

Physics 109 – General Physics I – Fall 2011
Lecture: MWF 9:10-10:10 & T 8:30-9:30 in Halsey 57
Lab: Thursdays in Halsey 360

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Office Hours: MWF 10:20-11:30 AM, T 9:40-10:40 AM

Schedule: <http://www.phys.uwosh.edu/rioux>

Texts: *Physics for Engineers and Scientists* (3rd edition) by Hans Ohanian & John Markert
Physics 109 Laboratory Manual: Fall 2011 by UWO Physics Department

Content: Physics deals with mathematical models of the way that nature works. Research physicists design and construct experimental apparatus, make measurements, and try to identify mathematical structures that represent these observations. Physics has been quite successful at this enterprise, and we have achieved a highly accurate understanding of a wide variety of phenomena including the everyday behavior of objects like cars and balls, the non-everyday behavior of atoms and molecules, and the origin and structure of the universe. One of the goals of this course is to help you repeat some of the old discoveries for yourself as you learn about the physical world you live in.

Goals: The specific learning goal for this course is for you to develop the background in kinematics, dynamics, wave motion and thermodynamics that is required for most science and engineering majors. The material in this course is developed with the aid of calculus-based mathematics – you should be concurrently enrolled in the first semester of calculus (Mathematics 171) or have taken this class previously.

Outcomes: UWO's Essential Learning Outcomes outline the broader goals for liberal education courses like this one. A full list of ELOs can be found on the University web site. No single course or academic discipline can hope to touch on all ELOs, but those specifically addressed to a greater or lesser degree by this course include:

- Knowledge of the Physical & Natural World
- Skills, both Intellectual & Practical, including
 - identification and objective evaluation of theories & assumptions
 - critical thinking & problem solving
 - quantitative & technology literacy
- Responsibility, as Individuals & Communities, including
 - knowledge of sustainability and its application

Each learning outcome represents an essential facet of your overall education which we hope leads to broad knowledge, transferrable skills and civic engagement. Some of the tools we will use to attain these goals include demonstration of phenomena, hands-on experimentation, discussion of concepts and theories, and problem solving sessions.

Web Page: <http://www.phys.uwosh.edu/rioux/genphysI/>

Grading: Your grade in this course will be based on the exams, laboratory work, homework assignments and in-class work that you have completed by the end of the semester, December 16, 2011. The use of a fixed grading scale is done to encourage cooperative learning rather than competition for grades.

	Components		Grade Scale			
Exams	5 equally weighted	75%	86-100%	A	68-71%	C
Lab	13 experiments	15%	83-86%	A-	65-68%	C-
Homework		10%	80-83%	B+	62-65%	D+
			77-80%	B	59-62%	D
			74-77%	B-	56-59%	D-
			71-74%	C+	0-56%	F

Homework: When learning physics it is important that you continually use your newfound knowledge. As part of your physics regimen, homework sets will be assigned weekly and are due at class time on Fridays unless otherwise noted. The assigned homework problems represent a minimum set of exercises for the topics at hand – you should also attempt other problems on your own. I strongly encourage you to work together on the problem sets to discuss physical concepts and problem solving techniques. However, your solutions should reflect your personal style and should be complete enough to follow. Beware of merely copying someone else's solutions as this will only hinder your learning progress and exam performance. After a homework set is due, I will post solutions on the web page. Homework sets are due in class. Late homework will not be accepted.

Laboratory: The Thursday laboratory sections will give you an opportunity to perform experiments designed to illuminate a particular physical concept. Data collection and analysis techniques will also be emphasized. Most often there is enough time within the scheduled lab period to complete the entire lab write-up. In these cases you must turn in your lab notebook before leaving. For those labs that require additional analysis outside of lab, the notebooks are due on Mondays at class time. If you miss a lab due to a University approved absence it is your responsibility to complete the lab by the Tuesday following the regularly scheduled lab period because the equipment is changed and the previous week's experiment will no longer be available.

Exams: Five sectional exams will be given during class time on the dates indicated in the syllabus. The exams will be closed-book and closed-note. You may use a calculator during the exam, and I will supply you with a "formula card" for each exam. Exams will consist of both short-answer qualitative questions and computational quantitative questions. Partial credit will be awarded; therefore, it is in your best interest to record your thoughts even if you are unsure of your answer. Be sure to show all of your work and document it even if you did it "in your head" or "on your calculator." If you believe that I have missed the essence

of your argument or have a question about your score, please see me immediately after the exams are handed back. If you miss an exam due to a University approved absence it is your responsibility to arrange to take a make-up exam within a week of the original exam date.

Tutors: Tutors will be on duty throughout the semester in HS 346. Hours will be arranged and posted during the first week of classes.

Assumed: There are some basic tools that I assume you have mastered prior to taking this course. If you are unfamiliar with the following items or feel that you need to brush up on them, I recommend that you learn them within the first week of class since I will not spend very much time developing them during lecture:

1. Units

You should know the basic Système International (SI) and centimeter-gram-second (cgs) sets of units for length, mass, and time. You should be able to convert a physical quantity from one set of units to another. You should be familiar with the standard power-of-ten prefixes like micro- (10^{-6}), giga- (10^9), pico- (10^{-12}), etc.

2. Vectors

You should be able to define vector and scalar quantities and distinguish between them. You should be able to (a) add two or more vectors together to obtain the resultant, (b) subtract one vector from another vector to obtain the resultant, and (c) multiply a vector by a scalar to obtain the resultant. We will spend some class time reviewing these topics.

Suggestions: The ideas in this course build on what has gone before – try to study physics on a consistent and regular schedule and avoid the dreaded cramming mode. The discussions, lectures, and labs are designed to complement each other – use them to see the topics in both theory and practice. Demand of yourself that you can explain to another person each physical concept you study. Ask lots of questions.

Tentative Schedule (Exam Dates are Fixed)

Week	Topics	Text	Lab
Sept. 7 - 9	Kinematics: 1D	1 & 2	
Sept. 12 - 16	Kinematics: 2D	3 & 4	1. 1D Kinematics
Sept. 19 - 23	Dynamics: Laws of Motion	5	2. Curve Fits & 2D Kinematics
Sept. 26 - 30	Dynamics: Basic Topics Exam #1 – Tuesday, September 27, 2011	5 & 6	3. Measurements & Errors
Oct. 3 - 7	Dynamics: Advanced Topics, Work	6 & 7	4. Newton's Laws
Oct. 10 - 14	Energy & Conservation	7 & 8	5. Stokes' Law
Oct. 17 - 21	Energy, Orbits Exam #2 – Tuesday, October 18, 2011	8 & 9	6. Energy Transformations
Oct. 24 - 28	Linear Momentum	10	7. Ballistic Pendulum
Oct. 31 - Nov. 4	Rotational Motion – Kinematics	11 & 12	8. Moments of Inertia
Nov. 7 - 11	Rotational Motion – Dynamics Exam #3 – Tuesday, November 8, 2011	12 & 13	9. Angular Momentum
Nov. 14 - 18	Oscillations & Waves	15	10. Non- Harmonic Oscillators
Nov. 21 - 22	Waves – Thermodynamics Intro	16 & 17	
Nov. 28 - Dec. 2	Temperature & Ideal Gases Exam #4 – Tuesday, November 29, 2011	19	11. Velocity of Waves
Dec. 5 - 9	First Law of Thermodynamics	20	12. Calorimetry
Dec. 12 - 16	Second Law of Thermodynamics Exam #5 – Friday, December 16, 2011	21	13. Heat Engines