

**Ohio Articulation Number (OAN)  
Course Submission Form  
2005-2006**



College/University Lorain County Community  
College

Course(s) Submitted(Title & Course #) College Physics I PHYC 251 E for  
Ohio Articulation Number OSS048

Date April 25, 2006 Course 1 of a 1 Course OAN mapping.

Name and title of individual submitting on behalf of the college/university

Name Rosemary Schestag Title Project Manager

Address 1005 Abbe Road N, CC219  
Elyria, OH 44035

E-mail [rschesta@lorainccc.edu](mailto:rschesta@lorainccc.edu)

Phone 440-366-7412

Fax 440-366-4150

Credit Hours 5 qtr \_\_\_\_\_ sem X

Lecture Hours 4

Laboratory Hours 3 (if applicable)

Pre-Requisites(s) Course work (if applicable)

MTHM 181 (Calculus I).

Placement Score (if applicable)

(Name of test) \_\_\_\_\_

(Domain) (Score) \_\_\_\_\_

Catalog/Course Description (Includes Course Title and Course #)

College Physics I PHYC 251 - Physics for engineers and science majors. A calculus based course covering motion, force, energy, momentum, rotation, and thermodynamics. Laboratory required. (A special fee will be assessed.) *Prerequisite: MTHM 181 (Calculus I).*

Texts/Outside Readings/Ancillary Materials

**REQUIRED TEXTBOOK(S)/MATERIAL(S):**

Physics for Scientists and Engineers, 2004 edition, by Knight  
Physics 251 Lab Manual, by Majoros

**OTHER RESOURCES INCLUDING EQUIPMENT AND SOFTWARE:**

Active learning problem solving kits (ALPS) by Van Heuvelen

**LIBRARY AND LEARNING RESOURCES:**

*All students are expected to fully utilize periodical and reference literature available in the Library and/or via Library computer.*

Course Objectives and/or Plan of Work

**SYNOPSIS OF SUGGESTED COURSE OUTCOMES:**

The student shall:

- have a working understanding of the description of motion and the causes of motion.
- have the ability to solve motion problems using the force laws and the energy conservation laws.
- have a working understanding of the description of rotational motion and causes of rotational motion.
- have the ability to solve rotational motion problems using conservation of angular momentum.
- have the ability to solve thermodynamics problems using the three laws of thermodynamics.

Description of Assessment and/or Evaluation of Student Learning

**SUGGESTED INSTRUCTIONAL METHOD(S) AND TECHNIQUE(S):**

Extensive use of the ALPS kits material, ranking tasks, demonstrations and other active learning materials.

**SUGGESTED-ASSESSMENT/GRADING PROCEDURES:**

Reading quizzes - one ten point quiz per chapter

4 or 5 exams, 100 points each

Comprehensive Final, 200 points

10 points per lab, and student must pass lab in order to pass course

# College Physics Syllabus

## Physics 251

Dr. Stephen Majoros  
January, 2005

### INTRODUCTION

The intention of this syllabus is to place all the relevant information that you may need or want concerning College Physics in one place. One obvious reason for this organization is that (as you will see) in the next 2 semesters we have to cover a tremendous amount of material. Another is to ensure that you have a clear picture of what we are trying to accomplish. And finally, if we don't have to waste class time going over procedure or policy or assignments, then we have more time to discuss science. Physics 251/252 is a two semester calculus based physics course. The sequence covers most of the ideas of what is conventionally called classical physics.

### THE COURSE

The purpose of this course is to have you understand the concepts developed over the last 2000 years or so in man's attempt to understand his physical world (at least in the Western sense). Understanding the concepts and *then* applying them towards the solution of a problem should be your goal. Very little value will be placed on memorization of formulae. In fact, if you understand the concepts, which tell you the relation that exists among different quantities, then you should be able to write down the correct equation just from your understanding. The test of your understanding comes from your ability to use these ideas to solve problems. The analogy I like to make is with chess. The rules of chess, like those of science, are few and simple. But just because you have memorized the rules of chess doesn't mean that you can now play a serious game against a grand master. The richness of possibilities and variations eludes you. You can only discover these by playing. Similarly, you can only understand physics by "playing" physics. Hence the questions, exercises and problems at the end of each of the chapters. The four hours you spend in "lecture" each week will only be a small part of your learning process. After all, real learning comes by your doing. It happens inside your head.

Very little, if any, class time will be devoted to me reading the book to you, i.e. lecturing. Class will be devoted to your participation in selected exercises from the workbook that accompanies the text or other exercises that I will bring to class. . It will be necessary for you to be prepared by having read the book before class.

These classes activities are not intended to be, and should not be viewed as, daily tests or quizzes or attempts by me to trip you up. The laws of nature are not complex but they do need careful and logical application in order to successfully solve problems – that requires practice. To think that one could learn to be a good problem solver by watching me solve problems up at the board is the equivalent of thinking that one could become a good basketball player by watching Lebron James on TV. If someone were to say that to you I trust that you would tell them that they need to go out and actually play some basketball. Think of class time as the equivalent of that practice time for basketball.

Everyone brings to class their own experiences and impressions of how the world works. Sometimes because these experiences are limited, misconceptions are easy to form. Research has shown that many of these misconceptions are fairly common and therefore many of the exercises in the workbook were developed to address these misconceptions. As you work through these exercises and we have these discussions in class, you should feel free to discuss your conclusions whether they turn out in the end to correct or not. It almost seems that the students who are not willing to work the wrong answers out of their brains during these class sessions are saving the wrong answers up for the tests.

## TEXT

The text for this course is Physics for Scientists and Engineers by Dr. Randall Knight. Packaged with this text is a workbook and Student access kit for the online homework system. The workbook is something that you should have with you everyday in class.

Homework assignments are handled through the MasteringPhysics online homework system. As you log in you can see the assignments and each assignment will correspond to one of the chapters. Specific information to get to this course will be given in class. This system is very rich in the feedback you will get as you work through a problem. Many problems require intermediate steps to be supplied. Generally if you are wrong it will ask you a question which will point you toward your mistake. You can also buy hints but these lower your score. Most problems are graded as a point per problem. This makes it easy for me to look at your score on a percentage basis. So if your average score is 0.81 this is 81% on the homework. This system gives each student what amounts to individualized tutoring. You also know immediately if you have done the homework correctly.

Most of the time, the “due” date for homework will be the day after we finish a chapter in class. That due date will be the last day to receive full credit for the homework and the credit available will decrease to zero over the two days following that due date.

## EXAMS AND GRADES

Your grade will be based on your performance on the homework, tests, labs and final exam. The homework is worth 10% of the total points, the lab 20%, the exams 50% and the final exam 20%. You must pass the lab part of the course to pass the course. Read the section on the lab in order to determine what this means. For the exams each student will be provided with a formula sheet. If you feel a formula or constant has been left off the sheet you should ask about it during the exam. Any other formula that you feel you want to use must be derived and shown to be appropriate for the given problem. One last point. Correct answers always have correct units. Numbers without units are meaningless.

Grading Scale:

90 % - 100 % = A

80 % - 89.999....% = B

70 % - 79.999....% = C

60 % - 69.999....% = D

Less than 60 % = F

## CLASS ATTENDANCE

I do not take attendance for the “lecture” part of the class. Past experience shows that for most students, there is a good correlation between class attendance and their success.

## OFFICE HOURS

My office hours will be announced during the first few days of class. They will also be posted outside my office and be available from the Math and Science Division secretary. I encourage you to use them as necessary.

And again, if you still are not satisfied with your work on a homework problem from the online system come and see me during office hours.

## LABORATORY

The laboratory is an integral part of the course and is meant to help you understand the sometimes abstract ideas presented in class. They are meant to be a reinforcing learning experience and to give some tangibility to the concepts. Frequently, the experimentalist finds his world far from perfect and sometimes different from his neighbors. I want each group to report what they find and to analyze those results instead of manipulating data in order to arrive at the answer which they think is the one I want. Each student is still responsible for doing each lab and turning in his own report. Not completing all labs means you have failed lab which means that you have failed the course. Since each lab is worth 10 points, by the time the semester is over, this is equivalent to about one of the unit exams.

## Laboratory Writeups

The report should be neat, orderly, legible(!), and written in ink. The original handout is not to be used as a data "scribble sheet". Your original data should be on the data sheet provided. Only after you are sure of the procedure should you transfer this data to any tables that may be provided in the handout. When analyzing data be sure to put at least one sample calculation of each step of the analysis.

Analysis of the measurements is the key to all science and thus to your lab reports. Besides the correct manipulation of the correct formulae in your test of theory against nature, it is also very important to analyze the uncertainties of your measurements and to see their effect on your answer. It is NOT sufficient to conclude that any discrepancies between your answer and the "expected" answer is due "experimental error". You must show that this is true by an analysis of errors in each of your measurements. Note also that the rules of significant figures in calculations are important here.

Most of the labs the first semester are in your packet and are selected from a series which is called Real Time Physics (RTP). Most of these labs have sections where you are to provide predictions of what you expect to see happen. Learning only really occurs if this process occurs in the correct order, so do not make your predictions after you have done the experiment. The homework problems assigned at the end of the lab will constitute your "conclusion" for these labs.

On almost all of these labs at various points you print out graphs of your experiment. The template associated with a given lab is generic and is set up to provide reasonable axes and scales for the experiment. The scales, however, may not be the best for your particular circumstances. It is your responsibility to make sure that the scales are set such that the graph conveys the most information. Most of the time what this means is that the scales are set too large, i.e., the scale goes from zero to 5 instead of zero to 1. This forces all the data down near the x axis and "squeezes out" the details. It is your responsibility to examine all your graphs and make sure that the scales are chosen appropriately. Almost everyone in this course is going to eventually be a professional. What better time to start learning how to present your work in a professional manner.

One guideline to use: your report should be written so someone else could pick it up a year later and figure out exactly what you did and then reproduce it.

### A FEW THINGS THAT WILL MAKE ME ANGRY (so you should avoid doing them)

One of these has already been mentioned and that is answers without units. Get in the habit early of always making sure that your solutions carry thru the units with them.

The second capital crime is to start a problem with half of an equation. Don't have the first line of your solution look like this:

$$= (4.1)(.0019)^2$$

If you are trying to solve an equation then write both sides of the equation. The mathematical symbol = implies an equality between 2 quantities, write both of them down.

Finally, try to present your answer in an orderly, logical manner. Avoid the situation where you have to see me to explain that the first part of your solution is down at the bottom of the page, the next step is up in the corner, the next step is the work written upside down on the back, etc. A little thought about the problem before attempting to substitute numbers into equations will go a long way towards being organized.

## Physics 251 Lecture Topical Outline

- Kinematics:
  - Chapter 1 – Concepts of motion
  - Chapter 2 – Kinematics
- Vectors
  - Chapter 3 – Vectors
- Newton's law
  - Chapter 4 – Force and motion
  - Chapter 5 – Motion in a line
  - Chapter 6 – Motion in a plane
  - Chapter 7 – Motion in a circle
  - Chapter 8 – Newton's 3<sup>rd</sup> Law
- Work Energy
  - Chapter 10 – Energy
  - Chapter 11 – Work
- Linear Momentum
  - Chapter 9 – Impulse and momentum
- Rotational Motion
  - Chapter 13 – Rotations of rigid bodies
- Angular Momentum
  - Chapter 13 – Rotations of rigid bodies
- Thermodynamics
  - Chapter 16 – Introduction to thermodynamics
  - Chapter 17 – First law of thermodynamics
  - Chapter 18 – Kinetic theory of gases
  - Chapter 19 – Heat engines

## Physics 251 Lab Activities

Introduction to Motion – part 1  
Introduction to motion – part 2  
Acceleration  
Force and Motion  
Combining forces  
Newton's 2<sup>nd</sup> Law  
Centripetal force  
Projectile Motion  
Work and Energy  
Conservation of Energy  
Impulse and Momentum  
Conservation of Momentum  
Moment of Inertia  
Linear Expansion  
Thermal Expansion  
Specific Heat and Latent Heat

Physics 251  
Tentative Schedule, Spring 2005 (**Revised**)

Introduction .....	Jan 18
Chapter 1 ( Motion) .....	Jan 20, 21, 24
Chapter 2 ( Kinematics) .....	Jan 25, 27, 28
Chapter 3 (Vectors) .....	Jan 31, Feb 1
Review .....	Feb 3
Test #1, Feb 4	
Chapter 4 ( Force and motion) .....	Feb. 7, 8
Chapter 5 (I-dim. Dynamics).....	Feb. 10, 11, 14
Review .....	Feb. 15
Test #2, Feb. 17	
Chapter 6 ( Dynamics in a plane).....	Feb. 18, 21
Chapter 7 ( Circular dynamics).....	Feb 22, 25, 28
Chapter 8 (Newton's 3 <sup>rd</sup> law) .....	March 1, 3, 4
Review .....	March 7
Test #3, March 8	
Chapter 9 (Momentum) .....	March 10, 11
Chapter 10 (Energy) .....	March, 21, 22, 24
Chapter 11 (Work).....	March 25, 28
Review .....	March 29
Test #4, March 31	
Chapter 13. (Rotational kinematics. & dynamics ).....	April 1, 4, 5,7
Chapter 14 ( Oscillations) .....	April 8, 11,12
Review .....	April 14
Test #5, April 15	
Chapter 20 (Traveling waves) .....	April 18, 19, 21
Chapter 21 ( Superposition) .....	April 22, 25, 26
Chapter 23 (Ray optics) .....	April 28, 29, May 2
Review .....	May 3
Test #6, May 5	
Review For Final	
.....	May 6, 9
Final, Friday May 13 @ 1:00 P.M.	

Note: Test review as noted above does not mean looking at homework problems as this is handled online and, if necessary, through office hours. These days will be used for more general questions that you may have and looking at the big picture of the chapters involved in the test.

Additional Documentation

OAN	LCCC	BGSU	KSU	U, Akron	U. Toledo
OSC 016	PHYC 251	PHYS 211	PHY 23001	3650:291	PHYS 2130

This information is from the Equivalency Guide in CAS.

It shows how our indicated courses are accepted by BGSU, KSU, U of Akron, and U of Toledo. Blue font indicates that the school submitted that course as indicated OAN.

**COURSE DESCRIPTION WITH STUDENT OUTCOMES**

**LORAIN COUNTY COMMUNITY COLLEGE**

**DIVISION:** Science and Mathematics

**COURSE TITLE:** College Physics I  
**COURSE NUMBER:** PHYC 251

**HOURS-CREDIT:** 5

**CONTACT:** 7

**LECT:** 4

**LAB:** 3

**REC/CLINICAL:**

**TOTAL COURSE ILUs:** 6.55

**LECTURE:** 1.0

**LAB:** .85

**REC/CLINICAL:** 0

**LECTURE SEATS:** 48

**LAB SEATS:** 24

**CLINICAL SEATS:** 0

**IS THERE A SEPARATELY SCHEDULED LAB:**

Yes

**IS THERE A SEPARATELY SCHEDULED CLINICAL:**

No

**FEES:** Yes  
\$40

**SPECIAL FACILITIES:** None

**FAS ACCOUNT NO.:** 1-02-02-350-450

**GEN. EDUCATION REQ. CHANGES:** Yes

**START YEAR/SEMESTER:** Fall  
1998

**TRANSFER MODULE REQ. CHANGES:** Yes

**PREREQUISITES:** MTHM 181 (Calculus I)

**COREQUISITES/CONCURRENT:** None

**CATALOG DESCRIPTION:**

Physics for engineers and science majors. A calculus based course covering motion, force, energy, momentum, rotation, and thermodynamics. Laboratory required. (A special fee will be assessed.) *Prerequisite: MTHM 181 (Calculus I).*

**REQUIRED TEXTBOOK(S)/MATERIAL(S):**

Physics for Scientists and Engineers, 2004 edition, by Knight  
Physics 251 Lab Manual, by Majoros

**OTHER RESOURCES INCLUDING EQUIPMENT AND SOFTWARE:**

Active learning problem solving kits (ALPS) by Van Heuvelen

**LIBRARY AND LEARNING RESOURCES:**

*All students are expected to fully utilize periodical and reference literature available in the Library and/or via Library computer.*

**SYNOPSIS OF SUGGESTED COURSE OUTCOMES:**

The student shall:

- have a working understanding of the description of motion and the causes of motion.
- have the ability to solve motion problems using the force laws and the energy conservation laws.
- have a working understanding of the description of rotational motion and causes of rotational motion.
- have the ability to solve rotational motion problems using conservation of angular momentum.
- have the ability to solve thermodynamics problems using the three laws of thermodynamics.

**TOPICAL OUTLINE: (COMMON CORE TOPICS)**

- Kinematics
- Vectors
- Newton’s law
- Work Energy
- Linear Momentum
- Rotational Motion
- Angular Momentum
- Thermodynamics

**SUGGESTED INSTRUCTIONAL METHOD(S) AND TECHNIQUE(S):**

Extensive use of the ALPS kits material, ranking tasks, demonstrations and other active learning materials.

**SUGGESTED-ASSESSMENT/GRADING PROCEDURES:**

4 or 5 exams, 100 points each  
Comprehensive Final, 200 points  
10 points per lab, and student must pass lab in order to pass course

**GENERAL EDUCATION REQUIREMENT:**

Meets General Education Outcomes: 1, 2, 3, 6, 7, 8 and 9. Refer to LCCC catalog for a complete description of the eleven General Education Outcomes.

**TRANSFER MODULE REQUIREMENT CHANGES:**

Add to Natural/Physical Sciences area of Transfer Module.

**Comment:**

Combines PHYS 261/262/263 in Semester Conversion.  
Date Revised for Semester Conversion: November 1996

OBR Use	Action
Approved	
Additional Information Requested	

Rejected	
----------	--

Date	
------	--