Neuroscience at Pomona College:

A Neuroscience major requiring coursework in the biological sciences

A bit of history—

Prior to 1994: Pomona students designed their own independent majors in psychobiology or biopsychology, or similarly-flavored majors

**The program arose from student interest**

Students used the available expertise of existing faculty, including:

- Richard Lewis
  Human neuropsychology
- Deborah Burke
  Cognitive psychology
- Rachel Levin
  Animal Behavior, Neuroethology
- Jim McKenna
  Biological anthropology
- Cynthia Selassie
  Organic chem; Medicinal chem

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A bit of history (cont’d)--

1994: the Neuroscience major was established. With the hire of a new neurobiologist (me), *Intro to Neuroscience* was launched for the first time. A dozen neuroscience majors graduated in May 1995.

Establishment of a cell and molecular *Neurobiology* course, with lab.

Introduction of a new *Neuroethology* course

Refinement of a *Human Neuropsychology* course

A bit of history (cont’d)—

1995-2009: Neuroscience continued to grow and grow. It is now the second most common major at Pomona College.

Faculty additions during this period:

Nicole Weekes
Human neuropsych
Karl Johnson
Sensory systems/Developmental neuro
John Milton
Computational Neuroscience
Jon King
neurobiology
Jonathan Matsui
Developmental neurobiology

What courses are required for a Neuroscience major at Pomona College?

- Basic science courses
- Two additional science courses
- Three core neuro courses with lab
- One Neuro elective
- Neuro senior seminar
- Neuro senior thesis
Basic science courses include:

- Introductory Biology (one semester each of Genetics with lab and Cell Chemistry/Cell Bio with lab)
- General Chemistry
- Calculus (at least one semester)
- Statistics
- Intro Psychology

What courses are required for a Neuro major?

- Intro to Neuroscience, with lab
- Three core neuroscience courses with lab
- One Neuroscience elective
- Neuroscience senior seminar
- Neuro senior thesis

At least two additional science courses in either:

- Biology
- Psychology
- Chemistry
- Computer Science
- Mathematics
- Physics

Typical course goals--

By the end of the semester your skills as a scientist will be broadened and you should be able to do the following:

- Find information about various topics in neuroscience through literature searches.
- Read the primary literature critically and thoroughly.
- Synthesize materials in the literature and understand “why” and “how” certain experiments were conducted.
- Develop your own hypotheses to explore new areas of research.
- Communicate scientific results efficiently through written lab papers and by oral presentations.
- Recognize that neuroscience is a multi-disciplinary subject that requires training in other subjects such as physics, chemistry, electronics, computer science, genetics and mathematics.
- Become an independent scientific thinker.
Three core upper-level neuroscience courses, one from each area:

- Cell and molecular neuroscience
  Options: Neurobiology w/ lab
  Devt’l Neurobiology w/ lab
- Comparative systems neuroscience
  Options: Animal Behavior w/ lab
  Neuroethology w/ lab
  Vertebrate Sensory Systems w/ lab
- Human neuroscience
  Human Neuropsychology

The lab component of an upper-level course
(class size = 10-12 students)

What courses are required for a Neuro major?

- Basic science courses
- Three additional science courses
- Intro to Neuroscience
- Three core neuro courses with lab
- One Neuro elective
- Neuro senior seminar
- Neuro senior thesis

An example of an upper-level course (class size = 20-24 students)
Neuroscience electives available:

Analysis of Human Motor Skills
Artificial Intelligence
Neural Networks
Neuropharmacology
Social Brain
Biological Basis of Psychopathology
Introduction to Mathematical Physiology
Cultural Neuroscience

The Neuroscience senior thesis requirement:

Two options—

1. A year-long research experience
   --highly encouraged for students considering graduate school in science

or

2. An NIH- or NSF-style grant proposal written in one semester
   --encouraged for students going into fields requiring grant writing, or students needing to work on writing/literature analysis skills

The Neuroscience senior seminar

--an opportunity for our senior Neuroscience majors to be together as a group

--gets students prepared for and started on their thesis work

--students present their thesis work to each other
From the Neuroscience “Blueprints” on undergraduate NS Curricula:

Expose students to the process of neuroscience through a research based curriculum. This should include “doing” research, reading and discussing primary articles from the literature and writing about their work in a journal style format. Where possible, students should spend at least one semester doing independent research. Laboratories accompanying courses should be “investigative,” encouraging students to design part of an experiment and collect novel data. Labs should extend over a period of weeks culminating in a journal style lab report.

Note:

Our students usually take Organic Chemistry and Physics in addition to the above, even though they are not required for the major.

There is a 16-course limit for any major at Pomona.

Students must fulfill liberal arts breadth requirements too.

Many students study abroad one semester of their junior year.