

## **Course Description and Syllabus**

### **Course Information**

BMS 660 Cellular, Molecular, and Developmental Neurobiology

Course description: This class is directed reading with discussion, supplemented by reading and discussion of classic papers in the field of Neuroscience.

Number of credit hours: 3

Prerequisites (previous courses, knowledge, and skills): none

General Education requirements satisfied (if applicable): none

### **Faculty Information**

Name: Rob Burgess, PhD

Phone, fax numbers: 207-288-6706

E-mail address: Robert.burgess@jax.org

### **Instructional Materials and Methods**

Textbook title(s) and other required course materials: *Principles of Neuroscience* and/or *From Neuron to Brain*, as well as selected seminal papers in the field

### **Student Learning Outcomes**

Course Goals: Understanding of neuroscience breakthroughs, including methods, and key discoveries and insights.

Instructional Objectives: Students will be able to critically analyze neuroscience literature.

Student Learning Outcomes: Students given research paper will be able to differentiate the breakthroughs in neuroscience and explain

why they were breakthroughs, the methods, discoveries, and outcomes.

## Grading and Course Expectations

Your grading criteria: Participation demonstrating understanding will be 50% of the grade, another 50% will come from the written final.

Grading Scale:

93-100%	A
90-92%	A-
87-89%	B+
83-86%	B
80-82%	B-
77-79%	C+
73-76%	C
70-72%	C-
67-69%	D+
63-66%	D
60-62%	D-
59% and below	F

Your Policies:

- Attendance and class participation: required, 50% of grade
- Final date for all work to be in, unless other arrangements have been made with instructor: May 8<sup>th</sup>

## Course Schedule:

Week 1, Jan 16 Intro to the class and its "organization"

Buy:

Kandel, Schwartz, Jessell, Siegelbaum and Hudspeth Principles of Neuroscience, 5th Ed.

Nicholls, Martin, Fuchs, Brown, Diamond, Weisblat, From Neuron to Brain, 5th Ed.

Download: MIT OpenCourseware or iTunesU, Gerald Schneider, Brain Structure and Its Origins, and Neuroscience and Behavior

Week 2, Jan 23 Ionic basis of the resting potential

Have read FNTB Chapter 6, PONS Chapter 6

Hodgkin and Huxley papers

Week 3, Jan 30 Ionic basis of the action potential  
Have read FNTB chap 7, PONS Chapter 7  
More Hodgkin and Huxley

Week 4, Feb 6 Ion Channels  
Have read FNTB Chapter 4,5 PONS Chapter 5  
Sackman and Neher patchclamp papers

Week 5, Feb 13 Electrical signaling (pumps etc)  
Have read FNTB Chapters 8,9  
Zagotta and Aldrich on K-channel gating

Week 6, Feb 20 Synaptic transmission  
Have read FNTB Chap 11,12 PONS Chapter 8 (see also 9,10,11)  
Del Castillo and Katz, Fatt and Katz - quantal release at the NMJ

Week 7 Feb 27 Vesicle cycle (SNAREs)  
Have read FNTB Chapter 13, PONS Chapter 12  
Sollner et al., SNAREs, Sudhof review article

Week 8, March 6 Spring Break

Week 9, March 13 Spring Break

Week 10, March 20 Neurotransmitter systems  
Have read FNTB Chapter 15, PONS Chapter 13  
Dunce and Rutabaga in flies

Week 11, March 27 Synaptic Plasticity  
Have read FNTB Chapter 16, PONS last part of Chapter 12 above  
Bliss and Lomo, NMDA receptor  $Mg^{++}$  block, Sackter mechanisms of LTP

Week 12, April 3 Neurodevelopment Cell fate, cell migration  
Have read ½ of Chapter 25 FNTB, PONS chapters 52, 53  
Jessell and Pfaff, spinal cord papers

Week 13, April 10 Axon outgrowth and guidance  
Have read rest of Chapter 25 FNTB, PONS Chapter 54  
Marc Tessier-Laviegn, Netrin discovery and review

Week 14, April 17 Synaptogenesis  
Have read FNTB third half of Chapter 25, PONS Chapter 55  
Sanes and Lichtman review, Scheiffle paper

Week 15, April 24 Developmental critical periods and Regeneration  
(Rob in TX)

Have read FNTB chapters 26,27 PONS chapter 57  
O'Leary on topographic maps, Konishi Bird song

Week 16 May 1 Visual system to tie it all up, anatomy, activity-  
dependent refinement

Have read PONS Chapter 56  
Hubel and Wiesel papers

May 8 Final due: The auditory system localizes sound by differences in  
timing and intensity, tell me how, explaining the anatomy, synaptic  
connectivity, and cellular physiology, 5 pages. Cite at least 5 primary  
(classic) refs. 50% of grade

**Course Schedule Disclaimer (Disruption Clause):** In the event of an  
extended disruption of normal classroom activities, the format for this  
course may be modified to enable its completion within its programmed  
time frame. In that event, you will be provided an addendum to the syllabus  
that will supersede this version.

**Academic Honesty Statement:** Academic honesty is very important.  
It is dishonest to cheat on exams, to copy term papers, to submit  
papers written by another person, to fake experimental results, or to  
copy or reword parts of books or articles into your own papers without  
appropriately citing the source. Students committing or aiding in any  
of these violations may be given failing grades for an assignment or  
for an entire course, at the discretion of the instructor. In addition to  
any academic action taken by an instructor, these violations are also  
subject to action under the University of Maine Student Conduct Code.  
The maximum possible sanction under the student conduct code is  
dismissal from the University.

**Students with disabilities statement:** If you have a disability for  
which you may be requesting an accommodation, please contact Ann  
Smith, Director of Disabilities Services, 121 East Annex, 581-2319, as  
early as possible in the term.

**Sexual Discrimination Reporting**

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of **sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination** involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

**If you want to talk in confidence** to someone about an experience of sexual discrimination, please contact these resources:

For *confidential resources on campus*: **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000**.  
For *confidential resources off campus*: **Rape Response Services: 1-800-310-0000** or **Spruce Run: 1-800-863-9909**.

**Other resources:** The resources listed below can offer support but may have to report the incident to others who can help:

For *support services on campus*: **Office of Sexual Assault & Violence Prevention: 207-581-1406**, **Office of Community Standards: 207-581-1409**, **University of Maine Police: 207-581-4040 or 911**. Or see the OSVP website for a complete list of services at <http://www.umaine.edu/osavp/>