

PHYSICS 201: THE MECHANICAL AND THERMAL WORLD (Foundations of Physical Science I)

PHY 201 is part of The Physical Sciences General Education Foundation Category.

MATERIALS YOU WILL NEED

The textbook for this course is *Physics by Inquiry - Volume I*, by Lillian C. McDermott. You need to purchase a **new** copy at the GVSU Bookstore as soon as possible, if you have not done so already. Due to the nature of the book and the course, *you may not work with a used copy of the book.*

You must provide a 3-ring notebook and paper in which to keep notes. You will also need a plastic ruler with centimeter and inch scales, a protractor to measure angles, and a pad of graph paper.

ABOUT PHYSICS BY INQUIRY

A quick glance through *Physics by Inquiry* will tell you that this book, unlike most texts, is a book of questions rather than a book of answers. The primary emphasis of this course is on discovery rather than memorization, and the teaching is done by questioning rather than by telling. For these reasons, this course may be unlike most, if not all, of the science courses you have ever had. For the same reasons, however, this course will allow you attain the following objectives:

- to develop an in-depth understanding of selected topics in the physical sciences, including properties of matter, balancing, buoyancy, and heat and temperature
- to come to a deeper appreciation for science as a process of inquiry, and
- to experience from a student perspective what it means to construct an understanding of physical phenomena on the basis of observations and experiments.

FORMAT OF THE COURSE

Class work. Class hours will be spent working through the text as described in the *Preface* of the text. You should keep a clear and complete written discussion of experiments and exercises in your notebook. During the semester notebooks may be collected and checked for clarity and completeness of work. In this course, exams are *open-book* and *open-notebook*, so it is to your advantage to be as thorough as possible in your notebook entries and responses.

Lab partners. Most work in PHY 201 is done during class (PAD 142, MWF 3:00 - 4:50 p.m.) with one or more lab partners. You will be working closely with your partners throughout the semester. You will be expected to make *significant* contributions *each day* toward your group's progress. It is extremely important that you discuss your findings as you proceed; do not move on to the next question unless you and your partners have discussed and agreed upon your answers. Above all: Successful groups are usually concerned much less about *who* is correct rather than *what* is correct and *why*.

Attendance. Because much of the work in this course takes place during class, **attendance is required.** Repeated absences will significantly affect your performance in the course, and quite possibly that of your partners as well. Unexcused absences and tardies will be a factor in determining participation points in the course grade.

CHECKOUTS

As you and your partners progress through the text, key experiments and exercises direct you to have your responses checked with a staff member. After you and your partners have all come to an agreement on your responses, write them down in your notebook. After reviewing them with you, I will either initial your responses or will discuss the issues further with you and ask you and your partners to revise and resubmit your responses. Checkout participation will be a factor in determining participation points in the course grade.

HOMEWORK

Homework will be assigned weekly. Each assignment will be collected at the *beginning* of class on the day it is due. Graded homework will be returned promptly; thus, late homework will *NOT* be accepted.

Most of the homework problems will be assigned from one of the “Supplemental Problems” sections of *Physics by Inquiry*. Most problems will be graded on a 5-point scale. Many problems have subtle aspects that are not immediately apparent. It is recommended that you first try the homework on your own and then work on it with your partners. Homework assistance will be available during office hours.

Homework resubmission: Problems that earn a score of less than 80% (*e.g.*, less than 4/5) may be resubmitted *once*, no later than *one week after the original due date*, for a maximum score of 80%. Problems that earn a score of 60% or less **must** be resubmitted. Resubmitted homework must be (i) written on separate paper and (ii) attached to the original response (with the grader’s original marks).

Essay homework: Occasionally you will be assigned to write a short essay for a homework assignment (or part of one). Specific topics will be announced in class. Each essay homework will be *two weeks* after the date on which it is assigned (in contrast to the usual homework problems from the text, which will be due one week after they are assigned). Each essay homework will be worth more points than a typical homework problem, and each will be graded on grammar and organization as well as content. Essay homeworks may not be resubmitted for additional credit. You may submit a rough draft of any essay for instructor feedback prior to the final deadline.

PRETESTS

You will be given a *pretest* prior to starting each section of the text. They are designed to provide both you and your instructor with information about your initial understanding of the material. After working a section, you will be required to re-work the pretest. Pretests pretest participation will be a factor in determining your participation points in the course grade.

QUIZZES AND EXAMS

There will be periodic quizzes, two (2) midterm exams, and a final exam. Each quiz will be given during class time and will be 30 minutes long. Each midterm exam will also be given during class time. Each midterm exam and the final exam will be two hours long. (See Course Calendar for dates.)

No makeup exams or quizzes will be given without prior arrangement. Missing any midterm exams or the final exam will result in a course grade of “F.” If you cannot take an exam as scheduled, you must contact me *at least seven (7) days before* the exam to arrange for a makeup. Exceptions for emergencies will be handled on an individual basis. If you are sick on the day of the exam, a doctor’s note is required to arrange a makeup exam. Exams and quizzes may *not* be resubmitted for additional credit.

Exams and quizzes will be open-book and open-notebook. A good way to prepare for them is to review the questions presented on homework assignments, as well as the work you have done in your notebooks.

COURSE GRADES

PHY 201 is a 4-credit course. The approximate weighting scheme shown below is tentative and is subject to change. The exact weighting scheme will be determined at the end of the semester. If you have three unexcused absences, fifteen tardies, five incomplete pretests, or ten incomplete checkouts you will lose most of the class participation points.

Course Grades (continued)

Midterm exams (2):	30%	Quizzes:	15%
Homework (including essays):	20%	Final exam:	20%

Attendance and class participation: 15%

The anticipated grading scale for this course is as follows:

A	93.0% and above	B+	87.0 - 89.9%	C+	77.0 - 79.9%	D+	67.0 - 69.9%
A-	90.0 - 92.9%	B	83.0 - 86.9%	C	73.0 - 76.9%	D	63.0 - 66.9%
		B-	80.0 - 82.9%	C-	70.0 - 72.9%	F	below 63.0%

Overall course grades will **not** be rounded to the nearest percent. The above grading scale is tentative and subject to change. For example, an overall score of 86% will guarantee a final grade of "B." However, the scale may shift downward slightly (*e.g.*, 86% may instead correspond to "B+") based on exam scores.

COURSE CALENDAR

Class will meet on *all days* that do not coincide with holidays. Although I will make a concerted effort to remind you of deadlines in class, it is *your responsibility* to keep track of all homework deadlines, quiz dates, and exam dates. Any changes to these deadlines will be announced during class.

Weeks 1 - 5: Mass, balance, uncertainty, operational definitions, volume

Weeks 6 - 10: Proportional reasoning, density, sinking and floating, Archimedes' principle

Weeks 11 - 15: Temperature, temperature scales, heat transfer, heat capacity, specific heat, phase changes

<i>Week of</i> <i>Monday:</i>	<i>Monday</i>	<i>Wednesday</i>	<i>Friday</i>
25 Aug.	(First day of class)		HW 1 due
1 Sept.	** Labor Day holiday ** (no class)		HW 2 due (HW 1 resubmits due)
8 Sept.			HW 3 due (HW 2 resubmits due, <i>etc.</i>)
15 Sept.	Quiz 1		HW 4 due
22 Sept.			Midterm Exam #1
29 Sept.			HW 5 due
6 Oct.	Quiz 2		HW 6 due
13 Oct.			HW 7 due
20 Oct.			HW 8 due
27 Oct.	Quiz 3		HW 9 due
3 Nov.			Midterm Exam #2
10 Nov.			HW 10 due
17 Nov.			HW 11 due
24 Nov.	Quiz 4	*** Thanksgiving holiday (no class) ***	

1 Dec.			HW 12 due Review for Final Exam
<u>FINAL EXAM</u>: Monday, December 8, 3:00 – 4:50 p.m., PAD 142			

Below is the description of the properties of a General Education course in the Physical Sciences.

GENERAL EDUCATION FOUNDATION CATEGORY: THE PHYSICAL SCIENCES

Category Purpose and Description

The physical sciences explore and seek to explain the behavior of the physical universe. They seek to understand the fundamental workings of nature, from the behavior of particles of matter to the functioning of the galaxies. Study of the concepts, history, contexts, and methodologies of the physical sciences assists students in becoming scientifically literate. Each course in this category is a broad introduction to one or more of the physical sciences. Courses contribute to the development of critical thinking and problem-solving skills, and help students apply an understanding of scientific ways of thinking to their own lives and careers.

Content Objectives

All courses in the Physical Sciences Category include the following content:

- 1) The introduction of the physical sciences as a “way of knowing”; an examination of principles and questions that define the field;
- 2) An understanding of how scientists use information and theory to explain the phenomena observed in the physical universe;
- 3) The unifying concepts of the physical sciences including the forces of nature, the structure of materials, and the role of energy in the physical universe.

Skills Objectives

All courses in the Physical Sciences Category use teaching methods that help students become more proficient in the following skills:

- 1) To engage in articulate expression through effective speaking or writing;
- 2) To think critically and creatively;
- 3) To locate, evaluate, and use information effectively.