Visual Object Recognition
Computational Models and Neurophysiological Mechanisms
Neurobiology 130/230. Harvard College/GSAS 78454

Web site: http://tinyurl.com/visionclass
→ Class notes, Class slides, Readings Assignments

Location: Biolabs 2062

Time: Mondays 03:00 – 05:00

Lectures:

Faculty: Gabriel Kreiman and invited guests

TA: Emma Giles

Contact information:

Gabriel Kreiman
gabriel.kreiman@tch.harvard.edu
617-919-2530

Emma Giles
emmagiles@g.harvard.edu

Office Hours: After Class. Mondays 5pm, or by appointment

Visual Object Recognition
Computational Models and Neurophysiological Mechanisms
Neurobiology 130/230. Harvard College/GSAS 78454

GRADING

Class participation	15%
Comments on class notes*	15%
Homework*	50%
Final paper*	20%

Reading assignments. [60% of grade]

- One paper per class.
- Total of 11 reading assignments

Visual Object Recognition
Computational Models and Neurophysiological Mechanisms
Neurobiology 130/230. Harvard College/GSAS 78454

GRADING. Comments on class notes* 15%

Lecture notes available at:

klab.tch.harvard.edu/academia/classes/Neuro230/2018/Neuro_130_230_Notes_2018.html

Maximum grade per week = 10 points.

Spelling/grammar/wrong citation/wrong figure reference/etc:	1 point
Undefined word in text, undefined variable in equation:	2 points
Error in equation:	5 points
Erroneous statement:	5 points
Suggestion for figure improvement:	4 points
Specific clarification question:	3 points
Relevant work missing in notes:	3 points

Filename: <YOURNAME>_LECTURE<LECTURENUMBER>_COMMENTS

Format: PDF, Word, Text, Latex

Lecture number, line number, your comments/edits

Due date: Monday, day of the lecture at midnight.

By email: emmagiles@g.harvard.edu

Visual Object Recognition
Computational Models and Neurophysiological Mechanisms
Neurobiology 130/230. Harvard College/GSAS 78454

GRADING. Homework* **50%**

One reading assignment per class.

Original scientific literature

Total of 11 reading assignments

Write two paragraphs about the paper:

Paragraph 1: Discuss one missing control or one problem with the interpretation.

Paragraph 2: Discuss a logical follow-up question.

Note: Do NOT copy and paste the paper. We have already read it.

Filename: <YOURNAME>_Assignment<AssignmentNumber>

Format: PDF, Word, Text, Latex

Due date: One week after assignment discussion in class. Monday, midnight. See specific dates on website.

By email: emmagiles@g.harvard.edu

Visual Object Recognition
Computational Models and Neurophysiological Mechanisms
Neurobiology 230. Harvard College/GSAS 78454

Class 1 [09/10/2018]. Introduction to pattern recognition [Kreiman]
Class 2 [09/17/2018]. Why is vision difficult? Natural image statistics. The retina. [Kreiman]
Class 3 [09/24/2018]. Lesions and neurological studies [Kreiman].
Class 4 [10/01/2018]. Psychophysics of visual object recognition [Sarit Szpiro]
October 8: University Holiday
Class 5 [10/15/2018]. Primary visual cortex [Hartmann]
Class 6 [10/22/2018]. Adventures into *terra incognita* [Frederico Azevedo]
Class 7 [10/29/2018]. High-level visual cognition [Diego Mendoza-Haliday]
Class 8 [11/05/2018]. Correlation and causality. Electrical stimulation in visual cortex [Kreiman]
Class 9 [11/12/2018]. Visual consciousness [Kreiman]
Class 10 [11/19/2018]. Computational models of neurons and neural networks. [Kreiman]
Class 11 [11/26/2018]. Computer vision. Artificial Intelligence in Visual Cognition [Bill Lotter]
Class 12 [12/03/2018]. The operating system for vision. [Xavier Boix]
FINAL EXAM, PAPER DUE 12/13/2018. No extensions.

Visual Object Recognition
Computational Models and Neurophysiological Mechanisms
Neurobiology 230. Harvard College/GSAS 78454

Recommended books

Suggested Books

Ullman S (1996) High-level vision. MIT Press.
Wandell BA (1995) Foundations of vision. Sunderland Sinauer Associates.
Chalupa LM and Werner JS (editors) (2003). The Visual Neurosciences. MIT Press.
Frisby and Stone (2010). Seeing. MIT Press.
Kriegeskorte and Kreiman (2011). Visual population codes. MIT Press.

Other good books

Purves and Lotto. (2003). Why we see what we do. Sinauer Books.
Deco and Rolls (2004). Computational Neuroscience of Vision. Oxford University Press.
Ripley. Pattern recognition and neural networks (1996). Cambridge University Press.
Rao, Olshausen and Lewicki (eds) (2002). Probabilistic models of the brain. MIT Press.
Koch C (2005) The quest for consciousness. Roberts & Company Publishers.
Regan (2000) Human perception of objects. Sinauer Books.
Dayan and Abbott (2002). Theoretical Neuroscience. MIT Press.

Academic Integrity Policy

All reading assignments will be discussed in class. During class, collaboration and discussion is not only permitted but actually encouraged.

After class, each student must prepare the homework on his/her own. Students should be aware that in this course collaboration of any sort on any work submitted for formal evaluation is not permitted. This means that you may not discuss your problem sets, paper assignments, exams, or any other assignments with other students. All work should be entirely your own.

The use of textbooks, books and articles is encouraged. Students must use appropriate citation practices to acknowledge the use of books, articles, websites or lectures, that were consulted to complete your assignments.

Reading Assignment 1

Olshausen, B. A. & Field, D. J. Emergence of simple-cell receptive field properties by learning a sparse code for natural images. Nature 381, 607-609 (1996). Discussion: Monday 09/17

Reading assignment due: Monday 09/24

Reading Assignments Link