

Physics 112 – Syllabus and Information Sheet Summer 2005

“Large-room” meetings [lectures]: MTuWTh 1:20 – 2:20 p.m. in MacKay 117

“Small-room” meetings [recitations]: Every Tuesday and Thursday, 9:50-10:50

Laboratories: On Mondays and Wednesdays, for two-hour periods. .

Instructor: Laurent Hodges

Office: A530 Physics; Phone: 294-1185; e-mail: LHodges@iastate.edu

Office Hours: By appointment – set one up with the instructor when you come to the large-room meeting; the instructor also expects to spend a considerable amount of time in the Physics 111/112 Help Room (Room 53 Physics), at times to be announced.

Textbook: none required, as notes will be provided on the web site as PDF files. It is recommended that you buy or borrow a book at this level to read along in, however. Look for a textbook for a college course using only algebra and trigonometry, not calculus; these books generally have the title *Physics* or *General Physics* – examples are *Physics* by D. Giancoli and *Physics* by J. Cutnell and K. Johnson (the exact edition is not important). If you have taken calculus, you are welcome to use a calculus-level textbook. We will provide some suitable books in the Physics 111/112 Help Room (Room 53 Physics) for you to use or even borrow. Also, there are many suitable books in the ISU Library that you can check out.

Required Materials: (1) *Physics 112 Laboratory Manual* prepared by B. Crawley (available at bookstore); (2) Lecture notes and other materials made available on line at the course web site at <http://www.public.iastate.edu/~lhodges/112/SS2005.htm>; you can link to it from <http://learning.physics.iastate.edu>, which links to all physics and astronomy courses.

Syllabus. Print out and read the notes before class, and work out the answers to the questions in the notes. This schedule is approximate.

Week 1 (June 13-16)	Topics 1 (Review) and 2 (Electric Forces, Fields, and Energy)
Week 2 (June 20-23)	Topics 2 (concluded) Thursday, June 23: Exam 1 over topic 2
Week 3 (June 27-30)	Topic 3 (Electric circuits)
Week 4 (July 5-7)	Topic 4 (Magnetic Forces and Fields) Thursday, July 7: Exam 1 over topics 3 and 4
Week 5 (July 11-14)	Topic 5 (Magnetic Flux and Electromagnetic Induction)
Week 6 (July 18-21)	Topics 6 (Electromagnetic Waves) and 7 (Ray Optics) Thursday, July 21: Exam over topics 5, 6 and 7
Week 7 (July 25-28)	Topic 8 (Wave Optics)
Week 8 (August 1-4)	Topic 9 (Atomic and Nuclear Structure) Wednesday, August 3: Exam 4 over topics 8 and 9 Thursday, August 4: Comprehensive final exam

A. Class Attendance and Activity

All students are expected to attend class. In the case of an absence from the classroom, the student will be held accountable for the material covered in class.

Most class time will be taken up by various student activities, such as group work on problems and questions. Relatively little time will be spent on formal lecture; rather, you will be expected to have read the notes and worked on the questions *before* class. You will frequently be asked to respond to multiple-choice questions in class using numbered “flash cards” or “clickers” provided in class. One of the purposes of this is to let the instructor know how well you understand the material, so that mini-lectures can be given on concepts providing difficulties. All students who attend class are required to participate in these in-class activities.

B. Grading

The course will be graded on the basis of 300 points, as follows:

Final exam	40 points
Three exams (best 3 of Exams 1-4, 40 points each)	120 points
Homework	35 points
Recitation exercises	15 points
In-class exercises, 6 points each, best 15 count	90 points
TOTAL	300 points

1. You may prepare one sheet (8.5" × 11", both sides) to use on each exam; after the first, you may also bring the sheet(s) for previous exams, so that by the time of the final you have four sheets in all. All exams and quizzes will be “cumulative,” and may include material from *any part* of this course. You may use the online review sheets provided by the instructor, with other things added to it.

2. The in-class exercises will be held on any day, unannounced. They will be 6-point exercises in which you may work with your classmates and use your notes. They will usually contain material from *that day’s* class, but may involve material that has been covered in class or assigned for home study but not yet covered in class. Most questions will be “short answer” and/or “multiple choice,” but the latter will not be as common. There will be at least 20 of these exercises, and your top 15 scores will be counted; there will be *no* make-ups for them, so any you miss will figure in as one that you do not count. The maximum score for in-class exercises is 90 points (30% of the total for the course).

3. There will be four **in-class exams** during the semester on Thursdays June 23, July 7, and July 21 and on Wednesday, August 3. These exams are worth 40 points each. Only your best three exams will count towards your final grade. There will also be a 40-point comprehensive final on Thursday, August 4. Make-ups on the in-class exams will be allowed only for good excuses; normally if you miss one, it will be the one that doesn’t count in your final grade.

4. **Homework** will be assigned and graded; homework is due at the beginning of your recitation section. Homework that is not handed in within 5 minutes of the beginning of the recitation will receive a maximum of half credit. Your recitation grade will be based on your homework and will be worth 35 points.

5. **Recitation** exercises are required, but will not be counted. In other words, your recitation grade is based solely on attendance and participation. The maximum recitation grade is 15 (for the 15 meetings at which there are recitation exercises – all but the one on August 4). This is intended to make recitation low-stress. Recitation exercise material may show up on exams.

5. **Lab:** You are required to complete **all** lab experiments satisfactorily to pass the course. Questions related to the lab can appear on exams and quizzes. Outstanding performance in the lab (as determined by the lab instructor) may garner you up to about three or four lab bonus points, but otherwise the labs don't figure into your total score; this is intended to make the labs low-stress.

C. Scaling of Grades: The grade will be based on the total points accumulated, with the following letter equivalents (plus and minus grade borderlines approximately 10 points apart):

290 or above: A+	(not an official university grade, but used in letters of recommendation)		
280-289.9: A	270-279.9: A-	260-269.9: B+	250-259.9: B
240-249.9: B-	230-239.9: C+	220-229.9: C	210-219.9: C-
200-209.9: D+	180-199.9: D	Below 180: F.	

These borderlines will not be raised and are unlikely to be lowered. If you have the above minima, you're guaranteed to get **at least** the specified grade. Since these are absolute borderlines, not curved, studying with classmates and helping them understand the material can't adversely affect your own grade.

D. Help Room: The Physics 112 Help Room is Room 53 Physics, in the front hallway of the building. It is shared with Physics 111, and various instructors from the two courses will share the staffing duties. The Help Room will be open at times to be determined. I will probably plan to be there after class Mondays through Thursdays, and probably at other times as well.

E. Additional Information

Subject matter to be covered in this course: Most of this course will be devoted to phenomena related to the electrical properties of matter. Electric charge, electric current, and magnetic phenomena will be our starting point. Then, we will explore electromagnetic waves, including aspects of light and optics, which are fundamentally just another class of electromagnetic phenomena. Finally we will spend some time on several “modern” physics topics such as atomic structure, spectroscopy, and nuclear physics.

Instructional methods: The large-room meetings four times a week in the Lecture Hall (MacKay 117) will have only a small amount of “lecturing” and showing of physics demonstrations. Instead, most of the time we spend in that room will be reserved for you to think through and discuss various questions and problems, most of which are in the notes. Before class read through the notes for that day’s topic and answer as many questions as possible; the material will only be briefly reviewed before moving on to other activities.

The main activity in the large-room meetings will be answering and discussing the “questions” incorporated in the notes. Many of these questions have multiple-choice answers. You may spend a short time thinking about the question and discussing it with classmates sitting next to you (or in front or behind you), to see if you agree on the answer. Then, you will be asked to hold up a flash card with the answer you think is correct or use a clicker provided as you enter class. In this way, the instructor can find out right away what all the students in the class are thinking about the question asked. Were most students able to figure it out, or were many confused about it and gave the wrong answer? This will let the instructor know if we need to spend more time discussing that problem.

Some questions may not have multiple-choice answers, and the instructor will ask volunteers to tell what answer they determined.

What’s the purpose of this type of instruction? Learning physics is a lot like learning to play piano (or some other instrument), or basketball (or some other sport). There’s only so much you can absorb just by listening to someone talk about it. Basically, you have to try it out yourself and get lots of practice doing it. Recently, physics instructors have been increasingly successful in helping students learn physics by using this type of “active learning” instruction. It can be hard and frustrating at times – just like learning a sport or a musical instrument – but I believe that you can learn a lot more this way than by listening to me lecture. You will find that during every class, and every recitation, you will be forced to think hard about physics, trying to puzzle out the solution to various problems, trying to explain your thinking to the people sitting next to you and trying to understand their own explanations of *their* thinking. If you chose the wrong answer to a question you will need to rethink the situation and determine why you were wrong. Most people who take this course end up enjoying this method of learning, although it can be very frustrating at first. Inevitably, some students just don’t like it, and prefer to be taught by a traditional lecture method. With a traditional lecture method, however, more students are dissatisfied: they dislike instructors who just repeat what’s in the textbook, and instructors who provide new and different material in class are criticized because the textbook they chose doesn’t have everything in it!

Types of problems and questions: Many of the questions and problems we will work on – and that will appear on the quizzes and exams – will be qualitative, not quantitative in nature. The answers will not involve numbers, and you may be asked to give an explanation of your answer.

Part of your grade will depend on the clarity of your explanation. The reason for this is that it is very important to get a good understanding of the basic concepts in this course, and not **just** to be able to solve quantitative problems. Sometimes it is easier to show (and test) your understanding of basic principles with non-quantitative questions. This type of question may often seem to be “tricky” if you don’t have a thorough understanding of the material, so a major objective in this course will be to **acquire** a very solid understanding of the basic concepts. When you have that, most non-quantitative questions will seem fairly straightforward.

We will, of course, also do lots of quantitative problems similar to ones you’ve done in other physics courses. But we won’t put a lot of emphasis on complex mathematical methods or problems that require lots of detailed calculations. Sometimes, you will be asked to solve a problem **without** using algebra, even though you might be able to work out a mathematical solution to the same problem. For most of the people in this class, a good grasp of the basic physical principles will probably be more important, in the long run, than the ability to carry out complex algebraic calculations.

Nature of Class Exercises and Exams: Most of the questions on the class exercises and exams will be quite similar to the ones we practice in the large- and small-room meetings. **However**, on each exam – and on some class exercises – there will usually be one or two problems that are **completely different** from anything you have seen. They can be solved if you have a very good grasp of the basic concepts, but they will require some creative thought on your part. These problems are **intended** to be particularly challenging.

How the Tuesday and Thursday recitations will work: Homework must be turned in at the very beginning of recitation, in the first five minutes. Turn in whatever you have done, even if it is incomplete. Homework turned in after the first five minutes will be counted for only 50%. If you are unable to attend recitation, turn in your homework in advance in the physics office (Room 12 Physics), where I have a mailbox. Your “homework” grade (maximum: 35 points) will be based on the homework you turn in. Solutions to the homework will be published online. The time in the recitations you will be working through worksheets that will be distributed to you. You are to work through these in groups, consulting with your neighbors just as you have done in the large-room meetings. The recitation instructors will be helping you by asking “leading” questions, asking you to explain your thinking, and guiding you in the right direction. The recitation exercises will count 15 points, based solely on attendance and participation. Recitations will then be low-stress periods of learning.

Other issues: Our department places a very strong emphasis on academic honesty. Most students are naturally honest, but we will not tolerate any incidents of academic dishonesty. Any students guilty of academic dishonesty will be given an F for the course.

Labs: There are two labs every week in this course; time will be reserved late in the summer session for makeup labs. The labs are on Mondays and Wednesdays. These labs will deal with the same topics covered in the rest of the course, at approximately the same time. Do well in lab and you learn valuable material for doing homework and exam questions. You must do every lab satisfactorily in order to pass this course. If you miss and don’t make up even a single lab you will receive an F for the course, regardless of your performance on homework, in recitation and on exams. The lab instructors will be allowed to give a few bonus points for outstanding lab performance, but otherwise the labs do not count in the grading scale. Note that the labs usually have a “pre-lab” exercise that must be completed before you go to lab. A good time to work on these would be Tuesday and Thursday afternoons or evenings.