



Course Syllabus

# Physics 106 Light, Perception, Photography, and Visual Phenomena

**PHYS 106**  
Spring 2019

## Learning Outcomes

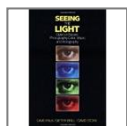
This is a survey course on the nature of light and vision, and its applications. No mathematical skills are assumed beyond simple algebra and some knowledge of simple trigonometry and its functions.

After successfully completing this course you will be able to:

- Describe the properties common to electromagnetic waves, and compare the behavior of visible light to that of other classes of electromagnetic radiation (microwaves, x-rays).
- Apply the principles of geometrical (and physical) optics to illustrate the images and shadows created by a variety of optical instruments and by atmospheric phenomena (rainbows, mirages).
- Explain how biological systems (the eye and brain), as well as modern instruments (cameras, televisions), process visual information.
- Discuss the principles of interference of light with itself as well as what is meant by polarization of light.
- Discuss the nature of color, and the environmental and biological factors affecting how it is perceived and reproduced.

## Required Resources

Course website: [www.elms.umd.edu](http://www.elms.umd.edu)



Seeing the Light: Optics in Nature, Photography, Color, Vision, and Holography

David R. Falk, Dieter R. Brill, David G. Stork

The first edition (1986).

ISBN #978-0-471-60385-6

will be available for free download from the ELMS course site

The second edition may be available later in the semester

**Prof. Andris Skuja**

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### Class Meets

Mondays, Wednesdays & Fridays

2:00-2:50pm

1410 Toll Physics Building

### Office Hours

PSC 3103

Mon 3:30pm

and by appointment

### Grader

Logan Wood

[lwood124@umd.edu](mailto:lwood124@umd.edu)

### Prerequisites

N/A

### Course Communication

Time-sensitive

information regarding the course will be sent via an ELMS announcement. To discuss questions, appointments, absences, or accommodations, please contact me through ELMS.

## Campus Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit [www.ugst.umd.edu/courserelatedpolicies.html](http://www.ugst.umd.edu/courserelatedpolicies.html) for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

## Activities, Learning Assessments, & Expectations for Students

- During class, I will present the course material through slides, demonstrations and examples. The lectures, demonstrations, and discussions are all tools to demonstrate the material and help you learn. Because the book is out of date in some areas, I will be supplementing it with more modern examples and information. Material covered in lecture, but not in the book, may appear on exams, but the lectures will be posted after given.
- Students are strongly encouraged to read the relevant text prior to class and be prepared to participate and ask questions.
- You will be assessed based on homework, quizzes, clickers and exams.
  - **Quizzes** will be taken on ELMS and are not timed. They are designed to motivate you to keep up with the reading and other course content. These will be a valuable diagnostic, as they are automatically graded and give instant feedback.
  - **Homework** will be assigned weekly. There is no better way to learn than through practice! The assignments will be posted on our ELMS website, and homework will also be submitted through ELMS. If you write your homework out by hand, you may submit a good quality cell phone image of your work. *Make sure the grader can read it!*
  - There will be **three midterm exams and a final exam**. They will be closed book, but necessary constants and formulae will be provided. A limited number of calculators will also be made available, if necessary.
  - I will drop your lowest quiz score, your lowest homework score, three of your missed clicker days, and your lowest midterm exam score.
  - No late submissions will be accepted, and no makeups will be given for unexcused absences.
  - If you know in advance that you will have an excused absence (i.e. a religious holiday), please notify me at least two weeks in advance to make arrangements to make up the work.

## Course-Specific Policies

**Use of computers, phones or tablets is strongly discouraged during our class meetings.** I understand and have considered arguments for permitting laptop and tablet computers in the classroom. However, researchers have found that these distractions do in fact interfere with learning and active participation see: <http://youtu.be/WwPaw3Fx5Hk>. (Yes really, watch this video). For that reason, I ask that you do not use computers, tablets, and/or phones during class meetings (except as a clicker or when required for DSS accommodations).

## Get Some Help!

You are expected to take personal responsibility for your own learning. This includes acknowledging when your performance does not match your goals and doing something about it. Everyone can benefit from some expert guidance on time management, note taking, and exam preparation, so I encourage you to consider visiting <http://ter.ps/learn> and schedule an appointment with an academic coach. If you just need someone to talk to, visit <http://www.counseling.umd.edu>.



Everything is free because you have already paid for it, and **everyone needs help**... all you have to do is ask for it.

## Grades

Grades are not given, but earned. Your grade is determined by your performance on the learning assessments in the course. If earning a particular grade is important to you, please speak with me at the beginning of the semester so that I can offer some helpful suggestions for achieving your goal. I am here to help!

Homework scores with rubrics will be posted on the ELMS page. Exams will be returned to you with clear marks. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet in my office.

Late work will not be accepted for course credit so please plan to have it submitted well before the scheduled deadline. I am happy to discuss any of your grades with you, and if I have made a mistake I will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

Learning Assessments	#	Category Weight
Quizzes: submitted on ELMS	about 10	15%
Homework: submitted on ELMS	about 10	15%
Midterm Exams: best 2 of 3	2	(2@ 20% each) 40%
Final Exam	1	30%

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone I have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut. It would be unethical to make exceptions for some and not others. **Some curving is possible, but not guaranteed.**

Final Grade Cutoffs					
+	97.00%	+	87.00%	+	77.00%
A	92.00%	B	82.00%	C	72.00%
-	90.00%	-	80.00%	-	70.00%

## Course Schedule

This schedule is approximate, we may move slower or faster, depending on the volume of class discussion. Please refer to ELMS for up to date announcements.

DATES		TOPICS COVERED
1/28	1/230	Course overview and introduction to Light (Chapter 1)
2/1	2/4,	Production and properties of electromagnetic waves (Chapter 1)
2/6	2/8	Geometrical Optics: Shadows and Reflection (Chapter 2)
2/11	2/13	Refraction and Dispersion (Chapter 2)
2/15	2/18	Spherical Mirrors (Chapter 3)
2/20	2/22	Lenses (Chapter 3)
2/25		Exam #1
2/27-	3/6	Photography (Chapter 4 & supplemental material)
3/8-	3/15	The eye and vision (Chapter 5)
3/18-	3/24	Spring Break
3/25-	3/29	Optical Instruments (Chapter 6)
4/1		Exam #2
4/3	4/8	Processing the image: the human eye and modern image processing (Chapter 7 & possible supplemental materials)
4/10	4/12	Depth Perception (Chapter 8)
4/15-	4/22	Wave Optics (Chapter 12)
4/24	4/26	Polarization (Chapter 13)
4/29		Exam #3
5/1	5/6	Color (Chapter 9)
5/8	5/10	Color perception (Chapter 10)
Final Exam Wednesday, May 20		1:30-3:30pm

**Note:** This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.