The ceaseless, self-announcing signal of the body in pain, at once so empty and undifferentiated and so full of blaring adversity, contains not only the feeling my body hurts but the feeling my body hurts me.” -- Elaine Scarry, “The Structure of Torture

Advanced Seminar in Neuroscience

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Course Description
A graduate-level seminar on the neural basis of nociception. Topics discussed will include molecular mechanisms of pain transduction, the spino-pontine-cerebral axis of pain processing, pharmacological and psychological influences on pain perception, and the relationship among pain, selfhood, and consciousness. We will also consider the social and cultural narratives that come to define and shape scientific investigations of pain. Course readings will be drawn broadly from both primary texts in the field as well as cultural studies of pain and its treatment. The overall learning goals of the course will be fully realized in independent, student-directed research grant proposals that further the current understanding of pain. Meets General Academic Requirement W. Prerequisites: Mind and Brain (NSC 201); Brain and Behavior (NSC 310), and Neurons and Networks (NSC 311).

Course Goals and Trajectory
This course is designed to provide you with a summative, writing-attentive, intellectually deep experience within neuroscience. The overarching goals of the course are: (1) to extend your knowledge of current research questions within neuroscience; (2) to provide you with the reading, writing, and research tools necessary for superior intellectual contributions to neuroscience; and (3) to ground you in an awareness of the current state of neuroscience by exposing you to parallel academic conversations in philosophy, biology, psychology, sociology, history, and cultural studies.

Although the specific focus of our class will be to read, analyze, and build upon the current understanding of the neural basis of pain, it is important for you to understand that this focus is secondary to the larger goals enumerated above. That is to say, the raw content of this course is of somewhat diminished importance. Although we will spend several class days building our own theoretical frame in which to interpret a neuroscience of pain, we will spend comparably less time discussing the actual neuroscience research that might be contained within such a frame. Rather, I will be expecting you to work independently to learn, at a deep level, the specific content that you will need to understand in order to craft a convincing and specific research grant proposal in the neuroscience of pain.

Given that I will be spending less time lecturing you on the raw content of this field, how do I plan to make use of class time? (1) I will provide you with key readings and references to ensure that you, as a class, have some shared foundational knowledge of the neuroscience of pain – and we will discuss these readings together; (2) I will begin the class by grounding our discussions in useful theory and key content, in order to further develop your analytical vocabulary and content-knowledge; and (3) most importantly, I will be developing your skills as a writer and thinker and practitioner of neuroscience. As a senior student, I expect that you already have honed your skills in assimilating new content (attend lectures, make study notes, write exams); by moving beyond this learning goal, we can begin to have more advanced, developmentally-appropriate conversations about working and thinking skills. In the end, working like a scientist is only partly about raw content; it’s also about graphic design, intellectual pragmatism, analytical writing, model building,
information literacy, knowing what questions to ask at a seminar, political jockeying, a keen sense of fashion, and excellent hand-eye coordination.

This course grants you a W perspective as a general academic requirement. To that end, the course uses writing as a way of thinking; it will also expose you to writing conventions within the (inter)discipline of neuroscience, including annotated bibliographies, literature reviews, and grant proposals. I will be working to strengthen your ability to communicate specific, difficult, and deeply-owned ideas in your writing. Please treat the writing assignments seriously, understanding that each of them has been built to encourage your growth as a thinker, as well as give you developmentally-appropriate and practical experience in research writing and analysis.

Assignment Summary
Individual assignments (with more specific direction) will be handed out in advance of assignment deadlines.

Twenty-minute tutorial 60 points

On several dates throughout the semester, I will turn over my role as facilitator/teacher to you. Together with another classmate, you will be responsible for summarizing the key findings of a recent research article in the neuroscience of pain in twenty class minutes. You will need to provide adequate, specific background; evaluate the most important figure(s) of the paper; and engage the class in a brief critical discussion. The major goal of this assignment, beyond strengthening your ability to unpack a scientific article, is to force you to be simultaneously economical, critical, AND engaging while discussing research literature.

Two abstracts 20 points each

The essential components of an abstract are: (1) one strong argument from an assigned reading and (2) one compelling idea/argument of your own that responds to the original argument. The evidence that you use to form your idea is “inspired” by the assigned reading, responds naturally by extending the ideas of the author, and may reflect stuff you’ve read before or in another class, your own personal ruminations, or ideas that we generate collaboratively in class discussion. These assignments will occur early in the semester and will function, in part, as diagnostic for any trouble you might be having in writing analytically.

Formal research grant 240 points, including sub-assignments

As a capstone assignment, you will design a novel research project in the neuroscience of pain. The project will be written as a grant application but will be built upon four sub-assignments: (1) a preliminary proposal sketching out the major questions of your project, (2) a research bibliography of critical manuscripts in your project, (3) a written critique of one paper from your research bibliography, and (4) your final formal grant proposal. You will also engage in a critical, anonymous peer review of another student’s proposal. Final projects will be assessed based on uniqueness, feasibility, analytical writing skills, and demonstrated understanding of the science and theory contained therein.

Class participation 60 points

This course depends on regular and engaged participation. Your facility in discussing assigned readings, your commitment to class material, your attendance and class participation, and your professionalism will be used to assign participation grades. There will be many times when you will be on the receiving end of a student-led discussion in this class; please support your class colleagues by doing the assigned reading and participating in discussion.

TOTAL 400 points
Evaluation
Grades will be assigned based on the sum of the total points you obtain by the end of the semester. Your score will be divided by 400 points and will be translated into a letter grade as follows: A+ = 100-97%, A = 96-93%, A- = 92-90%, B+ = 89-87%, B = 86-83%, B- = 82-80%, C+ = 79-77%, C = 76-73%, C- = 72-70%, D = 69-60%, F = 59% and below.

Course Texts
- Additional reading (available electronically on BlackBoard)

These texts are on sale in the College Bookstore (look in the Neuroscience section) and are also readily available from online distributors (including Amazon, Powells, Alibris).

Academic Behavior Code
All assignments are to be completed in line with the Academic Behavior Code of Muhlenberg College. I have zero tolerance for academic dishonesty. By submitting work in this class, you are pledging that your work is not plagiarized and is representative of only your ideas. Please be sure to read the Code carefully (the complete version is in your Student Handbook). Appropriate citation in science writing will be discussed in class.

Miscellany
- All assignments are due on the date indicated. I do not grant extensions on papers except in case of a medical emergency (documentation required). I will accept late papers but please bear in mind that they will be penalized for each day that they are past due.

- Please turn in papers with a single staple in the upper left hand corner. Make sure that your paper bears your name, the date, is paginated, uses 10, 11, or 12 point font, and has been proofread for grammar and spelling errors. You may submit your paper to me electronically if you wish, but please make sure that your formatting is standard.

- Please let me know if you have a documented learning disability that will require special accommodation. I will be glad to assist you.

- Please silence and stow all communication gadgetry prior to the beginning of class.

- Because this is an advanced class, I expect a fair amount of initiative, curiosity, and independence to be a part of your work. You are no longer passive recipients of knowledge (if you ever were) – please take responsibility for your learning and own it as an advanced student. To that end, sauciness and creativity are encouraged so long as they undergird a seriousness of critical intent. Whining and dependency are frowned upon.
Course Calendar

Readings marked with a ∆ are available in pdf format on BlackBoard.

Tuesday, August 31
Introductions and expectations

A. Pain as subject

Thursday, September 2
Pain and imagination
• Scarry, *The Body in Pain*, Chapter 3 (pp 161-180)

Tuesday, September 7
Pain and selfhood
• Harrington, *The Body that Speaks*, Chapter 2 (pp 68-102)

Thursday, September 9
Pain narratives of “right thinking”
• Harrington, *The Cure Within*, Chapter 3 (pp 103-138)

Tuesday, September 14
**Abstract one is due**
Pain narratives and modernity
• Harrington, *Broken By Modern Life*, Chapter 4 (pp 139-174)

Thursday, September 16
The biological function of pain
• Grahek, *Feeling Pain and Being in Pain*, Chapter 2 (pp 7-28)

Tuesday, September 21
‘Pain without painfulness’ I
• Grahek, *Feeling Pain and Being in Pain*, Chapters 3 and 4 (pp 29-50)

Thursday, September 23
**Library research session with Rachel Hamelers, Science Librarian**

Tuesday, September 28
**Abstract two is due**
‘Pain without painfulness’ II
• Grahek, *Feeling Pain and Being in Pain*, Chapters 5 and 6 (pp 51-93)

Thursday, September 30
Pain, torture, and power
• Scarry, *The Body in Pain*, Chapter 1 (pp 27-59)
B. Pain as object

Tuesday, October 5
Discussion of primary literature in molecular/cellular neuroscience of pain
• ∆ TBA

Thursday, October 7
Discussion of primary literature in molecular/cellular neuroscience of pain
• ∆ TBA

Tuesday, October 12
**Preliminary proposal is due**
Discussion of primary literature in molecular/cellular neuroscience of pain
• ∆ TBA

Thursday, October 14
Discussion of primary literature in systems/behavioral neuroscience of pain
• ∆ TBA

Tuesday, October 19
**No Class – Fall Recess**

Thursday, October 21
Discussion of primary literature in systems/behavioral neuroscience of pain
• ∆ TBA

Tuesday, October 26
Discussion of primary literature in systems/behavioral neuroscience of pain
• ∆ TBA

Thursday, October 28
**Annotated research bibliography is due**
Small talk: Some comments on transitioning from proposal to final grant

Tuesday, November 2
**Twenty minute tutorials I, II, and III**

Thursday, November 4
**Twenty minute tutorials IV and V**
Small talk: Some comments on methods design and writing

Tuesday, November 9
**Twenty minute tutorials VI and VII**
Small talk: Some comments on figure design

Thursday, November 11
**Literature critique is due**
Small talk: Some comments on obstacles to completion

Tuesday, November 16
**No Class – Society for Neuroscience Annual Meeting**
C. Pain as proposal

Thursday, November 18
Individual research proposal conferences

Tuesday, November 23
Individual research proposal conferences

Thursday, November 25
No Class – Thanksgiving Recess

Tuesday, November 30
Borrowing narratives from the East I
• Harrington, *The Cure Within*, Chapter 6 (pp 205-243)

Thursday, December 2
Research proposal is due to peer reviewers

Tuesday, December 7
Borrowing narratives from the East II
• Harrington, *The Cure Within*, Chapter 6 (pp 205-243)

Thursday, December 9
Reviewer response is due
Summation and commentary

Finals week, TBA
Final research proposal is due