

## **World of Light - Final projects**

### **What projects are**

You will investigate a topic on optics or waves as a final project. These projects will combine group and individual work. Each group will present their topic to the class during one of the last 2 class meetings (**6/5 and 6/8**) as an oral presentation. Each individual will also need to write and turn in a final paper on the topic. These papers will be due by e-mail (to [andrewss@seattleu.edu](mailto:andrewss@seattleu.edu)) by Friday **6/12**.

### **Project groups**

You need to do some of the work in groups. Groups should be between 2 and 4 people. Project themes and lists of group members will be due **May 18**.

### **Oral presentation**

Each group will between 10 and 15 minutes to present their project to the whole class. Your job is to teach the rest of the class about what you learned. I recommend about 10 to 15 PowerPoint slides for this presentation.

### **Paper**

Write a paper that's separated into the following sections, using section headings: introduction, subtopic, conclusions, and references. The paper should be written to inform a classmate about your topic. (However, be aware that the real audience is me, not your classmates, so your real job is to impress me; as part of that, it's nice if you can teach me something that I didn't already know.)

The introduction should be 1-2 pages long. It should introduce the topic and it should be the same for all group members. I suggest that one group member write the introduction section and then others edit it together until it's something that everyone agrees with.

The subtopic section should be 3-5 pages long and should be different for each person. This should investigate your topic in depth. Use explicit references to your journal article, book, and webpage, referenced in the text with the format (author, year). Also refer to your diagram explicitly (e.g. "Figure 1 shows..." or "... projection flattens 3D to 2D (see figure 1)"). This section should combine information from all of your sources to create a single coherent explanation of your subtopic. Note that this section should explore your topic *in depth*, drawing substantial information from the journal article.

The conclusions section should be about 1/2 page long. It should summarize the main points of the paper. It should give the reader a sense of completion. The conclusion should be about the paper topic, *not* about how much you learned.

The references section should list all of your references. See below for formats.

### **Scavenger hunt**

Each paper needs to include the following.

(1) At least one reference to a book (this can be your textbook). Example reference:

Rossing, Thomas D. and Christopher J. Chiaverina. *Light Science: Physics and the Visual Arts*, Springer-Verlag: New York, 1999.

- (2) At least one reference to a published journal article. Example reference:  
Land, Michael F. "Visual acuity in insects" *Annu. Rev. Entomol.* 42:147-177, 1997.
- (3) At least one reference to a website. Example reference:  
Wikipedia contributors, "Thin lens," *Wikipedia, The Free Encyclopedia*,  
[http://en.wikipedia.org/wiki/Thin\\_lens](http://en.wikipedia.org/wiki/Thin_lens) (accessed May 25, 2015).
- (4) At least one math equation.
- (5) At least one diagram or picture.
- (6) At least one number (not a page number or date).

### **Grading**

25 points - oral presentation (the same grade for all group members)

25 points - group portion of paper (the same grade for all group members)

25 points - individual portion of paper

25 points - scavenger hunt (did you include and use all items?)

Total is 100 points (the same as an exam).

Grading will be performed using the rubric that is attached. Note that longer papers typically have more content, and thus get better grades.

### **Topics**

Any topic that is related to light or waves (and that has a strong physics emphasis) is welcome. Each group should choose a broad topic, and then each group member should choose a sub-topic within it. For example, a broad topic could be atmospheric optical phenomena and sub-topics could be rainbows, solar columns, halos, etc. Following are some examples of broad topics. Choosing one of these is fine; you're also welcome to come up with your own ideas. When picking a topic, remember that you will need to find a journal article, an equation, and a number for your paper, which can be easier to find for more scientific topics.

remote sensing

optical computing

biophysics of vision

atmospheric optical phenomena

lasers

optics in art

microscopy

optics in forensics

LEDs

CDs and optical storage

Anything from this class. Lenses, mirrors, color, interference, polarization, etc.

spectroscopy

digital image processing

biophysics of photosynthesis

holography

medical imaging

theatre lighting and special effects

global warming

spacecraft optics

fiber optics and optical communication