
[MAKING SENSE OF OUR SENSES: THE PHYSICS OF SOUND AND LIGHT](#)

[Campuswide Honors Program](#), Physics H90, Course Code: 47550

Winter 2019, MW 1:00pm-2:20pm, [ALP 1700](#), [Professor J. Feng](#)

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Course Content and Goals

In Physics H90, we will study the science of sound and light. These are subjects of great importance and beauty. Most of what we know about the world we learn by hearing sound and seeing light, and so these subjects are literally applicable to every second of our daily experience. In addition, much of what we consider beautiful, from music to painting to natural beauty, is conveyed to us through sound and light.

As we will see, the beauty also extends to another level, as the seemingly disparate subjects of sound and light are, in fact, fundamentally similar, because both are wave phenomena. With this in mind, the course therefore consists of three parts: in Part 1 we will discuss wave motion in general; in Part 2 we will apply this knowledge to sound and music; and in Part 3 we will use it understand light and color.

In addition to learning about sound and light, a goal of this course is to provide an understanding of how scientists, and physicists in particular, make sense of the world. To achieve this goal, this course differs significantly from high school AP physics courses and from almost all physics courses offered in university physics departments. Physicists do not spend all of their time drawing force diagrams and rolling balls down inclined planes. They do, however, spend all of their time trying to understand simply and quantitatively all aspects of the natural world, from the smallest building blocks of matter, to living things, to materials, to galaxies and the universe as a whole. In this course, then, we will try to understand how simple observations, along with some careful thinking, can lead to deep insights. We will use sound and light as our example subject matter, but we will also touch on some truly mind-blowing ideas, such as quantum mechanics, relativity, and the expanding universe.

Participation

This course will include many hands-on activities and cool lecture demonstrations. Students should attend all lectures and participate fully in them, both individually and in groups, because we all learn better this way. Links to the lecture demos and activities will be available at the [Lecture Links](#) webpage. In addition, there will be an introductory questionnaire to complete on Canvas by noon on Friday of Week 1 (11 January 2019). A small component of the overall grade is based on attendance at lectures, participation in lecture activities and demos, and timely completion of the introductory questionnaire.

Textbook

The course textbook is *The Physics of Music and Color* (2012), by Leon Gunther. It is not required, but many students will find it useful as a supplementary source. It is available for free online at <https://link.springer.com/book/10.1007%2F978-1-4614-0557-3> if accessed from campus or through VPN. For those who prefer a printed version, hard copies are also available at the campus bookstore.

Discussion Sections

Discussion sections are Tuesday 3:00-3:50pm in [RH 108](#) and Thursday 4:00-4:50pm in [RH 184](#); please attend the one you have been assigned to. They will be conducted by the teaching assistant,

- Jason Arakawa, jarakaw1 [at] uci.edu, Office: FRH 3155, Office Hours: Thursdays 2:00-2:50pm.

The TA will also assist the instructor in grading the homework and exams. Attendance at the discussion sections is not required, but is *very* highly recommended.

Homework

There are 6 homework assignments; all will be collected and a subset of the problems will be graded. The homework problems and their solutions will be posted on the course [Homework and Exams](#) webpage, and the homework due dates are given on the course [Schedule](#). Completed assignments are due at noon on Friday and should be dropped into the Physics H90 dropbox outside of FRH 4129. If you have any trouble finding the dropbox, ask someone at the front desk in FRH 4129. Homework turned in late will not be graded and will be given a score of 0. The lowest homework grade will be dropped in calculating the final course grade.

Exams

Midterm Exam: Monday, 11 February 2018, 1:00pm-2:20pm in ALP 1700
Final Exam: Wednesday, 20 March 2018, 1:30pm-3:30pm in ALP 1700

The Midterm will cover all material presented in lectures up to and including the Monday lecture of Week 5, and the final exam will be comprehensive. For all exams, UCI ID is required. The exams are closed book, but you may use a scientific calculator. For the Midterm you may bring one 8.5" x 11" page of notes (both sides ok) and for the Final Exam you may bring two pages. These notes must have been written or typed by you. Cell phones, pagers, laptop computers and other similar devices are not allowed, and you do not need a blue book.

Make-up Policy

There will be no make-ups for homework and exams. Missed homework and exams will be given a score of 0. Recall, however, that the lowest homework score is dropped.

Project

The last component of the class assignments is the class project. These projects are intended to give students a way to delve slightly deeper into one aspect of the course. Possible projects include playing a musical instrument in class, helping to present a lecture demo, writing a short essay on the role of science in society, or attending a public lecture and responding to it. The available projects are described on the course [Projects](#) webpage and will be described further in the lectures and discussion sections of Week 1. Students should indicate their choice of project when they complete the introductory questionnaire by noon on the Friday of Week 1. The projects are due at noon on Friday of Week 8 (1 March 2019) and should be dropped into the Physics H90 dropbox outside of FRH 4129.

Grading Policy

The course grade will be determined with the following weighting:

- Participation: 5%
- Project: 5%
- Homework: 20% (lowest score dropped)
- Midterm Exam: 30%
- Final Exam: 40%

Each student's final course score is calculated with these weightings, and letter grades are assigned based on these final course scores. The course is graded on a curve. The curve varies from year to year, but in the past, roughly 5% of the grades are C's and below, and the rest are roughly equally divided between A's and B's.

Homework and the midterm exam will be returned in the discussion sections. Solutions to the homework problems and exams will be posted on the [Homework and Exams](#) webpage soon after they are due or given. If you believe you have found a grading error: (1) do not change or make any marks on your homework/exam; (2) attach a note explaining briefly the nature of the error; (3) give your exam directly to the teaching assistant or instructor (do not leave it in a mailbox, for example). Homework and exams submitted for regrades will be re-evaluated in their entirety and a new grade will be assigned. The new grade will supersede the old grade, even if it is lower. Regrade requests must be submitted within two weeks of the date the work was originally collected; regrade requests after that time will not be considered. It is the student's responsibility to retrieve the homework and exams in time to ensure that proper credit is given.

All UCI policies regarding academic honesty (see <https://www.reg.uci.edu/navigation/policies.html>) will be strictly enforced. Examples of academic dishonesty include tampering with and re-submitting work, giving or receiving assistance on an exam, and submitting identical homework papers. To discourage tampering, a number of homeworks and exams will be photocopied before being returned. All cases of academic dishonesty will result in a course grade of F and will be reported to the appropriate Deans for appropriate disciplinary action.

Instructor's Office Hours and Contact Information

In addition to the TA's office hours noted above, the instructor will hold office hours in FRH 3162 on Wednesdays, 2:30-3:20pm. Students who cannot attend these office hours are welcome to make additional arrangements by appointment in person or by email to jlf [at] uci.edu.

Course Email and Web Site

Throughout the quarter, instructions and information may be sent to the class email list. Please activate your [UCInetID](#) email account and check it regularly.

The course web site is <https://canvas.eee.uci.edu/courses/14453>. This syllabus and the course schedule are posted there, and solution sets and other updates will be added periodically.