NRSC 450: SENIOR SEMINAR IN NEUROSCIENCE
Neuroendocrinology of the Brain: Pathways and Perturbations
(with a primer on Neuroethical Considerations)

COURSE LOGISTICS

Class time: Monday: 4pm – 620pm
Office hours: M 3-350pm/ W 11-1150pm 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: The heart of the brain by Gareth Leng and The Ethical Brain – Michael Gazzaniga

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.
## 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 | 28th January | Introduction to course  
| | | Introduction to Neuropeptides and Neurohormones  
| | | Discuss papers that have been posted on moodle |
| Week 2 | 4th February | Intro to neuroendocrinology continued  
| | | Chapter 1-4; 10, 12, 13 |

**The class from now will be primarily student presentations and discussions**

### NEUROENDOCRINE AND NEUROHORMONAL SYSTEMS

Two students will present on selected topics in each class. Aside from the text readings each student will also pick a primary literature paper that is relevant to the text and use that to enhance the paper. Each presentation will be 25 minutes long followed by 15-20 min discussion on the presentation. Other students will be expected to write reports on these topics and participate in classroom discussions.

Some classes will also have a discussion segment on assigned topics which will count for class participation points. Readings are indicated in syllabus and will be supplemented on moodle.

| Week 3 | Feb 11th | HeartBrain: Chapter 5, 11 – Oxytocin, Vasopressin  
| | | Discussion Chapter 21 Behavior |
| Week 4 | Feb 18th | HeartBrain: Chapter 6, 8, 9- Gonadotropins  
| | | Discussion TBD |
| Week 5 | Feb 25th | HeartBrain: chapter 16, 17, 18 Obesity and Appetite  
| | | Discussion: Primer on Neuroethics (Reading on Website) |
| Week 6 | March 4th | Heartbrain: Ch14 ACTH  
| | | Discussion: Chapter 22, 23 |
| Week 7 | March 11th | Heartbrain: Ch 15 Rhythms -SCN  
| | | Discuss Topics for Final ethics papers |

**March 15th: Midterm Reports Due**

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 10. 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.

| Week 8 | March 18th | Spring Break |
We will engage in discussion on neuroethics in the second half of the class. Each student will lead one 40 minute session. You will supplement the reading with 1 scientific paper and 1 ethics paper. 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. Each student will be expected to complete the readings and write a report consolidating the three.

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<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Assignments</th>
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<tbody>
<tr>
<td>9</td>
<td>March 25th</td>
<td>The Ethical Brain Chapter 1 : Embryonic brain Ethics Engagement</td>
<td>2 reports due</td>
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<tr>
<td>10</td>
<td>April 1st</td>
<td>TEB Chapter 2: Aging Brain Ethics Engagement</td>
<td>2 reports due</td>
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<tr>
<td>11</td>
<td>April 8th</td>
<td>Senior Presentations: Neuroscience Symposium</td>
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<tr>
<td>12</td>
<td>April 15th</td>
<td>TEB: Brain Enhancement Chapter 3 and 4 Discussion of Papers for Final</td>
<td>2 reports due Bibliography for ethics papers due</td>
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<tr>
<td>13</td>
<td>April 22nd</td>
<td>TEB: Free will and Law Chapters 6 and 7 Ethics Engagement (movie?)</td>
<td>2 reports due First Draft of Ethics Paper Due</td>
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<tr>
<td>14</td>
<td>April 29th</td>
<td>TEB: Morality and the brain Chapter 9</td>
<td>2 reports due</td>
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<td>15</td>
<td>May 6th</td>
<td>Paper Reviews</td>
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**ASSESSMENT COMPONENTS**

**Class Presentation (Hormones)**

**Participation Points**

- 2 x 8 = 16 points

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 25-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 4 points x 18 reports 72 points
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).

Neuroethics discussion lead 30 points
Participation points 2 x 8 16 points
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 16 points
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.

Final (Neuroethics Paper) 20 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: 200 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 away 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/](http://www.pugetsound.edu/student-life/student-handbook/academic-handbook/academic-integrity/)

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**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.