This course provides hands-on experience in studying vision using computer graphics combined with visual psychophysics. Students will gain a better understanding of how images are formed, how one employs properties of image formation in the experimental study of vision, and how the perception of complex images works in biological systems. Labs will rely on matlab and several computer graphics packages (e.g., 3D LightWave). If you are proficient in another 3D graphics package (e.g., 3DS-Max) you are welcome to use it if you have access to a copy.

Instructors:

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Course web page:  
http://www.cog.brown.edu/~max/cg144/

Prerequisites: CG44, CS15 or CS17 and written permission

Requirements: Implementation of three experimental projects/demonstrations and written report of each project. Final projects may (optionally) be done in groups, so these reports can be “co-authored” meaning that two or more group members may turn in one report. The written reports for the first two projects can be quite short – 1500-2500 words – see typical Science or Nature articles. The report for the final project should also be written as a research report for Nature or Science and should be about 3000-4000 words including figure captions (but not references). No final exam. Course grades will be determined by attendance, participation, lab quality, and written reports.

Required Texts:

  [Actually the edition in the bookstore is MM7, but 6 is fine too if you have a copy.]
- Readings to be assigned.
Optional Texts:
- **Inside Lightwave 8** by Ablan, D, New Riders Publishing, 2001. [Again, the actual version we will be using is 7, so the LW7 edition is fine]

The following two texts are for background purposes. That is, if you feel you need to know more about a given topic than we provide in one lecture, get these as references. In particular, the second of these – Interactive Stats – is very important if you have never had a statistics class.

Course goals. By the end of this course you should have developed:
1) Proficiency in image synthesis
2) Proficiency in psychophysical methods as they apply to vision
3) A better understanding of how we perceive complex images

Some details.

This course will use Matlab and several off-the-shelf graphics packages, including LightWave and Adobe Photoshop. It is not expected that you already know how to use these specific programs, but you should feel comfortable both programming and learning to use new, reasonably complex software.

The course will consist of “modules” that emphasis different topics within visual perception. Classes themselves will be a mixture of lecture and laboratory, as well as a separate one hour technical weekly section (time TBD) to help you learn to use the specific software tools on which we will rely.

**Jan 27**  Intro

**Feb 1**  A Brief History of Vision (MT)
**Feb 3**  Methods (MT)

**Feb 8**  Stereo (FD)
**Feb 10**  Project #1 - Stereo

**Feb 15**  P#1 continued
**Feb 17**  Psychometric Functions (FD)

**Feb 22**  No class – President’s Day Holiday
**Feb 24**  P#1 continued

**Mar 1**  P#1 discussion
**Mar 3**  P#1 discussion

**Mar 8**  SFM (MDL); P#1 papers due (Science/Nature style)
Mar 10    Lighting

Mar 15    Project #2 - Lighting
Mar 17    P#2 continued

Mar 22    P#2 continued
Mar 24    P#2 discussion

Mar 29    Spring Break
Mar 31    Spring Break

Apr 5     Signal Detection Theory (MT); P#2 papers due (Science/Nature style)
Apr 7     Project #3 - Group Projects

Apr 12    P#3 continued
Apr 14    Inferential Statistics (MT)

Apr 19    P#3 continued
Apr 21    P#3 continued

Apr 26    P#3 discussion
Apr 28    P#3 discussion

Reading Period

May 5     P#3 papers due (Science/Nature style)