Physics 106: The Physics of Light

Time: MWF 2:00-2:50 pm
Dates: 23 Jan – 8 May 2013
Room: Phys 1410
Lecturer: Dr. Alan Peel
Office Hours: F 11-1 pm, or by appt.
Grader: TBD
Phone/Email: (301) 405-6647, apeel@umd.edu
Mailbox: CSS 1204 (9 am - 4 pm)
Textbook: *The Physics of Light* by David Falk, Dieter Brill and David Stork;
Wiley 1986, New York (ISBN 0-471-60385-6)
Other Required Supplies: TurningPoint ResponseCard (RF-LCD) (Clicker) or equivalent mobile app
Course Website: www.astro.umd.edu/~peel/PHYS106/, and also ELMS elms.umd.edu

Course Description

This course is intended primarily for students who are **not** majoring in the physical sciences but who need to fulfill a CORE Distributive Studies Requirement in Mathematics and Sciences*, and who have a curious mind. The course will provide a general scientific foundation to try to answer fundamental questions about light, such as:

- What is the nature of light?
- What are the properties of light which we can quantify/measure?
- How do glasses work? Telescopes? Microscopes?
- How do cameras work? How do my eyes work?
- What is color? What makes a rainbow?
- What does light have in common with microwaves and X-rays?
- What is ultraviolet light? What is the speed of light? Why do I care?
- What is a laser? Can you really hurt someone with a laser?
- How do holograms work?

For you to answer these questions, we will approach the nature of light as scientists would and develop a language to describe and measure the various qualities and behavior of light. Some of this jargon will be familiar, but bear in mind that we have to be precise about our definitions.

We will use a small amount of mathematics (algebra, logarithms) in this course and a lot of physical reasoning. A picture is worth a thousand mathematical explanations. Your challenge is to master the information presented in a comprehensive manner, **not** to memorize and regurgitate what I said in lecture! Since you are taking a CORE class to fulfill a science requirement of one sort or another, I may also spend one lecture (date TBD) on the nature of science.

***PLEASE NOTE!** This course (Physics 106) only fulfills the CORE Physical Science Lab (PL) Course requirement if taken **concurrently** with the laboratory section, Physics 107. Regardless of why you are taking the lecture, it is strongly recommended that you concurrently take the laboratory section. There is no substitute for "messing around" yourself with equipment to help cement comprehension of the material! This course DOES NOT fulfill the (PS) CORE requirement, nor apparently does it fulfill the General Education Natural Science (NS) distributive studies requirement.

Grading

You are STRONGLY encouraged to keep track of your grades using ELMS website as each homework and test gets graded. I grade on a point scale with different weights weighted as shown in this table:

ASSIGNMENT	Homework (5)	Tests (4)	Final Exam	Class Participation	Total
POINTS	300	400	200	100	1000

Letter grades will be assigned based upon your cumulative score, and I do not curve lightly. Having taught various classes for over five years (some multiple times), I have found these grading guidelines below to be about right. I reserve the right to adjust the following based on class averages. However, any adjustment will make it easier to get a given grade, never more difficult. Here is a **rough** guide as to how your points relate to your final grade:

Course Total	900-1000	800-899	680-799	550-679	0-549
Percentage	90%-100%	80%-89.9%	68%-79.9%	55%-67.9%	0%-54.9%
Letter Grade	A	B	C	D	F

As you can see, missing 100 points of the class participation can drop your grade a whole letter. So **DON'T SKIP THE LECTURES!** Let me know in person or by email as soon as possible if you are planning on missing lectures due to a religious holiday. Letting me know after the holiday will not work.

The point scale makes it possible for everyone in the class to do well. For example, if everyone scores above 80% in the course, you would all receive either a B or better letter grade. Unlikely as it may be, the entire class could potentially get A's. I **will** be using +/- modifiers for the final grade. Past experience has shown that my assignments and tests are pitched about right, to where the average total score in the class is in the 80% range of points, the B/B- range.

Class Participation

(*or* "Why did you have me buy this silly clicker?")

The text is "required" as well as a Turning Technologies response device (either the new RF LCD clickers which I recommend, or the old RF clicker; the XR also works but is horribly user unfriendly). This class has on the order of 100 students. It is a sure thing that many of you will have different perspectives on the material, sometimes incorrect ones. I use the clickers nearly daily; your responses give me immediate insight into how well the material is understood and by how many students. This informs my lecture on the spot, allowing me to go over difficult material sufficiently and to move on only when I deem that comprehension has become universal. You WILL NOT BE graded on your clicker responses, only docked points if you fail to respond.

Within a few weeks, I will actually know many of your names and faces (and even occasionally both at the same time!). In order for you to succeed in this course, I expect you to try to attend all lectures. This is very important! The homework assignments, tests and final are based upon the material covered in the lectures and text. The very few people that have ever earned bad grades from me had (not coincidentally) also had terrible attendance. The lectures are punctuated with in-class exercises and discussions with your neighbors which most students find very helpful in reaching comprehension of the material. That said, the official University policy on how to deal with absences is here.

If you do have to miss a lecture be sure to look at another student's notes and make sure that you understand what was covered or come to office hours. Essentially, you should assume that **EVERY LECTURE** during the semester will include a variety of group discussion questions and clicker questions and while your responses don't have to be initially correct, you often have to answer them using your clicker. Within the first few weeks only, you may let me know that you are there after class

to avoid losing participation points.

This participatory aspect of the lecture will be worth points, and part of the 10% of your overall grade (see above table). With that said, please see me (in advance whenever possible) if you plan on missing lecture(s) for any reasons, including religious holidays so that your grade will not suffer.

The first bit of participation grade involves:

1. finish reading this syllabus page, either here online or the "printer friendly" pdf file linked in the header;
2. going online to the ELMS site for this class and electronically "signing" that you've read the syllabus in "Participation #1";
3. and dropping by my office to check your name off a list. (Then I know that you know where my office is!)

NOTE: Failure to sign the syllabus acknowledgement or drop by my office to check your name off means you will lose EASY points off of your participation grade!

Tests and the Final Exam

A single midterm is a travesty of assessment; multiple quizzes would serve both you and me better. However, for time considerations there will be only four tests (call them midterms if you must, but only one is in the middle of the term). These are closed book with no notes and no calculators allowed (nor, as you'll discover, are they necessary). You'll be given the entire lecture time to take the test.

Each test will consist of short answer questions (true/false, multiple choice, short definition) and a few longer questions. These tests are incremental (i.e., non-cumulative) checkups on how well you have learned the material up to the lectures prior to the related homework. The Lecture Schedule (periodically check for updates!) shows what material will be covered on each test. If, for whatever reason, the University is **officially** closed on the test date, the test date shifts to the next lecture date.

The final exam is cumulative, i.e., it will cover *all* material discussed in this course. The final will include a mixture of short answer, long answer, and problem solving questions. This exam is also closed book with no notes and no calculators allowed.

PLEASE NOTE that many of the questions on the tests and final exam will NOT be exactly the same as homework questions but will challenge your comprehension of the material.

DSS students, see **§ Disability Accommodation** below.

Missed Test Policy

If you are not able to take a test due to a VALID EXCUSE as outlined in the Academic Information section of the schedule of classes and you wish to take a full credit make-up test (which may be considerably harder than the original test and, for example, may consist only of essay questions), you must:

1. contact me by email or phone **before** you miss the regularly scheduled test if physically possible **and**
2. submit a valid written excuse for your absence **within one week** after the regularly-scheduled test (by US Postal mail if necessary!).

There is rarely an excuse for not being able to at least call me and leave a message. For the record, the official University policy on how to deal with absences is here.

Homework Assignments

There are a total of five (content-related) homeworks in this course. Homework #1 will be online on the ELMS site by the evening of the first day of class. If you have trouble with the first homework, consider it an ominous sign and consult with me as soon as possible! Future homeworks will be also become available on ELMS as the term progresses.

Although you are HEAVILY encouraged to discuss the homework problems with your friends, the final writeup **must be in your own words**. Copying from a friend's homework, copying from a book without citing, or allowing a friend to copy your homework is academic dishonesty and will not be tolerated in this class, and you may receive an "XF" on your transcript. If you consult a reference other than the course text, **including websites**, please acknowledge or cite it in your homework! (See **§ Academic Integrity** below.)

Deadline. You must turn in a **paper** copy of your homework on the duedate at the beginning of class **sharp**. The duedates are listed on the Lecture Schedule.

DO NOT email me your homework under any circumstances. There is no way to turn in late homework; that is what is meant by a "deadline."

Neatness counts. Sloppy handwriting, incomplete reasoning and ragged paper edges are subject to point penalties. Homework which is not stapled properly is subject to a penalty. This isn't high school and we should not be responsible for loose sheets.

Every effort will be made to get your graded homework back to you quickly. However, sometimes the homework closest to a test will not quite get back to you quickly enough to be very useful. Solutions will be posted right after the deadline, and as always I urge you to use the "Discussions" feature on ELMS.

Extra Credit?

There will be no extra credit.

Labs

The lab is a useful course to take concurrently (especially since you might not get general education "NS" credit without taking them concurrently!). Please be aware that registration for the lab is separate from registration for the lecture! Please consult the Physics department and/or your academic advisor directly for more details.

I am not in charge of the labs, and your grade in the lecture is technically separate from the lab grade. But, there are some questions I always get asked, so here are the answers as best as I understand them. Your results may vary and you should consult your lab TA for details.

FAQs

1. **When does the first lab meet?**
   Generally, during the first full week of the semester.

2. **What if I miss a lab?**
   There is a makeup lab week near the end of the semester.
3. **Do the labs cover the same material as the lectures?**
   Yes, but not necessarily at the same time. This is not as annoying as it sounds.
4. **Can I take this course without the lab?**
   Sure, but it really depends on why you are taking the course. Plus, labs can aid in understanding the material.

Course Expectations (and Suggestions!)

Show up! You are expected to try to attend all lectures, and your grade depends (weakly and weekly) on participation.

Pure "lecturing" doesn't actually work that well. The advantages of attending lecture are to interact with students and ask questions: i.e., to be an active participant in your learning, not a passive, "empty vessel" awaiting the brilliant words of the professor to fill your head with knowledge. (Believe me, you'll be waiting a long time if you think that's the case.)

However (and this is where my contribution is priceless), attending lecture will help you gain important clues and caveats, especially if you don't understand the text. If you do understand everything, you'll have opportunities to share your unique perspective during lecture, so either way, be there! (See **§ Class Participation** above for more details.)

While many students bring laptops to take notes, it is extremely rude to surf on irrelevant websites during lecture as it can distract those around you. So, don't do it. **I will deduct participation points for those who cannot abide by this simple rule.**

Preparation: I expect you to be prepared to work. You will get more out of the participation during lecture if you preview the reading assignment (listed in the Lecture Schedule and updated during the semester). You'll also be more aware of what you don't understand and can come to class with useful questions. A more careful second reading is recommended after lecture. It is also good to peruse your class notes sometime before the next lecture to make sure that everything is clear. I STRONGLY encourage you to ask questions in class, during office hours, and on the ELMS Discussions for our class. The only dumb question is "Why didn't I ask in class when I had the chance?"

Study Habits: PLEASE ask for help if you need it. If you rely on cramming the night before any test, you are not likely to do well. It is better (and easier) if you keep up with the material on a nearly daily basis. Make it a point to read the chapters in pace with (or even ahead of) the lectures; this is one of the best study habits you can have. If you have questions, please see me in office hours and/or post them on the ELMS Discussions. I troll it frequently to make sure people aren't left hanging endlessly waiting for insight. BUT DO NOT WAIT until the day before an test!

Discussions! Sometimes the best way to understand something (or check that your understanding is correct!) is to try to explain it to someone else. I encourage collaboration (but not plagiarism!) and discussion inside and outside class and online on the ELMS Discussions. I generally "troll" those boards to make sure questions are getting answered, so unless it's to remind me that I haven't trolled in a while, please avoid the temptation to email me directly: if you have a question, chances are a large number of other students have the same question and answering it in the ELMS Discussions is more efficient.

Other Classroom rules: No newspapers, mp3 players, etc. And *please* turn off all cell phones or risk

ridicule by me. In short, show respect to your lecturer (me), your neighbors and yourself.

Disability Accommodation

Students with a documented disability who require academic accommodations should contact me as soon as possible. If you suspect you might require such in this class or any, please feel free to discuss this with me during office hours, or head straight to the Disability Service Support office for more information.

Academic Integrity

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the definitions and consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu/ or go straight to the source.

Copyright Issues and Your Notes

Selling or distributing copies or modified copies of instructors' course materials or assisting another person or entity in selling or distributing those materials should be considered a violation of the University Code of Student Conduct, Part 9(k). In general, only some of the overhead presentations shown in class will be available on the web. They won't necessarily make a lot of sense by themselves, however, so don't use them in lieu of coming to class! (Besides, then you'd be missing out on easy points - see **§ Class Participation**.) Students may always request a reviewing of them during office hours on a face to face basis.

Course Evaluations

CourseEvalUM will be open for students to complete their evaluations later in the semester. Students can go directly to the website to complete their evaluations. You will be alerted when the evaluation sites are ready closer to that time via your official University e-mail account.

Students who complete evaluations for all of their courses in the previous semester (excluding summer), can access the posted results via Testudo's CourseEvalUM Reporting link for any course on campus that has at least a 70% response rate. You can find more information, including periodic updates, at the IRPA course evaluation website.

The expectation is that all students will complete these. This is YOUR chance to anonymously evaluate this class: please use this opportunity! I have altered courses before based on constructive criticism from students.

Last Modified: January 2013 ***subject to change***