

PHYSICS FOR THE MODERN WORLD PHYSICS 100 - COURSE SYLLABUS

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COURSE MATERIALS:

TEXTBOOK: Conceptual Physics, tenth edition by Paul G. Hewitt. The accompanying web site can be found at: www.physicsplace.com (Your individual access ID is found on a card in the front of your textbook).



LAB MANUAL: Physics for the Modern World Lab Manual, 5th Edition.

CALCULATOR: You will need a **traditional** calculator with exponential capabilities.



OTHER: Pencils lots of pencils!

GENERAL EDUCATION INFORMATION:

Recently a full review of the General Education program was conducted that resulted in a new system of course clusters to allow greater freedom in tracking from foundation courses to second-level courses. Each curricular area now comprises only two clusters in which a group of foundation courses leads to a larger number of second-level courses. For additional information regarding the changes to the General Education Program please refer to the document "*Informed, Effective Minds: A Guide to Changes in the General Education Program*" which can be found online at: <http://www.gened.american.edu/academic.depts/gened/NIEF.pdf>.

Physics for the Modern World is one of five foundation courses within Cluster 2 (*The Physical World*) of Curricular Area 5 (*The Natural Sciences*) in the University's General Education Program. All courses in this curricular area focus on the nature of scientific reasoning, discovery, and invention through systematically exploring basic concepts within their historical context. Foundation courses unite hands-on scientific experimentation, inductive reasoning, and deductive analysis with the study of such basic principles as the structure of matter, biological evolution, human behavior, and thermodynamics.

Physics for the Modern world is the first of a two-course sequence in the Natural Sciences. Students who choose to take *Physics for the Modern World* may complete the sequence in the Natural Sciences by taking one of the following second-tier courses in Curricular Area 5, Cluster 2:

Bio 240G – Oceanography

Chem 205G – The Human Genome

Chem 210G – General Chemistry II

Chem 220G – Environmental Resources & Energy

Chem 230G – Earth Sciences

Phys 200G – Physics for the New Millennium

Phys 205G – College Physics II

Phys 210G – University Physics II

Phys 220G – Astronomy

Each of these courses explores in more depth a topic introduced in *Physics for the Modern World*. The second-level courses include both traditional advanced study in each discipline



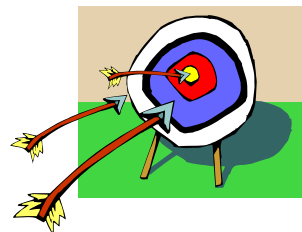
as well as integrative courses, such as oceanography, earth sciences, astronomy, and human biochemistry and health. This curricular area conveys a respect for the natural world, extends scientific literacy, and refines the modes of thought that characterize scientific inquiry. *Physics for the New Millennium* addresses these ideas using an activity-oriented, lab-lecture approach using a number of interactive engagement strategies. Using this approach students have an opportunity to probe the topics of electricity & magnetism, light & color, and modern physics.

COURSE GOALS AND OBJECTIVES:

By the end of the semester, students should:

1. Know basic terms. Some ways students may be given the opportunity to express their knowledge of basic terms include:

- 1.1 Writing a definition of a specified term.
- 1.2 Providing the term that best fits a particular context.
- 1.3 Selecting the best term when given a definition.
- 1.4 Distinguishing between scalar and vector quantities.
- 1.5 Identifying the appropriate usage of a specified term.



2. Understand that units must be included when presenting or describing physical data and/or results. Some ways students may be given the opportunity to express their understanding include:

- 2.1 Converting from the SI to the British system of units and vice versa, using learned techniques.
- 2.2 Distinguishing between units of various physical quantities.
- 2.3 Recognizing the appropriate unit for a given term.
- 2.4 Expressing proper units with each numerical result or data obtained through direct measurement.

3. Understand fundamental physical concepts and principles. Some ways students may be given the opportunity to express their understanding include:

- 3.1 Selecting the appropriate law or relationship given a physical description of a situation.
- 3.2 Writing a description of a particular law or principle.
- 3.3 Recognizing an appropriate concept or principle for a given task.
- 3.4 Citing examples which exemplify fundamental laws and principles.
- 3.5 Relating fundamental laws and principles to given physical situations.



4. Understand appropriate problem solving techniques and methodologies. Some ways students may be given the opportunity to express their understanding include:

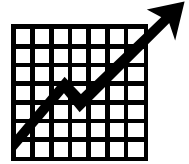
- 4.1 Outlining problem solving methodologies.
- 4.2 Recognizing appropriate uses of problem solving techniques.
- 4.3 Recognizing improper uses of problem solving techniques.
- 4.4 Explaining one's choice of problem solving methodologies.

5. Apply fundamental physical laws and principles. Some ways students may be given the opportunity to apply fundamental physical laws and principles include:

- 5.1 Distinguishing between appropriate and inappropriate applications of physical laws and principles.

- 5.2 Formulating solutions to problems based on appropriate laws and principles.
- 5.3 Solving problems that require the application of physical laws and principles.
- 5.4 Applying principles to new and different problem solving situations.
- 5.5 Demonstrating appropriate problem solving techniques.

6. **Interpret and draw motion graphs.** Some ways students may be given the opportunity to draw and interpret motion graphs include:



- 6.1 Drawing a graph of a particular motion of interest and determining its slope and y-intercept.
- 6.2 Describing the motion of an object in a given graphical representation.
- 6.3 Making interpretations based on a given graphical representation.
- 6.4 Selecting the graphical representation which best illustrates a given situation.

7. **Synthesize processes for obtaining a solution to a unique conceptual or numerical problem or situation.** Some ways students may be given the opportunity to synthesize processes include:

- 7.1 Using laws, principles, and concepts correctly and effectively.
- 7.2 Devising appropriate problem solving sequences leading to the solution of a unique problem.
- 7.3 Reorganizing given information into logical problem solving sequences.
- 7.4 Justifying the steps taken to solve a conceptual or quantitative problem.
- 7.5 Integrating various concepts learned into an effective problem solving strategy.

8. **Appreciate physics.** Some ways students will be given the opportunity to appreciate physics include:



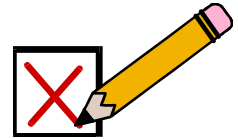
- 8.1 Exploring real-world applications of the concepts, laws, and principles discussed.
- 8.2 Being encouraged to make connections between physics and one's individual major.
- 8.3 Making comparisons between various ways of looking at a given physical phenomenon.
- 8.4 Experiencing hands-on applications of physics, particularly through laboratory activities.
- 8.5 Exploring how scientists build models through which various physical phenomena can be analyzed and understood.

ATTENDANCE POLICY:

Your presence is required at every class session and you are responsible for all material presented (i.e., discussion material, handouts, demonstrations, announcements, schedule changes, etc.). You must notify me in advance if you are going to be absent from class due to an illness, a university-related activity, or some other excusable activity. If you must be absent from a class session it is totally your responsibility to obtain the missed material. Further, if you must miss a class because of an extreme family or individual emergency or some other unavoidable circumstance, you should inform me as soon as possible (i.e. in advance of missing a class). A doctor's note is required if you are ill and will miss class on the day of an exam or quiz. In addition, if you are ill on the day of an exam or quiz you must notify me *via telephone* PRIOR to the start of class time. An email message (especially one sent shortly before class is to start) is NOT an appropriate means of notifying me in terms of missing an exam or quiz. Thus, if you know you will need to be absent from class on a

particular day you should let me know ahead of time so that proper arrangements can be made to make up any missed class work. **Only when proper arrangements have been made with me in advance will you be allowed to make up a missed assignment, in-class interactive exercise, quiz, exam, etc. Work-related activities do not constitute an excused absence.**

If you miss a class and do not inform me of the circumstances as indicated above, that absence will not be excused. Any work that is missed because of an unexcused absence (including unannounced quizzes and other in-class activities) will be given a zero grade. Attendance will be taken each class period. No points are deducted from your grade for an unexcused absence, however, the total number of unexcused absences will be noted in my grade book at the end of the semester. **Missing three or more class sessions (i.e., about 10% of the total number of class sessions) due to unexcused absences is considered excessive and may lead to the lowering of your overall course grade.** The number of unexcused absences an individual has will be one of the many items I will look at when recording final grades. This is particularly important for borderline situations. It is much easier to give a student with a perfect or nearly perfect attendance record the higher grade in a borderline situation.



GENERAL USES OF E-MAIL: I am happy to respond to e-mail. The most appropriate uses of e-mail include: asking a question, clarifying an assignment, sharing general class-related information, etc. Do not send me a “last minute” e-mail on the day of an exam or a quiz telling me you are unable to attend class. This will not be accepted and you will not be allowed to make up the missed exam or quiz. I do not check my e-mail around-the-clock and may not see your message until after an exam or a quiz has been given. To avoid potential miscommunication, always

phone me (in advance) or stop by my office if an unavoidable problem or situation arises in which you must be absent, especially on the day of a scheduled exam or quiz. **If you are using a hotmail, yahoo, aol, or other account rather than your AU account, then I ask that you be sure to go into your AU account and have your email forwarded to the account you are actually using.** Please be sure that you have your spam and junk filters properly formatted to ensure that you will receive email with an american.edu extension on it. I want to be sure that everyone in the class receives all of email announcements that I send out. This is very important. Please be sure to check your e-mail every day.

CELL PHONES AND PAGERS: Cell phones and pagers are wonderful pieces of technology (and which utilize many good physics concepts!), but they have no place in a college classroom. If you use a cell phone or pager, please be sure it is turned off before you come to class. Better yet, leave it at home!



BLACKBOARD: As a member of this class, you have been added to the Physics for the Modern World Blackboard site. I expect you to regularly check the site for updates and announcements. You will be able to access the site through my.american.edu using your AU username and password. One feature of Blackboard that I will make use of this semester is the online live chat. I hope to have a “floating time” each week that I can be online to chat with you and answer questions, etc. The “floating time” will help ensure that at least some of the times will work with your schedule. I will post the weekly chat time on the Announcements page in Blackboard and/or send you an e-mail announcement. I will try to do that by Sunday evening so that you can plan the chat time into your schedule for the coming week.

GRADING POLICY:

Each raw score you receive in this class will be standardized for a mean of 75 and a standard deviation of 15. The standard deviation is one measure of the variability of the scores. The procedure for standardization of scores is given below in the section entitled **Determination of Student Grades**. Please note that you are not competing with your classmates for grades. I standardize scores because it is an efficient and fair way of giving each exam, quiz, homework set, etc. an appropriate weighting. The procedure for standardizing scores is very straightforward and allows a grade distribution to be established based on actual class performance. **Your final grade for this course will be determined on the following basis:**

Hour Exams	300 points or approximately 33.3% of total points possible
Final Exam	150 points or approximately 16.6 % of total points possible
Quizzes	75 points or approximately 8.3 % of total points possible
Homework	175 points or approximately 19.4% of total points possible
Laboratory	200 points or approximately 22.2 % of total points possible
TOTAL POINTS	900 (Note: these are standardized points)

The distribution of course grades in a **typical semester** has been approximately: 20% A's, 45% B's, 30% C's, 5% D's. Classes that perform better than average may have distributions of grades that are higher, and classes that perform below average may have distributions of grades that are lower than typical ones.

DETERMINATION OF STUDENT GRADES:

On each class activity (exam, quiz, homework set, etc.) you will receive a raw score (RS) and a standard score (SS). The scores will be standardized for a class average (x_S) of 75 and a standard deviation (σ_S) of 15. The standard deviation is simply an indicator of how much above or below the class average a particular score is. If the raw score for a particular class activity has an average value of (x_R), and a standard deviation (σ_R), the corresponding standardized score can be determined in the following manner:

$$\text{Standard Score} = 75 + \frac{\text{Raw Score} - \text{Raw Average}}{\text{Raw Standard Deviation}} \times 15$$

The quantity:

$$\frac{\text{Raw Score} - \text{Raw Average}}{\text{Raw Standard Deviation}}$$

is called your evaluation ratio. If you have had some statistics, you might be more familiar with the term "z-score". Essentially this ratio indicates where you stand relative to the class average. Please note that standardizing scores does not change your class rank. Your individual scores will be displayed on a summary printout that I will keep posted outside my office. Feel free to stop by and take a look at it any time you like. You will be identified on the printout by the last five digits of your student ID number (unless you specifically request otherwise). I will run a new printout after each regular classroom exam. This way you will always have a good idea of how you are doing in the class. If you have any questions at all regarding the grading policy, please see me. I will be more than happy to answer any questions you might have. I always keep a current copy of the grade printout in my office as well.

Following each exam a frequency distribution of grades will be posted outside my office. I will indicate tentative grade cut-offs on the frequency distribution. The grade cut-offs will be marked as A, B, C, etc. You will easily be able to see the range of scores within each grade category. In terms of +/-

grades, you will be able to note by inspection whether your individual score is in the top third, middle third, or bottom third of the grade range. In addition to the composite grade printout posted outside my office, an **individualized grade profile sheet** will be made available to you after each exam. The first individualized grade profile sheet will be distributed during class following the first hour exam. After the first exam, you may stop by my office to receive an updated individualized grade profile sheet as often as you like.

EXAMPLE: The following is an example of 20 students' scores (raw and standardized) on a particular exam:

Student	Raw Score	Student	Raw Score
1	65	11	71
2	93	12	86
3	41	13	62
4	72	14	79
5	60	15	74
6	89	16	55
7	97	17	67
8	59	18	40
9	78	19	92
10	63	20	80

Raw Class Average (\bar{x}_R) = 71.1

Raw Class Standard Deviation (σ_R) = 16.1

From this information, the above formula can be used to obtain the individual students' standard scores. The results (rounded to the nearest whole number) using the above information are as follows:

Student	Standard Score	Student	Standard Score
1	69	11	75
2	95	12	89
3	47	13	67
4	76	14	82
5	65	15	78
6	92	16	60
7	99	17	71
8	64	18	46
9	81	19	94
10	67	20	83

ABOUT THE EXAMS:

There will be three 75-minute exams and one comprehensive final exam. All students will take the final exam. The exams will focus on conceptual as well as problem-based questions. An equation and review sheet will be given at least one class period prior to each exam. I do not require that you memorize equations, rather I want to see that you know how to select and apply appropriate relationships to given physical situations. Always be sure to clearly identify your methods and techniques as you solve numerical problems. You should also provide written explanations as necessary. I will not give credit for answers alone without proper justification. I often give partial credit when sufficient work is presented in a solution. **Also note that no dictionaries of any kind are allowed during exams and quizzes.** Traditional calculators are allowed during exams.



Any device such as a cell phone that has calculator capabilities will not be allowed. It is recommended that you carry a calculator with you to class each period. If you arrive for an exam without a calculator, you may find yourself in a situation in which you will need to perform calculations the "old fashioned" way.

ABOUT THE QUIZZES:

We will have three regularly scheduled quizzes throughout the semester. You may be given an occasional unannounced or take-home quiz as well. You will be allowed to drop your lowest quiz score at the end of the semester. If you miss class on the day a quiz (or exam) is given due to an excused absence, and you have notified me in advance, you will be allowed to make up that quiz (or exam). However, if you miss class due to an unexcused absence on the day a quiz (or exam) is given then you will receive a zero grade for that quiz (or exam). I must be notified PRIOR to your absence in order for you to be allowed to make up a quiz (or exam).



Note: All quizzes are given at the beginning of the class session. You will be given approximately 15 minutes to take a quiz. If you are late for class, you will forfeit work time - all quizzes are collected at the same time. Furthermore, if you are substantially late, you will forfeit the opportunity to take the quiz and you will receive a zero grade for it. Once a quiz has been distributed, the classroom door will be closed. No one will be allowed to enter the classroom until after the quiz has been collected.

ABOUT THE HOMEWORK:

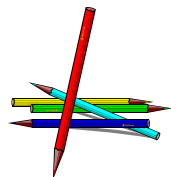
All homework assignments will be collected and graded. Homework sets will typically consist of **Review Questions (RQ)**, **One-Step Calculations (OSC)**, **Exercises (E)**, and **Problems (P)** from your text. The Review Questions and Exercises are highly conceptual and will give you a chance to express your understanding of the concepts in written form. The Exercises are somewhat more challenging and often require you to apply one or more concepts simultaneously. The Problems allow you to express your understanding through the use of some numerical computations. In addition to the problems found in your text, you will also find **Supplemental Problems (SP)** posted in the Assignment section of Blackboard. The SP are to be completed (in pencil) and turned in along with the assignment from the textbook for each chapter. Your homework assignment sheet listing the question assignment from the text is included along with the class schedule on a separate handout. There you will also find additional information as to what my expectations are regarding your homework assignments.

Homework is due at the beginning of class on the designated dates. Once a homework set is graded and returned to you, the solutions will be kept in a notebook in my office. I do not allow photocopies of these solutions to be made but you are welcome to come by my office and view them for as long as you like. No credit will be given for homework turned in after an assignment has been graded and returned to the class. However, homework turned in after the designated collection time and before it is returned to the class will receive 1/2 credit.



Some occasional in-class exercises may be included as part of your homework activities. Many times these will take the form of what I term "Classroom Assessment Techniques" (CATs). You will receive a certain amount of homework credit each time you complete one of these exercises. My intent in giving you these exercises is to allow you to discover any shaky logic you might have on a given topic before a major exam or quiz. This will allow you to make adjustments and/or come in and see me for help as necessary.

You are encouraged to work together on the homework assignments, but it is assumed that the work you turn in is your own. Written solutions and explanations that are identical to a classmate's solutions and explanations give rise to the need for me to question the integrity of your work. **When you write your name on the top of each assignment, that is your written assurance to me that the work you have submitted is completely your own.**



I do look carefully at all homework assignments before I return them to you. I will have an assistant to help me grade most of the homework assignments. I will grade all other activities and assignments myself. My assistant will simply score your paper. If you find written comments on your paper they will have come from me. I will always use a different colored ink pen than that used to score your paper, so you will be able to easily spot my comments and feedback. If you ever have a question regarding the scoring of your paper, please bring it to my attention immediately following class.

ABOUT THE LABORATORY:

The laboratory is intended to be a learning experience for you. It has been designed to give you an opportunity to gain some hands-on experience with different types of laboratory equipment. Sometimes the laboratory exercises will be exploratory in nature. You may also be asked to complete some type of pre- or post- lab activity for selected laboratory experiments.



You will perform approximately 12 laboratory activities over the course of the semester. Each activity will require a written laboratory report. Guidelines are presented in the introductory portion of your laboratory manual for the written report. In addition, you will find more information on the laboratory requirements in the policy found in the front pages of the lab manual. A revised copy of this policy will be distributed at the beginning of the semester. Please read over the introductory material in the lab manual before attending your first lab session. Labs will begin during the second week of class.

The laboratory activities are not intended to “make or break” your grade. Do not rely solely on your lab score to drastically change your class grade. Your individual lab scores will be determined by your laboratory instructor, with guidance from me. I will then incorporate these scores into my grade program. **Attendance in lab is important. Being on time is important. Coming in late to lab will not be tolerated. Except in extremely rare circumstances, lab make-ups will not be allowed.**

As with the homework assignments, you are encouraged to work together on the laboratory activities. However, you must turn in laboratory reports that are independently written. It is assumed that the only shared information between your lab partner and yourself is the data that you collect. All other portions of the lab report must be written on your own. If you work with another person, that is perfectly fine. However, just be sure that each of you turn in independently written abstracts, independently performed sample calculations, etc. If two reports are turned in with identical abstracts, calculations, question solutions, etc., they will be given an automatic zero grade. For additional information regarding the laboratory portion of the course, please refer to the lab policy posted on Blackboard as well as in the introductory portion of your lab manual.

USE OF COMPUTERS IN THE CLASSROOM:

Physics is not the type of course that lends itself easily to the use of computers in the classroom. You will make extensive use of computers in the laboratory and those will be provided for your use. However, within the classroom environment, the use of computers can be very distracting for those

around you. If you have a circumstance in which you need to bring a computer into the classroom, then you must get that approved by me (in advance). In addition, you will need to sign a contract with me regarding the appropriate use of computers in the classroom. The bottom line is that I prefer that computers not be brought into the classroom at all and will handle individual situations on a case-by-case basis. Thank you for your understanding and cooperation.

ACADEMIC INTEGRITY:

The university's academic integrity policy is expressed in the Academic Integrity Code and in the Student Handbook which illustrates the procedure to be used in case of violations to the code. This procedure will be strictly adhered to in this course. Any situations involving academic dishonesty will be reported to the Dean of the College of Arts and Sciences. The Academic Integrity Code can be found on-line at: <http://www.american.edu/academics/integrity/index.htm>.

ACADEMIC SUPPORT SERVICES AVAILABLE ON CAMPUS:

If you experience difficulty in this course for any reason, please don't hesitate to consult with me. In addition to the resources of the department, a wide range of services are available to support in your efforts to meet the course requirements. These services include:

Learning Services (x3360) offers study skills workshops, individual instruction, tutor referrals, and services for students with learning differences.

Psychological Services (x3360) offers counseling and consultations regarding personal concerns, self-help information, and connections to off-campus mental health resources.

Disability Support Services (x3315) offers technical and practical support and assistance with accommodations for students with physical or psychological disabilities.

OFFICE HOURS:

Monday: 2:00 – 4:00 PM
Tuesday: 2:00 – 4:00 PM
Wednesday: By appointment
Thursday: 10:00 – 11:00 AM
 2:00 – 3:00 PM
Friday: By appointment



Please feel free to stop in for help during my regularly scheduled office hours. If these times do not work for you, I am happy to set aside an alternate time to meet with you. Feel free to call or email me to set up an appointment. You are always welcome to call me at home as well. You may also feel free to simply “drop in.” If you happen to drop by and find that I'm busy working with someone else, feel free to interrupt and schedule a time to stop back and see me. Don't ever feel embarrassed or afraid to ask for help. Working with you is one of the



most enjoyable aspects of my job. I truly look forward to working with and getting to know you this term.

LET'S HAVE A GREAT SEMESTER!!