INSTRUCTOR: Dr. Ryan Parsons
OFFICE: Psych B, Rm. 320
OFFICE HOURS: By appointment

COURSE MATERIALS: Readings for each topic will be distributed

COURSE DESCRIPTION:
Learning and memory result in long-term changes in behavior, which are supported by molecular and cellular changes in the brain. This seminar will cover background on the basics of molecular and cellular neurobiology. Students will read and discuss works on topics including: intrinsic and synaptic plasticity, neural mechanisms of memory consolidation, in vivo models of plasticity, and memory systems. Special focus will also be given to state-of-the-art techniques currently being used to probe brain function as they relate to learning and memory.

COURSE REQUIREMENTS:
Attendance:
Regular attendance is mandatory. If you anticipate having to miss a class for a legitimate reason (e.g. attending a conference), please let me know at the beginning of the semester.

Weekly Readings:
There is no textbook for the course. Weekly readings are listed below. Articles to be discussed for each class period will be available on “blackboard” for download (http://blackboard.stonybrook.edu/).

Weekly presentation and discussion:
Each week, a class member will give a presentation and lead the discussion on the assigned readings. (Presentations should be done in PowerPoint format.) Presentations should last 1 hour and discuss the pertinent literature background, highlight the research question addressed in the article, review the methodology used to answer the question, and discuss the results and their interpretation in relation to the general topic under investigation. Each student will be responsible for leading the discussion 3 times over the semester.

Weekly questions/comments on the readings:
Class members who are not presenting are expected to submit short reaction papers (no longer than 1 page) for each article. You are recommended to first write a brief summary of the article (a few sentences should be sufficient) and then make comments related to (1) the significance and potential impact of the paper, (2) the authors theoretical arguments and empirical approach, and (3) make suggestions for further analyses/experiments. The purpose of the reaction papers is to show that you’ve read the papers and to further develop critical thinking.

GRADING:
Grading will be based on the quality of the presentations, participation in class, and submission of questions/reaction papers for each class topic.

DESCRIPTION AND SCHEDULE OF THE REQUIRED READINGS AND TOPICS:

Class Schedule

Week/Date Discussion Topic
Week 1
Jan. 24 Class organization – Lecture: Introduction to the Biology of Memory
Background Readings:

Jan. 26  Lecture: Cell Biology of learning and memory
Background Readings:

Week 2
Jan. 31  Memory Systems: The Hippocampus
Background Readings:
Research articles:

Feb. 2  Memory Systems: The amygdala and cerebellum
Background Readings:
Research articles:

Week 3
Feb. 7  Long-Term Potentiation as the cellular correlate of learning
Background Readings:
Research articles:

Feb. 9  Neurobiology Seminar
Michael Hasselmo – Boston University
12:00-1:00
Life Sciences Bldg - Room 038
Week 4
Feb. 14 Metaplasticity and learning

Background Readings:

Research articles:

Feb. 16 Neurobiology Seminar
Andre Fenton – New York University
12:00-1:00
Life Sciences Bldg - Room 038

Week 5
Feb. 21 Synaptic Tagging and memory

Background Readings:

Research articles:

Feb. 23 Glutamate Receptors and Learning

Research articles:

Week 6
Feb. 28 Protein Kinase Signaling

Background Readings:

Research articles:

Mar. 2 Protein synthesis and memory

Background Readings:

Research articles:

Week 7
Mar. 7 CREB and memory
Background Readings:

Research articles:

Mar. 9 Epigenetic Regulation of Memory
Background Readings:
Research articles:

Mar. 14 SPRING BREAK
Mar. 16 SPRING BREAK

Week 8
Mar. 21 Protein kinase M-Zeta and memory maintenance
Background Readings:
Research articles:

Mar. 23 Reconsolidation of memory after retrieval
Background Readings:
Research articles:

**Week 9**
Mar. 28 ___________________________ Extinction learning
*Background Readings:*
*Research articles:*

Mar. 30 ___________________________ Extinction of memory following retrieval
*Background Readings:*
*Research articles:*

**Week 10**
Apr. 4 ___________________________ From the lab to the clinic: D-cycloserine
*Research articles:*

Apr. 6 ___________________________ Stress effects on memory
*Background Readings:*
*Research articles:*
Week 11
Apr. 11 The role of neurogenesis in memory
Background Readings:
Research articles:

Apr. 13 Sleep and memory
Background Readings:
Research articles:

Week 12
Apr. 18 Optogenetic manipulation of memory
Background Readings:
Research articles:

Apr. 20 ‘DREADD’ manipulation of memory
Background Readings:
Research articles:

Week 13
Apr. 25 Using CRISPR/Cas9 to manipulate memory
Background Readings:
Research articles:

Apr. 27 Experimenter effects on behavior

**Week 14**

May 2  Preventing age-related memory decline


May 4  The Nature of Amnesia


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**ACADEMIC INTEGRITY STATEMENT:**

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person’s work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, and Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at

**CRITICAL INCIDENT MANAGEMENT:**

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.
Blackboard and electronic communication:
In addition to classroom communications, announcement posted on blackboard and email sent via Blackboard are ways we will officially communicate with you for this course. It is your responsibility to check blackboard announcements and read your email in your official University email account. For most students that is Google Apps for Education (http://www.stonybrook.edu/mycloud) but you may verify your official Electronic Post Office (EPO) address at: http://it.stonybrook.edu/help/kb/checking-or-changing-your-mail-forwarding-address-in-the-epo
If you are not familiar with using blackboard, read the following information.
You can access class information on-line at: http://blackboard.stonybrook.edu
In order to log into this website, you will need your blackboard user name and password. If you have used Blackboard in the past, your login information (Username and Password) has not changed. If you have never used Stony Brook’s Blackboard system, your initial password is your SOLAR ID# and your username is the same as your Stony Brook (sparky) username, which is generally your first initial and the first 7 letters of your last name. For help or more information see: https://tlt.stonybrook.edu/StudentServices/BbStudents/Pages/default.aspx
For problems logging in, go to the helpdesk in the Main Library SINC Site or the Union SINC Site, you can also call: 631-632-9602 or e-mail: helpme@stonybrook.edu