Physics 0081 - Fall 2016
Light & Matter, Space & Time

Professor: James A Mueller

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Office hours: M 2-4, or by appointment.

Textbook: Hobson **Physics Concepts and Connections,** 5^{th} **ed.**, Addison-Wesley (2010).
LONCAPA: Homework will be assigned online. To access the homework, you need to go to the following web site:
http://homework.phyast.pitt.edu
A page describing how to use the site is available at
http://fafnir.phyast.pitt.edu/LON/loncapa.msu.edu/student/getting_started.html
(This may be out of date.)

Exams: Three in class exams will be given during the term.

- Thursday September 29.
- Thursday November 3.
- Thursday December 8.

If you can't be at an exam, let me know as soon as possible. An unexcused absence will result in failure for the exam.
Grading: The course grade will be assigned based on the homework+class participation (15 points) and the three in-class exams (30 points each). Grades will be assigned as

A 90-105 points

B 75-90 points

C 60-75 points

D 45-60 points

Description of Course: This course attempts to introduce you to the physics of the very small (particle physics) and the very large (Astrophysics). We will try to emphasize the connections between the two. As preparation for this, we will cover some other parts of physics to provide a basis for our later discussions. Over the first 1.5 months, we will rapidly cover the classical physics. We will then spend the rest of the time on more esoteric topics. In all this I want you to remember the prime directive of physicists in their classes.

Don't Memorize, Understand.

I will try to give you insight into the scientific method. I will try to do demonstrations in class to elucidate certain points. Physics is an experimental science, or as Tony Rothman said,

"One good experiment is worth a century of bad philosophy."

Warning: We will use some basic math in this course. I will try to keep this simple, but one cannot avoid it entirely. To quote Rothman again: "...although students often approach teachers ... with the tearful plea that they are interested in 'concepts', not math, to the physicist the distinction is not obvious. ...the natural language of physics is mathematics and many of the laws cannot be expressed precisely in English, or even Sanskrit."

Course Objectives: Students successfully completing this course will be able to

- describe what physics is, what natural phenomena are explained by the science of physics, and what physicists study.
- Describe current topics in Particle Physics and Cosmology and the experimental devices used to study them.
- identify the basic physical laws of nature.
- explain where scientific knowledge comes from.
- describe Newtons's laws of motion and gravity.
- outline the atomic theory of matter.
- describe the nature of energy and the laws of thermodynamics.
- describe the nature of light, electricity, and magnetism.
- outline relativity and quantum theory.
- explain the structure of matter based on fundamental building blocks.
- apply the fundamental laws and principles of physics to simple problems.

Tentative Calender of lectures

Date	Topic(s)	Readings
Week 1	Introduction: Stars and Atoms	Ch 1-2
Week 2	How and Why things move	Ch 3-4
Week 3	Gravity and Energy	Ch 5-6
Week 4	Energy and Thermodynamics	Ch 6-7
Week 5	ElectroMagnetism + Review + First Exam	Ch 8
Week 6	Electromagnetism and waves	Ch 8-9
Week 7	Special Relativity	Ch 10
Oct 18	NO CLASS	
Week 8	Quantum	Ch 12
Week 9	Quantum	Ch 13
Week 10	Quantum + Review + Second Exam	
Week 11	Nuclear Physics	Ch 14-15
Week 12	Particle Physics	Ch 17
Week 13	Particle Physics &Thanksgiving	
Week 14	Particle Physics and General Relativity	Ch 11
Week 15	Cosmology + Review + Third Exam	

Course Policies:

- Academic Integrity:

  Students in this course will be expected to comply with University of Pittsburgh's Policy on Academic Integrity. 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. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

- Disabilities:

  If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and the Disability Resources and Services no later than the 2nd week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call 648-7890 (Voice or TTD) to schedule an appointment. The Office is located in 216 William Pitt Union.

- 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 students own private use.