Topics in Neuroscience: Introduction to Neural Systems
a.k.a. “Zombies vs. Brraiinss”

NEUR 4910, Spring 2013

Room: Sparks Hall 137
Time: MW 2:50 – 4:35pm
Credits: 4.0

Instructor: Robert Clewley, Ph.D.
Office: Petit Science Center 8th floor, room 812. (You will need your Panther card, and email me your ISO # if your card has a problem at the security gate.)
Office Hours: MW 4:45 – 5:45pm
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[The course syllabus provides a general plan for the course; deviations may be necessary.]

Course Description: NEUR 4910 Topics in Neuroscience, Critical Thinking through Writing (CTW). Pre-requisite: NEUR 3000, NEUR 3010, NEUR 3020.

What is the relationship between Resident Evil, forest fires, CDC policies on pandemic outbreaks, epilepsy, obesity, and biomechanical prosthetics? This course will teach you.

This course takes a high-level and fun ride through the ways in which scientists develop theories of human behavior and function, from cognitive to the micro-biological. We will study a wide range of literature to learn the important general principles of these theories, and what non-mathematicians can learn about how and why we turn theories into computational models. Modeling is increasingly used in medicine, biotechnology, public health, as well as in basic science, and you need to know how to relate to it even if you don't plan to do it yourself. We will use neuroscience as an excellent focal point for inter-disciplinary examples, and no math background is assumed.

This course will provide a collaborative learning experience, through a critical discussion of journal papers and writing assignments. This will develop your understanding of what “neural systems” are, and the value of this kind of analysis.

As a CTW course, a key aim is to increase your critical thinking skills through analysis of, and writing about, the primary scientific literature. We will look at many kinds of neural system, from molecular to cognitive/behavioral models, and consider how they are drawn from experimental observations, constructed, presented in the literature, and tested. Students will learn to assess the meaning and validity of the assumptions of models, and how they relate to “theories” about the brain. I will provide some necessary background information before each reading assignment.
Course Goals: Upon successful completion of this course, you will be able to:

- Identify “general systems properties” of neural mechanisms described in text form and formulate flow diagram descriptions of their processes
- Relate concepts from systems theory and applied mathematics to the analysis of models of neural function
- Communicate with mathematicians and computational modelers about the use of formal and informal models in the context of experimental neuroscience

- **Use critical thinking effectively**
  - Evaluate the quality of information
  - Evaluate the source of information
  - Recognize and defend against common fallacies in thinking
  - Avoid being swayed by appeals to emotion or authority
  - Evaluate popular media reports involving modeling in neuroscience
  - Demonstrate an attitude of critical thinking that includes persistence, open-mindedness, tolerance for ambiguity and intellectual engagement

- **Engage in creative thinking**
  - Pursue unusual approaches to problems
  - Recognize and encourage creative thinking and behaviors in others
  - Evaluate new ideas with an open but critical mind
  - Use reasoning to recognize, develop, defend and criticize arguments and other persuasive appeals
  - Identify components of arguments and theories (e.g. conclusions, premises/assumptions, gaps, counterarguments)
  - Distinguish among assumptions, emotional appeals, speculations, and defensible evidence
  - Weigh support for conclusions to determine how well reasons support conclusions
  - Identify weak, contradictory, and inappropriate assertions
  - Develop sound arguments based on reasoning and evidence
  - Approach problems effectively
  - Recognize ill-defined and well-defined problems
  - Articulate problems clearly
  - Generate multiple possible goals and solutions
  - Evaluate the quality of solutions and revise as needed
  - Select and carry out the best solution

Prerequisite: All students in this class must have completed and passed NEUR 3000 (Principles of Neuroscience), NEUR 3010 (Neuroscience Laboratory), and NEUR 3020 (Scientific Method in Neuroscience) with a grade of C or higher. This course is required for the B.S. in Neuroscience; failure to pass the course in two attempts prevents one from declaring or continuing as a Neuroscience major.

Required Texts: The instructor will assign papers from the scientific literature on the topic, unless otherwise stated.
Everyone is expected to complete the reading BEFORE the class for which it is assigned, assuming it has been assigned at least three days in advance. This expectation will be reflected in scores for “participation” as described below.

Assessment: This course fulfills the requirements of a Critical Thinking through Writing (CTW) class, and as such we emphasize written analysis of topics covered in class – a major portion of your grade will be determined by your performance on the following assignments:

Article Comparisons: You will write two, one-page article comparisons, between media reports or journal articles on a scientific topic. You can revise each paper once, addressing my comments and edits in a second (final) draft: each draft counts 2.5% of your grade = 10% of your final grade.

Review Papers: You will write two 5-7-page review papers wherein you cite peer-reviewed research articles (at least two) that you summarize, analyze or critique. You will revise each paper once, addressing my comments and edits in a second (final) draft: each draft counts 7.5% of your grade = 30% of your final grade.

Examinations: There will be two “take home examinations” that will consist of short essay questions. The examinations will be designed to test basic factual knowledge from readings and lecture as well as interpretation and evaluation of facts. After the first examination, students can submit revisions for their answers for the opportunity to earn additional points toward the grade. Through these revisions, the student can earn up to ½ of the points lost on each essay of the exam by correcting and elaborating their previous responses: each exam counts 15% of your grade = 30% of your final grade.

Participation and discussion: The remaining 30% of your final grade will be determined by your participation and enthusiasm during in-class discussions and short-answer quizzes related to scientific papers that we study in a journal club format. Credit for more than two missed classes in the semester cannot be made up (see Attendance Policy below).

I will supply the journal / media articles for all your writing assignments, unless otherwise agreed upon. Your work will be electronically prepared using a standard word processor (e.g. MS Word) in 11 or 12 pt font on letter pages with margins between 1-1.5” and emailed to me before the deadline from your GSU email account. If you are uncertain whether I will be able to open and edit your document or whether your formatting is acceptable, email me a test document well ahead of the deadline. Unacceptable or unreadable submissions will be considered “late” and penalized after the deadline. All your written work must be entirely your own unless an assignment is expressly indicated as collaborative. All quotes or paraphrasing from the literature must be correctly cited (see Cheating and Plagiarism section below).

The minimum passing grade in this course is a C.
Final grades will be assigned based on the following scale:

- A+ = 97-100%
- A  = 90-96%
- A- = 88-89%
- B+ = 86-87%
- B  = 80-85%
- B- = 78-79%
- C+ = 76-77%
- C  = 70-75%
- C- = 68-69%
- D  = 60-67%
- F  < 60%

**Attendance Policy:** Attendance is a pre-requisite for earning your participation and discussion grade. You may receive credit for some kinds of late work ONLY if your absence on the due date is excused. No written assignments will be accepted late for credit. In order to have an absence excused, you must provide me official documentation that your absence was excusable. Official documents must have the date, the name of the issuing party (e.g., your physician), and a contact phone number. They must also clearly indicate that you were unable to be in school on the day in question, according to some relevant authority. A bill from a physician’s office showing that you were there around the time of a class is neither sufficient nor necessary. You must have a signed note from the physician saying that you were hospitalized or ordered to stay home from school and work on the day of the exam. Please make sure that NO other personal information appears on your note.

Note: March 5th is the last date that you can withdraw from the class (“W day”)

**Evaluation of Instructor:** Your constructive assessment of this course plays an indispensable role in shaping education as Georgia State. Upon completing the course, please take time to fill out the online course evaluation.

**Cheating and Plagiarism:** If you are caught cheating you will receive an “F” for the entire course, have your name submitted to the Neuroscience Institute Chair and be turned in to the Dean of Students. Please read the GSU Code of Conduct. All members of the university are responsible for abiding by the GSU tenets on Academic Dishonesty. Lack of knowledge of this policy is NOT an acceptable defense to any charge of academic dishonesty. All members of the academic community are expected to report violations of these standards of academic conduct to the appropriate authorities. The procedures for such reporting are on file in the offices of the deans of each college, the dean of students, and the provost. Please read the University Policy on Academic Honesty, Section 409, [http://www2.gsu.edu/~wwwdos/codeofconduct.html](http://www2.gsu.edu/~wwwdos/codeofconduct.html).

In addition, scientific papers involve a special type of writing not addressed in the general plagiarism policy discussed above or in the GSU Student Handbook. In general writing, *any words that were not written by you alone must be enclosed in quotes*, even if you cite the source
in the appropriate style. However, quotes are generally not used in scientific writing except occasionally to put a topic in a historical context, BUT all sources are cited often throughout the text at the end of the appropriate sentences. If the information you are writing is not your own idea or your own words you must cite the source in parentheses at the end of the sentence.

Email: All GSU students are required to activate and monitor their university e-mail accounts. Your student.gsu.edu account is the medium through which GSU distributes announcements and other information to you, and you are responsible for any and all school-related information sent to this account -- whether you actually read the messages or not. If you have any questions about how to activate or use your free university account, go to:
http://www.student.gsu.edu/network/email.html
It is your responsibility to check your GSU email account regularly to make sure that your account is working properly and that your inbox is not full.

Always use your GSU student account when you email me - do NOT use gmail, yahoo or other 3rd party emails - they will be blocked by the spam server. Do NOT use Desire2Learn e-mail to contact me - I never check it - ever.

Accommodations: Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which an accommodation is sought.