Special Topics in Neuroscience: Neurons, Connectomes, & Cognition


**Prerequisites:** Neur 327, Neur 335, Psyc 372, or permission of instructor.

Graduate and undergraduate students in the neuroscience, psychology, biology, physics, philosophy, and bioengineering programs are especially encouraged to enroll.

**Course Goals:** This broad-spanning exploration of the brain-mind relationship aims to connect fundamental aspects of cognitive and behavioral phenomena, such as learning from experience, with basic operating principles of neural architecture. The course also surveys numerous topics of contemporary research and includes a hands-on virtual lab of modern web-based tools for neuroscience research.


**Method of Instruction and Evaluation:** Weekly classes will intersperse lectures, online real-time demos, and oral/practical tests. Active student participation is warmly encouraged. Mandatory readings and homework questions will be assigned every week. Each lecture will be preceded by a homework discussion by the students (this will be an opportunity to review and expand the material as well). This means that each student will be called several times during the semester to explain and discuss how s/he answered the assigned question(s) to the rest of the class. I will provide the called student(s) with direct feedback and a grade corresponding to their answers upon request. Student attendance and punctuality are required (3 late arrivals >10 minute = 1 absence; 3 absences = 1 homework “F”). The final exam will consist of a take-home literature annotation project followed by individual classroom presentations. Final grades will be based on 50% class participation and homework discussion, and 50% final project. Letter grades will be assigned as follows: A+ and A, 4.00; A-, 3.67; B+, 3.33; B, 3.00; B-, 2.67 (undergrad only); C-, 2.33 (undergrad only); C, 2.00; D, 1.00 (undergrad only); F, 0.00.

**Instructor:** Dr. Giorgio Ascoli - Ph. x3-4383, E-mail: ascoli@gmu.edu
Office location: Krasnow Institute, Rm. 223
Office hours: Mondays 3-4p or by appointment.

**Other Material:** Online web-sites and portals.

**Technology Requirement:** Ability to access the web and email communication.
**Honor Code:** GMU Academic Policies apply in full (catalog.gmu.edu)
If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office.

(Approx.) Class Schedule of Topics and Readings

2) 1/27: Neuron Trees and Network Forests: Transmitting and Processing Information (Chapters 2 & 3). Branching arbors, synaptic connections, and the mind-boggling scale of the nervous system. Axonal reach, dendritic integration, and multifarious plasticity. Assignments: Read Chapter 4. Read these news (and watch video) from Salk. Class slides available HERE.

Last day to add classes & to drop with no tuition penalty: Mon Feb 1 (extended date!).


Last day to drop with a 33% tuition penalty Tues Feb 9 (extended date!).

4) 2/10: Activity Patterns and Mental States (Chapter 4). The first principle of the brain-mind relationship. Information integration theory of consciousness as a case study. Assignments: Read chapter 5. Class slides available HERE.

5) 2/17: Learning from Experience (Chapter 5). The second principle of the brain-mind relationship. Probability vs. capability to experience a mental state. Structural plasticity and synaptic adaptation: spatial & temporal scales. Assignments: Read chapter 6. Class slides available HERE.

Final Drop Deadline (67% tuition penalty) Fri Feb 19.


14) 4/27: Final Project Presentations.