NRSC 450: SENIOR SEMINAR IN NEUROSCIENCE

Neuroendocrinology of the Brain: Pathways and Perturbations
(with a primer on Neuroethical Considerations)

COURSE LOGISTICS

**Class time:** Thursdays: 4pm – 6:50pm

**Office hours:** M 11-12pm/ W 2-3pm WYE 329 or by appointment

**Instructor:** Siddharth Ramakrishnan, sramakrishnan@pugetsound.edu, x-2698

COURSE SUMMARY

Students study and discuss topics of neurohormonal pathways, such as the reproductive hypothalamo-pituitary-gonadal axis; the suprachiasmatic nucleus and circadian rhythms; and cortico-steroid pathways. Students also explore perturbations to such systems and the different diseases and syndromes that arise as a result. It is expected that the class gives students an opportunity to present research papers and discuss them, critique and report on topics in Neuroendocrinology.

As Neuroscience is becoming more and more public, students of the program need to have a grasp on ethical considerations in the field. In that vein, we will discuss papers and topics that shape the field of neuroethics.

**Textbook:** R/W: Defining Right and Wrong in Brain Science: Essential Readings in Neuroethics (Foreword by Walter Glannon, Ph.D) Edited by Walter Glannon, Ph.D.

**Learning Outcomes**

- You will gain expertise in searching for, choosing, reading, presenting and critiquing scientific papers
- You will be able to discuss and debate scientific principles and methodologies using insightful and supported arguments
- You will also gain experience in concisely presenting facts that were conveyed in a scientific paper (as used in grant panels).
- You will gain experience in conveying scientific information to a lay-audience both through oral presentations and written work.
- Specific to the topic of neuroendocrinology – you will gain a comprehensive understanding of different hormonal systems, how they affect body homeostasis, their pathologies and potential treatments.
- You will gain an understanding of some of the ethical issues that are associated with the study of neuroscience, its place in law and policy making.

Readings will be posted on [http://moodle.pugetsound.edu](http://moodle.pugetsound.edu).
**TENTATIVE COURSE SCHEDULE:** Most of the class is discussion based. Readings will be posted on moodle. You are expected to continue class discussions on the message boards

| Week 1 | 22\(^{\text{nd}}\) January | Introduction to course  
Introduction to Neuropeptides and Neurohormones 
Discuss papers that have been posted on moodle |
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<tr>
<td>Week 2</td>
<td>29(^{\text{th}}) January</td>
<td>Methods in investigating neurohormonal systems: Discuss papers that have been posted on moodle</td>
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The class from now will be primarily student presentations and discussions

**PATHWAYS**  
**NEUROENDOCRINE AND NEUROHORMONAL SYSTEMS**

| Week 3 | Feb 5\(^{\text{th}}\) | Hypothalamo-Pituitary Gonadal reproductive axis  
(4 presenters) |
|--------|---------------------|-------------------------------------------------------------------|
| Week 4 | Feb 12\(^{\text{th}}\) | Hypothalamo Pituitary Adrenal axis and stress  
(5 presenters) |
| Week 5 | Feb 19\(^{\text{th}}\) | Appetite and metabolism (4 presenters) |
| Week 6 | Feb 26\(^{\text{th}}\) | Suprachiasmatic Nucleus, circadian rhythms  
(4 presenters) |
| Week 7 | March 5\(^{\text{th}}\) | Oxytocin, vasopressin and trust(4 presenters) |

**March 9\(^{\text{th}}\): Midterm Reports Due**

- **Week 8**  
  March 16\(^{\text{th}}\)  
  **Ethical Brain**  
  Primer on Neuroethics

- **Week 9**  
  March 19\(^{\text{th}}\)  
  Senior Internship Presentations

- **Week 10**  
  March 26\(^{\text{th}}\)  
  R/W: Chapter 9  
  Chapter 10/11; Chapter 12, 13  
  Ethics Discussion led by 4 people

- **Week 11**  
  April 2\(^{\text{nd}}\)  
  Movie: Eternal Sunshine of the Spotless Mind

- **Week 12**  
  April 9\(^{\text{th}}\)  
  R/W: Chapter 15, 16  
  Chapter 17; Chapter 18

- **Week 13**  
  April 16\(^{\text{th}}\)  
  r/w: chapter 19, chapter 20

- **Week 14**  
  April 23\(^{\text{th}}\)  
  R/W: chapter 24, 25  
  chapter 21; chapter 22;

- **Week 15**  
  April 30  
  R/W: chapter 26, 29  
  Chapter 27; Chapter 28

**ASSESSMENT COMPONENTS**
Class Presentation (Hormones)  

Students will present on a neurohormone topic based on a primary literature paper during the course of the semester. During each class from we will have two 30-minute presentations. Each followed by a 20-minute discussion/question-answer session. Each session will have a Presentation lead and a Discussion lead.

Presentations will have the following format:

1. What is the Neuroendocrine system being discussed
2. Brief anatomical description of location of the neuroendocrine system
3. What is the primary hormone(s) in this system/mode of release
4. What are the inputs/outputs to this system
5. A description of the receptor pathways and modes of activation
6. What is the primary function of this neuroendocrine axis

Presentations will be evaluated on the following criteria (Rubric will be provided)

1. Extent of knowledge
2. Clarity of communication (+ time management)
3. Visual Aids
4. Background Information on research
5. Understanding methodology and results

Reports  

Prior to each class, you have to submit a 1 page report on the paper the students will present on. (You do not have to write a report for your own presentation).

Each report will be worth 2 points

Movie Report  

We will engage in discussion on neuroethics in the second half of the class. Each student will lead one session worth 15 points. You will also be evaluated based on your participation during these sessions. This will be looking at how well you understood the papers, ability to engage in group discussions, ability to lead groups, formulating opinions and conclusions.

Midterm  

You have been asked to blog for a popular science magazine. As a topic you have chosen the hormone of your choice. For the midterm you will write a piece 1000 words on the hormone of choice, introducing the audience to what the hormone is, what its role is in the body, where it is to be found, its historical significance, its evolutionary place and the way it regulates bodily functions. References are essential and should be at least 5. A template and format will be provided. Alongside this blog, you will have to provide a Schematic/representative figure that consolidates most of the information you provide in your text. Think of figures you see in review articles that consolidate information and serve as go-to figures to understand things about the hormone.

11 points will be for the written component and 4 points for the figure itself.

Final (Neuroethics Paper)  

15 points
You will discuss comprehensively a neurological/neurobiological issue and its treatment/study from an ethical/social standpoint. Guidelines for submission
http://www.springer.com/social+sciences/applied+ethics/journal/12152

Total: 150 points

Emergency Preparedness

Please review university emergency preparedness, response procedures and a training video posted at www.pugetsound.edu/emergency/. There is a link on the university home page. Familiarize yourself with hall exit doors and the designated gathering area for your class and laboratory buildings.

If building evacuation becomes necessary (e.g. earthquake), meet your instructor at the designated gathering area so she/he can account for your presence. Then wait for further instructions. Do not return to the building or classroom until advised by a university emergency response representative.

If confronted by an act of violence, be prepared to make quick decisions to protect your safety. Flee the area by running away from the source of danger if you can safely do so. If this is not possible, shelter in place by securing classroom or lab doors and windows, closing blinds, and turning off room lights. Lie on the floor out of sight and a way from windows and doors. Place cell phones or pagers on vibrate so that you can receive messages quietly. Wait for further instructions.

Names & Pronouns

We want to call you by what you consider your name, no matter what the official roster might tell me. Similarly, we want to honor your pronouns. Please inform us how you want us to refer to you, and please keep us informed if your pronouns change.

Academic Honesty: All materials that you present in this course as your work must be the product of your own efforts. It is not honest to treat or represent work as if one were fully responsible for it when it is, in fact, the work of another person or work in which one received unacknowledged assistance. Therefore, you should not receive outside help except from a tutor at the Center for Writing, Learning, and Teaching or instructors of the course. We will enforce all rules pertaining to Academic Honesty as outlined in The Logger. http://www.pugetsound.edu/student-life/student-handbook/academic-handbook/academic-integrity/

Copyright and Fair Use

Course materials are for educational purposes only and limited to students enrolled in the course. They are protected by copyright law and may not be copied, downloaded, stored, transmitted, shared or changed in any way.

Bereavement Policy
Upon approval from the Dean of Students’ Office, students who experience a death in the family, including parent, grandparent, sibling, or persons living in the same household, are allowed three consecutive weekdays of excused absences, as negotiated with the Dean of Students. For more information, please see the Academic Handbook.

**Accessibility and Accommodation**

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Peggy Perno, Director of the Office of Accessibility and Accommodation, 105 Howarth, 253.879.3395. She will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Please notify me well in advance should you require accommodation in the class or lab.