

PHYSICS 111: PHYSICS FOR SCIENTISTS AND ENGINEERS II

SYLLABUS

FALL 2018

INSTRUCTOR:	Dr. Q. Su	
ADDRESSES:	Office: 314 Moulton Hall	Office hours: MW 2–2:50 pm, or by appointment
	Phone: 438-5392	Email: qcsu@ilstu.edu
	Quiz Web page:	http://www.webassign.net
	(to self-enroll in this class, use class key: ilstu 1017 6940)	
LECTURES:	MLT 214 / MTWR / 1:00 pm – 1:50 pm	
LABS:	Sect. 02: MLT 217 / R / 9:00am–11:50 am	TA: Harold Diaz

The material contained in this syllabus is tentative and subject to change at my discretion.

OBJECTIVES & FORMAT

We will learn basic principles and applications of physics in electricity, magnetism and light. Basic experimental skills will also be developed in these areas. Lectures will mix with demonstrations and tests. Only major topics will be discussed during lecture sections. **It is essential that you study the relevant sections before each lecture. Materials in the required sections (as well as labs) but not covered in the lectures may be tested.** Homework problems and remaining questions raised from the class will be addressed during the review sessions. Homework will not be collected, but solutions will be posted.

REQUIRED MATERIALS

Text: R. Serway, J. Jewett, Physics for Scientists and Engineers, 9th ed., Brooks, Belmont.

Lab manual: Laboratory Manual for Physics 111

Other: Scientific calculator.

ON LIBRARY RESERVE

Text: R. Serway, J. Jewett, Physics for Scientists and Engineers, 6th ed., Brooks, Belmont, 2004.

R. McGrew, J. Saul and C. Teague, Instructor's Manual to Accompany Physics for Scientists & Engineers (Vol-1), 6th ed., Brooks, Belmont, 2004.

GRADING

Exams (3 × 160 pts)	480 pts
WebQuizzes (10 × 20 pts)	200 pts
Pop-up Quizzes (8 × 5 pts)	40 pts
Labs and Essay (9 × 15 pts)	135 pts
<u>Final Exam (145 pts)</u>	<u>145 pts</u>
total	1000 pts

Scales The boundaries are **A**≥900, **B**≥800, **C**≥700, **D**≥500. The final grade boundaries may be lowered.

Web Quizzes will be offered via the internet. The software tool we will be using is called *WebAssign* and may be accessed via the address: <http://www.webassign.net>. To learn about how to enroll, please read http://www.webassign.net/manual/WA_Student_Quick_Start.pdf. Enroll in the class using **class key: ilstu 1017 6940**. After that please enter a purchased access code. The access code can be purchased at ISU bookstores, from [webassign.net](http://www.webassign.net), or from cengagebrain.com. After enrolling in the class, there is short grace period to enter the access code. We will take 11 web-based quizzes, 10 best scores will be counted toward 200 points (or 20%) of the overall grade. Each quiz will consist of several problems similar to the end-of-

the-chapter problems and of fill-in-the-blank or multiple-choice types. Each question in a quiz weighs equally. There is no minimum passing grade for each quiz. To improve your grade you may retry the questions that you have answered incorrectly by loading a new set. Each new loading generates a similar but different set of questions. You may retry up to 5 times before the due date. After then no improvement may be made toward the quiz. Practice sets are available immediately after each due date.

Pop-up Quizzes will be offered in class throughout the semester. Problems appear in the pop-up quizzes should be similar to those of the WebQuizzes. The maximum points for each pop-up quiz is 5. Eight best quiz scores will be counted toward a total of 40 overall points.

Mid-term Exams will generally contain multiple-choice, fill-in-blank, true-false type, or show-your-work type problems. We will take 3 best out of 4 exams. Exams will be close-book, close-note, open-Mathematica and calculator. No cellphones are allowed during exams.

Formula Sheet All tests will be close-book. You will be allowed to bring to each test (*but not to the final*) a formula sheet (8.5×11in) displaying only *formulas* and physical *constants* (no sketches, nor words). The formula sheet should be turned in together with each exam and will be returned. Use of mathematica and calculator will be permitted on all exams.

Final Exam generally contains multiple-choice, fill-in-blank or true-false type problems. There will be no show-your-work type of problems on the final. The final will be cumulative that covers the material taught throughout the semester, including possibly the labs. Final exam will be close-book, close-note, but open-Mathematica and calculator. A formula sheet will be provided by the instructor. No cellphones are allowed during the final exam.

Physics Colloquia The Physics Colloquium series invites guests, usually from outside the university, to present progress in physics and teaching developments. These seminars are aimed at undergraduate level. Attending these talks will give you a further appreciation and a broader understanding of today's physics. You are expected to attend at least one seminar throughout the semester (announcements will be made in class). After which please write a 4-page essay about the talk to earn a total of 15 possible points. The essay will be collected in week 15. I am offering **2 extra points** (in addition to the 1000) for each colloquium talk you have attended.

Mathematica Software Wolfram Mathematica and its basic functions will be used to carry out algebraic and calculus manipulations, to graph data, and to perform curve fitting. Lab report written solely in Mathematica will receive **1 extra point** (out of 15).

Academic honesty Pop quizzes, Lab reports, Essay, Exams and the Final are to be completed independently. No cellphones are allowed. **Any form of cheating is prohibited.**

MAKE-UPS AND ABSENCES

Make-up *Exams*, *WebQuizzes* and *Labs* will not be allowed because we allow you to drop an exam, a webquiz, and a lab/essay.

WITHDRAWAL

Friday, **August 31** will be the last day to drop the course with no **WX** grade, a full refund will be issued.
Friday, **October 12** will be the last day to drop the course with a **WX** grade, no refund will be issued.

SOLUTIONS

Solutions to exams will be discussed in class.

SOLUTION TO END OF CHAPTER PROBLEMS

Web Quizzes are based on end-of-the-chapter problems (in the 9th edition). To practice for these problems, I suggest similar problems from the 6th edition by the same authors. I have deposited the 6th edition in the Milner library on its reserve desk together with the solutions manual to the 6th edition. Problem solving is probably the best way to learn physics and is good preparation for the tests. Feel free to work together on these problems. If you encounter difficulty and your peers cannot help, see me outside of classes. You may drop by at other times if my office door is open, and I will generally be glad to help you. Leave an electronic mail message for further questions or make an appointment.

PHYSICS LABORATORY

Students will ordinarily work in pairs in the laboratory. Students are expected to be on time. Prelab reading of the lab manual (or relevant text and class notes) is expected. Prelab tests are to be handed in as you walk into a lab. Instructions are frequently given at the beginning of an experiment and might not be repeated for late-comers. Persons who are habitually late will not be allowed to use their partner's data.

Laboratory Rules

1. The experimental work station is to be left in the condition that you found it.
2. Please report promptly any breakage or any inoperable equipment.
3. Data is to be entered in ink directly into the data sheet provided for each experiment. Data is never to be copied over or entered in pencil.
4. Data sheets are to be stamped or initialed by the lab instructor before leaving. Reports with unstamped data sheets will receive no credit.
5. Each student will record data individually. Laboratory reports are also to be written up individually.
6. Graphs should be done using graphing software, for example Excel, Mathematica or a more sophisticated scientific graphics program.
7. For each lab, please read the lab manual before coming to the lab. Your TA will answer general questions. You are responsible for figuring out the details by reading background material in the lab manual and by working with instruments or software provided.
8. Each lab report is worth 15 points and should generally contain the following elements: cover sheet, purpose, background, diagram, procedure, data table, graphs, and calculations, error analysis, and conclusion.
9. Type your lab report. Use equation editor for equations. Attach your initial data sheet to the end of the report. Lab report written solely in Mathematica will receive 1 extra point (out of 15).
10. Lab report is due one week after the lab is performed. Please hand in your lab report to your lab TA or in the homework box in the Physics Department office, Moulton 311.

PHYSICS COLLOQUIUM ESSAY FORMAT

The essay shall address the following:

- (a) What is the speaker's field of study and why is it important to the society? (3 pt)
- (b) What was the method used by the researcher? (3 pts)
- (c) What conclusion was made? And what was the analysis leading to the conclusion? (3 pts)
- (d) What are the open questions to be addressed by future studies? (3 pts)
- (e) coherence, logic and style of the essay (3 pts)

PHY-111 TENTATIVE SCHEDULE

Topic	Section	Labs, Exams, Colloquia & WebQuizzes
Week-1 (Aug 20)		
Charges	Ch23.1-Ch23.2	
Coulomb's law	Ch23.3	
Electric field	Ch23.4	
E-field of charge distributions	Ch23.5	Lab-1: Intro to Mathematica / Webassign (Aug 23) due: WebQuiz-1 (Aug 26)
Week-2 (Aug 27)		
E-field lines, charge motion	Ch23.6-Ch23.7	
Flux, Gauss's law	Ch24.1-Ch24.2	
Application of Gauss's law	Ch24.2-Ch24.3	
E-field of conductors	Ch24.4	Lab-2: Intro to Mathematica / Problems (Aug 30) due: WebQuiz-2 (Sep 2)
Week-3 (Sep 3)		
Labor Day, no class		
Electric potential	Ch25.1-Ch25.2	
Point charge potential	Ch25.3	
E from V, examples	Ch25.4-Ch 25.7	do: Lab-A: E field mapping (Sep 6) due: WebQuiz-3 (Sep 9)
Week-4 (Sep 10)		
Capacitance and calculation	Ch26.1-Ch26.2	
Combination of capacitors	Ch26.3	
Energy in dielectrics	Ch26.4-Ch26.5	
Electric dipole	Ch26.6	do: Lab-B: Basic circuits (Sep 13) due: WebQuiz-4 (Sep 16)
Week-5 (Sep 17)		
Current and resistance	Ch27.1-Ch27.2	
Electrical conduction model	Ch27.3-Ch27.5	Speaker ?
Electric power	Ch27.6	Lab: review and Exam 1 (up to Ch26, Sep 20)
Week-6 (Sep 24)		
DC circuits	Ch28.1	
Resistors in series and parallel	Ch28.2	Speaker 1: Sep 25
Kirchhoff's rules	Ch28.3	
RC circuits	Ch28.4	do: Lab-C: Ohm's law (Sep 27) due: WebQuiz-5 (Sep 30)
Week-7 (Oct 1)		
Magnetic field & Lorentz force	Ch29.1	
Motion of charge in uniform B	Ch29.2-Ch29.3	Speaker 2: Oct 2
Magnetic force on current	Ch29.4	
Torque on a current loop	Ch29.5	do: Lab-D: Kirchhoff (Oct 4) due: WebQuiz-6 (Oct 7)
Week-8 (Oct 8)		
Biot-Savart law	Ch30.1	
Magnetic force of two wires	Ch30.2	Speaker 3: Oct 9
Ampere's law	Ch30.3	Lab: review and Exam 2 (up to Ch29, Oct 11)

Week 9 (Oct 15)

Magnetic field of solenoid	Ch30.4	
Gauss's law in magnetism	Ch30.5-Ch30.7	Speaker 4: Oct 16
Faraday's law	Ch31.1	
Motional emf	Ch31.2	do: Lab-E : RC circuits (Oct 18) due: WebQuiz-7 (Oct 21)

Week-10 (Oct 22)

Lenz's law, induced emf	Ch31.3-Ch31.4	
Generator and motors	Ch31.5	Speaker 5: Oct 23
Inductance	Ch32.1	
B energy, mutual inductance	Ch32.3-Ch32.4	do: Lab-F : magnetic fields (Oct 25) due: WebQuiz-8 (Oct 28)

Week-11 (Oct 29)

RL circuits	Ch32.5	
RCL circuits	Ch32.6	Speaker 6: Oct 30
EM waves	Ch34.1	
		Lab : review and Exam 3 (up to Ch32, Nov 1) due: WebQuiz-9 (Nov 4)

Week-12 (Nov 5)

Maxwell's equations	Ch34.2	
Plane EM waves	Ch34.3	Speaker 7: Nov 6
EM wave energy, momentum	Ch34.4-Ch34.6	
Nature and speed of light	Ch35.1-Ch35.3	do: Lab-G : charge motion in E-B fields (Nov 8)

Week-13 (Nov 12)

Reflection and refraction laws	Ch35.4-Ch35.5	
Total internal reflection	Ch35.6-Ch35.8	Speaker 8: Nov 13
Images by flat mirrors	Ch36.1	
Images by curved mirrors	Ch36.2	do: Lab-H : image by mirrors (Nov 15) due: WebQuiz-10 (Nov 18)

Week-14 (Nov 19)

Thanksgiving break, no class

Week-15 (Nov 26)

Images by spherical mirrors	Ch36.2	
Images by refraction	Ch36.3	
Thin lenses	Ch36.4	due: Essay (Nov 28) Lab : review and Exam 4 (up to Ch36, Nov 29)

Week-16 (Dec 3)

Interference conditions	Ch37.1	
Young's double slit	Ch37.2-Ch37.3	
Polarization of light	Ch38.6	
Final Review		do: Lab-I : image by thin lenses (Dec 6) due: WebQuiz-11 (Dec 9)
