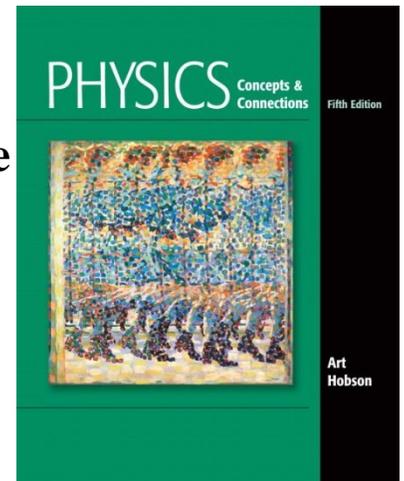


# Syllabus for PHYS 0081

## Light & Matter, Space & Time

### Fall 2017



## Course Information

CRN 24165  
Location 104 Thaw Hall  
Lecture Tuesday and Thursday 11:00am – 12:15pm  
Text *Physics Concepts and Connections, 5<sup>th</sup> Edition* by Hobson  
Prerequisites Any MATH course greater than or equal to 0031 (minimum grade of C).  
General Studies Requirements – This course will fulfill one of the Natural Sciences requirements

Instructor Russell J. Clark, Ph.D.  
Phone 412-624-9204  
email [ruc2@pitt.edu](mailto:ruc2@pitt.edu)  
Office OEH 404  
Office hours Monday: 7:00am – 8:00am  
Tuesday: 2:00pm – 3:00pm  
Wednesday: 3:00pm – 4:00pm  
Thursday: 3:00pm – 4:00pm  
Friday: 7:00am – 8:00am  
Other times by appointment: <http://tinyurl.com/Russell-Clark-Appointments>

## Text and Materials

The textbook for this course is *Physics Concepts and Connections, 5<sup>th</sup> Edition* by Hobson (Addison-Wesley) and is available in the university book stores. In addition, you will need a scientific calculator with trigonometric, logarithmic and exponential functions.

## Course Description and Objectives

**Course Description:** This course will introduce you to the physics of the 20<sup>th</sup> century by looking at very small scales and very large scales. In order to do this it will be necessary to learn about physics prior to the 20<sup>th</sup> century, so you will also be introduced to the “classical” physics of mechanics, thermodynamics, oscillations and electromagnetism. However, the majority of the course will focus on more contemporary topics like Special and General Relativity, astrophysics, cosmology, quantum theory and other topics.

Warning, this course may contain trace amounts of math. If you think of math as a language, then it turns out to be the best language for describing the concepts in physics. Teaching physics, even a very non-technical course like this, without using math would be like teaching French poetry without using any French words. MATH 0031 (Algebra) is the minimum requirement for this course, and we won’t go beyond that.

**Objectives:** A student successfully completing this course will be able to:

- 1) Describe what physics is, what natural phenomena are explained by the science of physics, and what physicists study.
- 2) Describe current topics in particle physics and cosmology and the experimental devices used to study them.

- 3) Identify the basic physical laws of nature.
- 4) Explain where scientific knowledge comes from.
- 5) Describe Newton's laws of motion and gravity.
- 6) Outline the atomic theory of matter.
- 7) Describe the nature of energy and the laws of thermodynamics.
- 8) Describe the nature of light, electricity and magnetism.
- 9) Outline Relativity and quantum theory.
- 10) Explain the structure of matter based on fundamental building blocks.
- 11) Apply the fundamental laws and principles of physics to simple problems.

## Course Schedule

Important Dates	
Thursday, September 28 <sup>th</sup>	<b>Exam 1</b>
Tuesday, October 10 <sup>th</sup>	<b>Fall Break, No Class</b>
Tuesday, November 7 <sup>th</sup>	<b>Exam 2</b>
Thursday, November 23 <sup>rd</sup>	<b>Thanksgiving Break, No Class</b>
Thursday, December 7 <sup>th</sup>	<b>Exam 3</b>

Chapters Covered	General Topics
1 & 2	<b>Astronomy and Atoms</b>
3 & 4	<b>The Physics of Galileo and Newton</b>
5 & 6	<b>Gravity and Energy</b>
7	<b>Thermodynamics</b>
8	<b>Electromagnetism</b>
9	<b>Waves and Light</b>
10	<b>Special Relativity</b>
12 & 13	<b>Quantum Theory</b>
14 & 15	<b>Nuclear Physics</b>
17	<b>Particle Physics</b>
11	<b>General Relativity and Cosmology</b>

## Course Grades

Your grade in this course will be based on questions asked in the lecture (course participation), the homework assignments, and exams. The maximum number of points for each is listed below:

Lecture Questions	50 points
Homework	100 points
Exam 1	100 points
Exam 2	100 points
Exam 3	100 points
	450 points

The maximum number of points for the semester is 450. Letter grades will be assigned according to the table below. The number of points listed is the minimum number of points required to achieve that letter

grade. For example, a student with 382 points would receive a B for the course because this is greater than 375 and lower than 390.

Grade	Points	Grade	Points
A+	435	C+	345
A	420	C	330
A-	405	C-	315
B+	390	D+	300
B	375	D	285
B-	360	D-	270

**Lecture Questions:** The lecture hall is equipped with hand-held radio transmitters, called clickers, used by the students to answer multiple choice questions. At the beginning of the semester you will be assigned a number that corresponds to a particular clicker and you will use that same clicker throughout the semester. The clickers will be stored in bins on carts at the front of the room so that you may pick up your clicker as you enter the hall and then place it back there as you leave. **Do not take your clicker out of the classroom!** The clickers in the lecture hall will not work with other SPS systems on campus.

Please observe the following rules for the clickers:

1. Memorize your clicker number and where it is located on the cart.
2. Pick up your clicker as you enter the classroom.
3. If your clicker is missing, check nearby bins as it may have been misplaced. If you still cannot find it then record this on the clicker sheet.
4. **Do not pick up a clicker that is not assigned to you or use more than one clicker (such as when a friend is absent).**
5. Answer the multiple choice questions by pushing the appropriate key on your clicker.
6. Record any sort of technical issue with your clicker (such as a dead battery, error light, etc.) on the clicker sheet at the end of class.
7. **Place the clicker back in the proper bin at the end of lecture.**

During the lectures the instructor may pose multiple choice questions. You will be given some time to think about each question and discuss it with your neighbors. During this time the SRS receiver will pick up all of the responses and tally the results. The questions are intended to motivate discussion with your peers and to provide the instructor with feed-back on how well you understand the material. You will receive full credit (100%) for each correct answer, 80% for each incorrect answer, and 0% for no response.

**Exams:** There will be three midterm exams (see the schedule for the dates). Each exam will be multiple choice and will be worth 100 points.

**Homework:** A short homework assignment will be given each week, due the following week. We will use the LON-CAPA online homework system:

<http://homework.phyast.pitt.edu/>

Your username for this system is the same as your Pitt email account, but your initial password will be your PeopleSoft number which is available through [my.pitt.edu](http://my.pitt.edu). If you have used LON-CAPA in a previous course, then your password is the same as it was before. If you have any trouble logging into the system then

click “Forgot Password?” on the login screen and follow the instructions there. Please contact Dr. Clark if you have any questions about using the system.

## **Where to Get Help**

If you have any questions about the homework problems or anything else then contact Dr. Clark. In addition, the Department of Physics and Astronomy provides free assistance for all students. The **Physics Help Room** is staffed with graduate students who can answer homework related questions, explain basic concepts and help you with the math. This is a free service and you are encouraged to use it. The Physics Help Room is located in Thaw 312 ([http://www.physicsandastronomy.pitt.edu/resource\\_room](http://www.physicsandastronomy.pitt.edu/resource_room)).

## **Courseweb**

The University of Pittsburgh provides an online portal for classes called Courseweb. Here you will find relevant course material such as a copy of the syllabus, sample exams, etc. You may also view your grades online through this site.

<http://courseweb.pitt.edu>

## **Academic Integrity**

All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity (<http://www.provost.pitt.edu/info/acguidelinespdf.pdf>). This may include, but is not limited to the confiscation of the examination of any individual suspected of violating the University Policy.

## **Disability Services**

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 216 William Pitt Union, (412) 648-7890/(412) 383-7355 (ITY), as early as possible in the term, DRS will verify your disability and determine reasonable accommodations for this course.

## **Statement on Classroom Recording**

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student’s own private use.