings**. The date and time of the final exam will be announced when they become available. Evening exams are used in this course so that all students can take the same exam at the same time and thus be graded on the same basis. Room assignments and instructions will be posted and discussed in advance of each exam. The exams this semester will be multiple-choice. Approximately 1/3 of the problems will stress understanding of the physics concepts, whereas the remainder will be numerical problems to test ability to apply these concepts.

- **FINAL EXAM: DECEMBER 14 - 18, time and day TBA 120 minutes**
Covers all lectures, with a slight emphasis on lectures 29-42, and includes the laboratory final exam.

Conflicts: If you have a conflict with the scheduled time for the final exam or any other reason why you cannot take it at the assigned time, you must notify Professor Paul Canfield before **5pm Tuesday, December 1** so that an alternative arrangement may be found

Bring to each exam a Number 2 pencil, a scientific calculator and your student ID card. Programmable and/or charting calculators are not necessary but may be used. Laptops or PDA's are not allowed. Each exam will include the values of any physical constants you may need, a formula sheet and scratch paper.

A single, end-of-semester, make-up exam will be allowed only in exceptional circumstances, such as illness, family emergencies (not anniversaries, family vacations, etc.), or *official* university-sponsored activities. Students who know in advance that they will miss an exam as a result of one of these university-sponsored activities must explain the circumstances to the lecturer well before the exam and seek permission to take a make-up exam. After the fact, such permission will not be granted. Students who miss an exam because of illness or other unforeseen emergencies should send a message (by phone, voice-mail, e-mail, or through a friend) to the lecturer or the course secretary before the start time of the exam in order to receive permission to take the make-up exam. This make-up exam will be held during the week before finals week and will be a comprehensive exam. ***Clearly only one exam can be made-up in this manner.***

Students with special needs: If you have a documented disability and anticipate needing accommodations in this course (for lectures, recitations, labs, or exams), please make arrangements to meet with Professor Paul Canfield as soon as you can. Please request that a Disability Resources staff send a SAAR form verifying your disability and specifying the accommodation you will need.

Students often ask what they should study for the exams. Some suggestions are:

- i. Be sure to read the indicated reading assignments before each lecture. The reading assignments are essential to understanding the material presented in the lecture.
- ii. Actively review (= redo without looking at the solution) the assigned homework problems and solutions as well as recitation worksheets and quizzes. Be sure you understand all of the concepts as well as steps associated with each problem.
- iii. As needed, reread the chapter summaries in the textbook. Review the appropriate sections and/or go over your lecture notes.
- iv. Solve extra questions and problems in the textbook (the odd numbered problems have the answers in the back of the book).
- v. Attend the review lectures prior to the exams and/or special review sessions scheduled by recitation instructors.

HOMEWORK

The assigned problems will be posted on the Physics 222 page. There will be two types of homework problems.

1. Online homework: There will be computer administered and graded problems that will be due twice a week on **Mondays and Thursdays by 8:00 am**. Each assignment can be submitted an unlimited number of times before the deadline. After each submission you will be informed how many problems you have answered correctly so that if you want to recheck your work and resubmit your wrong answers, you may do so. The correct answers do not need to be entered again. The first online assignment is due Thursday August 28.

If you encounter difficulties with a submission, please read the Instructions link that can be found at the bottom of each problem. If that does not solve the problem, send an e-mail to Dr. Paula Herrera-Siklódy (siklody@iastate.edu). Under exceptional circumstances, **and only under exceptional circumstances**, (e.g. computer or server breakdowns) hand-written solutions to homework will be accepted if they are delivered to the Physics Office (12 Physics) mailbox by 8:00 am the same day the assignment was due.

2. Written Homework: The second type of homework will be a set of “long answer” problems that will have to be **handed in at the beginning of the Tuesday recitation section**. These problems will be posted on the course web page and can be printed out as needed. This problem set will be graded by the recitation TA and handed back to the student by the following Tuesday recitation section. The first written assignment is due Tuesday September 2.

Solutions to all homework will be posted online one day after each assignment is due.

It is to your advantage to work with other students so as to learn the material. This can often help you to do better on the exams and homework. We encourage you to work together and perhaps form a study group. You may meet in the Physics 222 help room, if you wish. Please see the academic honesty statement for guidelines about working on homework assignments in a group.

RECITATIONS

There will either be one 50-minute recitations every Tuesday.

The recitations in this course are conceived of as hands-on / interactive activities. Students will work in small groups (2 to 4 students) on a worksheet or problem provided by the recitation instructor. Discuss, sketch, ask, explain, disagree, think aloud... *Anything except sitting back and waiting for the instructor to solve the problem on the board.* Your instructor is there to help you through the problems, to answer your questions and to monitor your understanding of the material. Learning is done by doing, not by watching.

At the end of the semester, recitation instructors will give each student a score out of 10 points based on attendance and participation.

Quizzes: At the end of every recitation (except during the first week of classes), a 10-minute quiz will be given. The quiz will draw on material covered in the lectures and recitations of the previous two weeks. (So a quiz given in week 5 will test material presented in weeks 3 and 4.) Quizzes will be graded by the recitation TA and handed back to the students at the next recitation.

Missed quiz: If you miss a quiz for a good reason (e.g. being sick, being away due to an ISU sponsored activity), you should bring some document to prove the reason of your absence to your TA who will give you an Excused Grade (i.e., at the end of the semester your score for the missed quiz will be the average of all of your other quizzes).

LABS

Labs meet once a week.

Students must complete the corresponding prelab before coming to the lab. Prelabs must be turned in at the beginning of each session. At the end of each session, each student must also turn in a lab report. Your lab grade will be based on the quality of your laboratory work (including the prelab). The prelab will account for 30% of your lab score and the lab reports will account for 70% of your lab score.

Missed lab: see Lab Schedule and Instructions handout for makeup policy.

Lab waivers: If you have completed the laboratory part of the course successfully during a previous semester at ISU, you may wish to contact the course secretary about requesting a lab waiver **during the first few days of classes**. If this waiver is granted, your lab grade will be based on your performance on homework and in recitation, with the same maximum possible number of lab points as listed below. You still have to answer the lab questions on the exams.

The importance of the recitation and laboratory classes cannot be over-emphasized. You will not understand the material in this course if you cannot apply it to the solution of the assigned problems. The laboratory is essential to your efforts to understand the experimental foundations of physics as well as of scientific instrumentation. Questions based on recitation and laboratory classes will appear on the mid-semester exams as well as on the final exam.

GRADING

COURSE GRADES are based on a numerical score determined as follows:

	Points	<u>Letter Grade Scale</u>	
Two, mid-semester night exams (75 points each)	150	≥ 325	≥ A-
Final exam	100	≥ 285	≥ B-
Quizzes	50	≥ 245	≥ C-
Online homework	25	≥ 215	≥ D-
Written homework	25	<215	F
Recitation participation	10		
Laboratory grade	40		
Maximum Total	400		

The above point scale for letter grades for the course will not be raised, but may be lowered. **A failing course grade (F) will be given if: (1) any laboratory has not been satisfactorily completed, or (2) the student has engaged in any form of academic dishonesty.**

- **Homework scores:** Homework is an investment –the “direct” credit from homework is only 12.5% of the final score, but this is the most important learning tool in the course. Homework is your opportunity to make mistakes and learn from them. Then you will be able to answer the exam and quiz questions correctly, which carry 75% of the total points.
- **Recitation and lab scores:** The precise number of recitation/lab points you receive from your instructors during the semester will not necessarily be the same as the number that counts towards your final grade. Some instructors grade "hard" during the semester and some grade "easy". Thus, in the interest of fairness to all the students, each instructor will be told the average recitation/lab score to turn in. This means you will not automatically get a higher grade because you have an easy grader, or a lower grade if you have a hard grader. An average student in an average recitation section will receive about 70% of the maximum points possible.
- **Gradebook:** You should regularly check that all your scores are correctly entered in the online gradebook. It is **your responsibility** to bring any problems to the attention of your section instructor immediately.
- **Exam scores:** If you believe there has been an error in the grading of an exam, you need to bring this up to your recitation instructor, preferably before the exams are handed back in recitation. You and your recitation instructor should then contact Professor Paul Canfield **no later than one week after the results are released.**

STUDENT ASSISTANCE

There are several opportunities for students to receive assistance with the material of this course:

- Room 83 Physics will be the Physics 222 Help Room. The staffing schedule will be posted on the door and on the bulletin board.
- Instructor office hours.
- The course web page.
- Discussion board on WebCT. Tycho does not have the discussion board option right now, so a WebCT page is set up for that. There is a link to WebCT at the bottom left of the University web page. Log in using your regular ISU NetID and password. Please notify one of the instructors if you have access problems.
- SI sessions for Physics 222 (times to be announced by the SI instructors).
- Bulletin boards outside of the lab rooms display material related to the laboratory.

It is to your advantage to work with other students to learn the material. This can often help you to do better on the exams and homework. We encourage you to work together and perhaps form a study group. You may meet in the Physics 222 help room, if you wish. Please see the academic honesty statement for guidelines about working on homework assignments in a group.