

Moravian College
Neuroscience Seminar (NEUR 373) - Neuroplasticity
Spring 2014

Instructors:

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Th 10:30-11:30am and by appt

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Office hours: T & W
12:30-2:30pm and by appt

Class Meeting Time:

Fridays 12pm-3pm, PPHAC 103

Prerequisites:

Senior status or permission of instructors

Readings:

Readings will be chapters and journal articles distributed by the instructors in class or via Blackboard. Additional scholarly sources researched by the students will also be provided.

Course Description:

Brain plasticity, also known as neuroplasticity, is a term that refers to the brain's ability to reorganize itself by forming new neural connections throughout life. This neuroplasticity allows the neurons in the brain to compensate for injury and disease and to adjust their activities in response to new situations or changes in their environment. Plasticity in the brain is at its greatest in the growing, learning organism.

Synaptic communication between nerve cells changes in response to brain activity generated by new and repeated experiences. The design of the synapses themselves change; even the electrical responses of the cell membranes can be altered with repeated exposure to an event. Plasticity is also at work when the brain responds to repeated pain, or drug use, both of which can induce intense changes in motivation, habits, and life style.

A growing body of scientific literature is providing new therapeutic strategies to address damaged neural circuits. The ability to understand and affect brain plasticity will allow researchers and physicians to more effectively address healing brain defects, avoiding chronic pain, treating developmental disorders such as autism and preventing and treating addiction.

This seminar course will focus on the role of neuroplasticity as it begins in development and progresses through the aging processes of the brain. The impact of structural plasticity in learning and memory will be discussed as well as the influences of environmental and genetic

factors on the reorganization of neural connections within the brain. Finally, the role of functional or injury-induced plasticity will be examined during the process of brain repair.

This is the capstone course in the Neuroscience curriculum.

Course Objectives:

1. Read and discuss important biological and psychological theories and findings about neuroplasticity. To think critically about how genetic, environmental and other factors impact plasticity within the brain.
2. Generate class ownership of the material—students will be required to lead discussions on the material and give presentations on primary literature.
3. Strengthen skills used in reading, analyzing data, and forming conclusions from scientific literature.
4. Develop an understanding of the interdisciplinary approaches in examining a particular problem in the field of neuroscience.
5. Develop skills used in presentation design and public speaking.
6. Reflect actively on aspects of their academic and extracurricular experiences over their undergraduate careers, in relation to both the material being covered and personal career goals.

Course Evaluation:

Attendance: Each student is allowed two absences (not including days when they are expected to present). Except where arranged with the instructors on a case-by-case basis, for each absence beyond the allowed ones, **your final class participation grade will be reduced by 1 letter grade** (e.g., B+ → C+). Of course, a legitimate reason for being late can occur, but repeated lateness is disrespectful to the other members of the class. Please see one of the instructors if you have a legitimate reason for repeated lateness or absence.

Class Participation/Reading Responses: You will earn a grade based on your participation in class discussions and questions/reactions to the readings. We expect each set of assigned readings to have a 1-page maximum reaction prepared and brought to class. *In addition to this paper, you are to electronically submit three questions or comments you hope to share with the class by 9pm on Thursday (the evening before the topic is discussed).* Then, at the end of class, you will have the opportunity to add further reaction based on the day's discussion. These reading responses will be marked as completed, provided they reflect a reasonable degree of understanding of the readings. You will also be evaluated for your participation during the class discussion. Participation includes the following: asking questions, providing contributions that reflect an understanding of the material, responding to other students' points of view, answering questions in a manner that demonstrates reasonable preparation (having read the appropriate readings thoroughly), etc., Please be mindful to not overly dominate the discussion.

Ideas that go beyond the assigned readings for the day that are incorporated into your own comments or those synthesized across readings from different classes are especially encouraged.

Being attentive and engaged in what others are saying and taking notes is expected, but a high grade will require you to go beyond that and participate spontaneously (not just when called on). Students who arrive late to class disrupt the flow of the session and distract their peers. Please be prompt! Lateness will also negatively impact your participation grade, especially if chronic.

Interview Paper: This is a short paper (2 pages maximum) based on an interview conducted with a person in the field you wish to pursue. The interview itself does not need to be very long, but part of the process will involve generating some questions that relate to the idea of changes in habit, ability, performance, etc., over the course of one's career, and particularly as related to your interviewee's daily activities, obstacles in pursuing his/her career, etc.

Discussion Leader: You will be responsible for selecting an article to be read by the class and leading the discussion of that reading for part of the class period on that day. Your responsibilities will include organizing a list of questions and key larger themes for the class to discuss. You can start off with a brief overview of the reading for no more than 5 minutes, and then you will engage the class in active discussion. You will bring in a handout to help guide the class through the ideas/questions you have prepared. It is your responsibility to keep the class discussion going for the length of the assigned portion of class; however, other students are, as always, responsible for being active participants—each student's participation on those days will factor particularly heavily into their class participation grades. Having hands-on activities, in-class writing, demonstrations, or other unique ways of engaging with the material is encouraged!

Research Paper and Presentation: Toward the end of the semester, you will be responsible for composing a research paper related to the theme of neuroplasticity. You will be expected to engage in a meaningful literature review followed by a novel research proposal on a topic of your choosing. You will also give a formal presentation of your research design, including hypothetical results. This assignment should be modeled after the style and format of conference presentations in this field. More information will follow about the paper and presentation as the course progresses.

Portfolios: The purpose of the portfolio assignment will be to address various facets of your academic growth within the Neuroscience major. You will reflect on abilities such as oral and written communication, research skills and development of career goals. The portfolio will be composed of the following: self-statement, writing assessment, research skills assessment, service learning/advocacy assessment and resume. More information will be provided in a separate document to be distributed in class.

Late Policy: Late assignments or papers will be accepted for up to four days after the due date and, unless otherwise noted, will result in **a reduction in points equivalent to one letter grade (10%) for every calendar day late** beginning at 5pm on the day the assignment is due (unless otherwise noted). After the four-day period, a paper will not be accepted and a grade of 0

will be applied. No exceptions will be made for minor technical difficulties (printer or email mishaps), but other circumstances may allow for exceptions as determined by the instructors on a case-by-case basis.

Plagiarism and Cheating: Any work that you turn in for this class must be entirely your own work. Any sources used must be properly documented and ***we will ask you not to use any direct quotes in papers or presentations.*** For more information on plagiarism and cheating, refer to the Student Handbook and the following website regarding academic responsibility at Moravian College: <http://www.moravian.edu/studentlife/handbook/academic/academic2.html>. As this site clearly explains, the consequences for cheating or plagiarism can range from failing the assignment to receiving an F for the final course grade to expulsion, depending on the severity of the case and prior history of offenses. All of the work you submit must be entirely your own. It is your responsibility to come see one of the professors if you have any questions about your use of sources.

Disabilities: The Americans with Disabilities Act (ADA) provides for some accommodations to be made for students with certain disabilities. Students who wish to request accommodations in this class for a disability should contact the Director of Academic and Disability Support at 1307 Main Street, or by calling 610-861-1510. Accommodations cannot be provided until authorization is received from the Academic Support Center.

The Writing Center is located in a building that is not accessible to persons with mobility impairments. If you need the services of the Writing Center, please call 610-861-1392.

Extra Help: If any difficulties arise during this course from selecting a research topic to designing your presentation, please see one of the instructors. *We will be happy to help!* The reference librarians in Reeves Library are also willing to assist you with reference materials.

Grading:

Class participation/Journal	100 pts
Class-led discussion	100 pts
Drug use and addiction article	50 pts
Research paper draft	100 pts
Interview paper	50 pts
Research paper final version	200 pts
Final portfolio	100 pts
<u>Research presentations & abstracts</u>	<u>150 pts</u>
Total	850 pts

Note that it is within our purview as instructors to use qualitative judgments in determining grades for presentations, papers, participation, or other aspects of the course.

Tentative Class Schedule: Any changes to this schedule will be announced in class or via Blackboard.

Date	Class topic/activities:	Assignments:
1 Jan 17	Introduction to course and scientific writing; Start portfolios	
2 Jan 24	Neuroplasticity in Development - <i>Fox</i>	
3 Jan 31	Learning and Memory - <i>Johnson</i>	
4 Feb 7	Language - <i>Johnson</i>	
5 Feb 14	Drug Use and Addiction	<i>Source for student-led discussions due</i>
6 Feb 21	Injury-Induced Neuroplasticity - <i>Fox</i>	
7 Feb 28	Resume Workshop Service Learning/Advocacy	<i>Resume draft due</i>
8 Mar 7	No class – Spring break	
9 Mar 14	Student-led discussions	<i>Interview paper due</i> <i>Additional 3 sources for paper due for approval</i>
10 Mar 21	Student-led discussions; Writing assessment workshop	
11 Mar 28	Student-led discussion	
12 Apr 4	No class - NCUR Conference <i>Mandatory conferences regarding research paper by this week</i>	<i>Research paper draft</i>
13 Apr 11	<i>Research presentations</i>	<i>Completed portfolios due</i>
14 Apr 19	No class - Easter recess	
15 Apr 25	<i>Research presentations</i>	
Finals Week	<i>Research Paper due (date TBD)</i>	