NEU 301

Introduction to Neuroscience I

Fall 2012

Tuesdays and Thursdays 8:30 – 9:50 am

118 Psychology Building

Dr. Laura Symonds Dr. James Galligan

symonds@msu.edu galliga1@msu.edu

Office Phone 3-8947 Office Phone 3-8947



Course Description

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WELCOME! MSU has a brand new neuroscience major, and you are the very first students to take an official MSU undergraduate neuroscience course!

This is the first semester of a two-semester core neuroscience course sequence. When we designed the neuroscience major, we wanted to make sure students had a chance to experience at least a smattering of the huge, broad, interdisciplinary field of neuroscience, and we didn’t see how we could accomplish that in one semester. Hence, the course name: *Introduction to Neuroscience I*.

The topics that we will cover this semester include the basic principles of neuroscience that you simply have to understand if you want to call yourself a neuroscience major (or better yet, neuroscientist). These topics are Neural Signaling, and Basic Systems and their Organization. If you stick with us and take *Introduction to Neuroscience II* next semester you will get to apply some of these neuroscience principles to understand how the nervous system controls some of the most interesting (and sometimes baffling) subjects in neuroscience, such as how we learn and remember and what happens when we are asleep.

A note about how we are planning to help you learn: We know that there is nothing like learning something – and taking charge of it! Therefore, much of this course is designed to put *you* in charge of your own learning. We have planned lectures, activities, projects and assignments with that in mind, and we are committed to partnering with you in this learning adventure. We do want to know what is working for you and what needs changing, so we will be asking you about this throughout the semester.

Finally, neither of us has posted office hours because we hope you will ask us questions whenever they arise – in class, after class. You can phone or email us, and if you want to set up a time to meet, we will be happy to do that.

**Here is the nitty-gritty of the course:**

**Reading**

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Reading will consist of one text, one popular-press neuroscience book of your choice (and approved by instructor), and case study materials posted on Angel for three separate in-class activities.

Text: *Neuroscience: Exploring the Brain*, by Mark F Bear, Barry W Connors, and Michael A Paradiso; published in 2007 (3rd edition). A lot happens in the neuroscience field in five years, but this text is a particularly readable neuroscience textbook and we have selected it with care. We will make sure to give you up-to-date information in lectures and in sources for classroom activities.

Popular Press Neuroscience Book: This book will be selected by you. You may choose from a list of suggested books (posted on Angel), or you may select one that you find on your own. See below (*Term Project*) for more information.

Case Study Materials: These will usually be published, peer-reviewed scientific articles, and links to them will be posted on Angel.

**Grading**

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Exam #1: 25 points

Exam #2: 45 points

Case Study activity #1: 10 points

Case Study activity #2: 10 points

Case Study activity #3: 10 points

Mid-course feedback for instructors: 5 points

Term Project: 60 points

**Total 165 points**

Grade Scale:

4.0 > 90% 148 – 165 points 2.0 70 – 74% 115 – 123 points

3.5 85 – 89% 140 – 147 points 1.5 65 – 69% 107 – 114 points

3.0 80 – 84% 132 – 139 points 1.0 60 – 64% 99 – 106 points

2.5 75 – 79% 124 – 130 points 0.0 < 60% < 99 points

**Other Course Information**

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*Attendance:*

Attendance is not required. However, if you are absent without an excuse on days of graded group activities, you will receive 0 points for the activity. Absence due to religious holidays, team commitments or other foreseeable and important circumstances will be excused if you let us know in advance. In such cases, you will receive points based on the average number of points you earn on the other graded group activities.

*Term Project (Book Review and Peer Review):*

The term project, to read a popular-press book on neuroscience and post a review of it to Amazon, is adapted from Bob Calin-Jageman (who, I am told, adapted it from Steve Potter).

Due Dates and Points for Term Project Assignments:

|  |  |  |
| --- | --- | --- |
| **Date** | **Assignment** | **Point Value** |
| Thursday 9/13 | Book Selection | None\*  |
| Tuesday 10/23 | Book Summary | 5 points |
| Tuesday 11/13 | Draft #1 of Review | 15 points |
| Tuesday 11/27 | Peer Review Feedback on two reviews | 5 points each |
| Tuesday 12/4 | Final Draft of Review | 30 points |
| Tuesday 12/6 | Final review posted to Amazon | None\* |

\* Negative points awarded if late

*Academic Integrity:*

The “Academic Freedom for Students at Michigan State University**”** document(found at <http://splife.studentlife.msu.edu>) is a legal document that you, as a member of the MSU community, should be familiar with. The welcome letter at the beginning reads, in part:

“As an academic community, it is necessary to set standards that will promote an environment conducive to learning. The first part of Spartan Life presents the policies, regulations and guidelines developed to provide an atmosphere that furthers opportunities for intellectual and personal development while protecting individual freedoms. As a student you are encouraged to exercise your rights and you are expected to meet your responsibility to adhere to the standards set. The second part of this guide serves to inform you of the rules, regulations, rights and responsibilities that have been established in the interest of all members of the University community.”

The following link provides helpful information about plagiarism that was put together by the School of Education at Indiana University. There is a great online quiz that you can take to see if you understand what is and is not plagiarism. Knowledge is power! (Take the quiz.)

<https://www.indiana.edu/~tedfrick/plagiarism/>

*Course Outline and Schedule*:

|  |  |  |  |
| --- | --- | --- | --- |
| **Date****Instructor** | **Topic** | **Homework (due by class session on this day)** | **Other assignments** |
| Thu 8/30 LLS | INTRODUCTION |  |  |
| Tue 9/4LLS | Lab ‘practical’Discussions: Class Rules; Learning Goals; Academic IntegrityBrief History of Neuroscience | Bear, pp 206-210Bear, Ch. 1, pp. 4-13 onlyWebsite Treasure Hunt (optional – for extra credit) |  |
| Thu 9/6LLS | Cellular Components of the Nervous System | Bear, Ch.2 |  |
| Tue 9/11JG | BEGIN DOMAIN 1: NEURAL SIGNALINGElectrical signals of nerve cells | Bear, Ch. 3 |  |
| Thu 9/13JG | Voltage-dependent membrane permeability | Bear, Ch. 4 | Term Project: Deadline for selecting book |
| Tue 9/18JG | Ion channels and transporters | Bear, Ch. 6 |  |
| Thu 9/20JG | Synaptic transmission | Bear, Ch. 5 |  |
| Tue 9/25LLS | Practice Test;Cell Signaling |  |  |
| Thu 9/27LLS | Guest Lecture: AstocytesDr. Brian Gulbransen | Spend < 1 hour looking up material on astrocytes |  |
| Tue 10/2JG | Transmitters and their receptors | Bear, Ch. 6 |  |
| Thu 10/4JG | Molecular signaling within neurons |  |  |
| Tue 10/9JG | Practice test: Cell Signaling |  |  |
| Thu 10/11JG | Review of Cell Signaling Practice Test |  |  |
| Tue 10/16 | **EXAM #1** |  |  |
| Thu 10/18LLS | BEGIN DOMAIN 2: SENSATION, AUTONOMIC NERVOUS SYSTEM; SENSORY PROCESSINGIntroduction to: Somatosensory System: touch and proprioception | Bear, Ch. 12,pp. 387-407 |  |
| Tue 10/23LLS | Somatosensory System: touch and proprioception | Bear, Ch. 12,pp. 387-407 | Term Project: Summary of book due |
| Thu 10/25JG | Autonomic nervous system I | Bear, Ch. 15,pp. 490-497Bear, Ch. 7,pp. 230-231 |  |
| Tue 10/30JG | Autonomic nervous system II | Bear, Ch. 15,pp. 490-497Bear, Ch. 7,pp. 230-231 |  |
| Thu 11/1JG | In-class group project: Autonomic neuropathy and pain (10 points) |  |  |
| Tue 11/6LLS | ~~Pain~~ Cancelled | Bear, Ch. 12,pp. 408-418 |  |
| Thu 11/8LLS | Pain; In-class activity: Central Pain Pathways |  |  |
| Tue 11/13LLS | Modulation of PainIntroduction to Visual System | Bear, Chs. 9 & 10 | Term Project: Draft #1 of book review due |
| Thu 11/15JG | Auditory System and Vestibular System | Bear, Ch. 11 |  |
| Tue 11/20JG | Chemical Senses | Bear, Ch. 8 |  |
| ***No Class Thursday 11/11: Thanksgiving Break*** |
| Tue 11/27LLS | Discussion: Peer Review Groups(IMPORTANT: See note on Grading Rubric for Peer Review Checklist!)  |  | Term Project: Peer reviews of two other students’ drafts |
| Thu 11/29 | **Exam #2** |  |  |
| Tue 12/4JG | Synaptic Plasticity & In-Class Group Project (10 points) |  | Term Project: **Final draft** of Amazon book review |
| Thu 12/6LLS | Molecular Neuroscience: In-Class Project; Gel Scramble (10 points) |  | Term Project: Deadline for posting book review on Amazon.com |