NSC 210: ‘Fundamentals of Neuroscience’  Spring 2019

Instructor: Adam Hall
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Office hours: Mon 10-11, Fri 4-5, or by appointment
Teaching Assistant: Vivian Qian (qqian@smith.edu)


Course Description: The course will provide an introduction to the
organization and function of the mammalian nervous system along with an
exploration of the brain using multiple levels of analysis ranging from molecular
to cognitive and behavioral approaches. The course will develop an
appreciation of how brain cells interact to orchestrate responses and
experiences. Emphasis will be placed on the cellular and molecular physiology
of the nervous system with a focus on retinal phototransduction and
mechanisms governing motor control. The material will be presented at a level
accessible for life science majors. Prerequisites: BIO 132 Cells, Physiology and
Development or AP BIO 4/5, or permission of the instructor. A basic
appreciation of this level of biology is essential in order to understand the
cellular and molecular underpinnings of the nervous system and the biological
bases of behavior. {N} Credits: 4

Course Objectives: This course will survey the organization and function of the
nervous system. We will take a close look at the structure and function of individual
neurons, how they communicate, and how they are arranged to form the nervous
system. We will examine the structure and function of the systems that serve the
senses bringing information about our environment to the brain and how that
information is processed to generate movement. Additionally, we will explore the
neurobiology of motivation and memory, and if time allows, other areas of interest.
This is a great deal to accomplish in only one semester, but it will be fun and
manageable if you don’t fall behind in your work. If there is anything that you do not
understand or need help with, please come to office hours or make an appointment to
see me or the teaching assistant.

Lecture Attendance: It is expected that you attend every class meeting.
Material covered in lecture is information considered most important and will
be covered in quizzes and the final exam. In addition, important
announcements regarding changes in scheduling or assignments may be made in
class. If you miss a class meeting, get the class notes from a colleague, and
drop by in office hours to confirm your understanding.
Consideration will be given to students for religious observation, provided you let me know in advance. Absences for religious reasons will be considered similar to the type of absence granted for illness or a major life event.

**Assessment:** Your grade in this course will be comprised of 2 semester quizzes, 2 homework assignments, group preparation of a week of lecture notes and 1 final exam. All quizzes/exams are closed-book (according to the Honor code) and based upon material presented in lecture. The final exam will be self-scheduled during Finals Period and will cover material in the last section of the course as well as some general questions drawn from the whole semester’s coursework. Homework assignments will be posted on Moodle or discussed in class and are due on the day noted in the course schedule. Please place a hardcopy of your homework in the box outside my office (Ford Hall 202A) or preferably bring your completed work to class.

**Weighting of Assignments**

- **Quiz 1:** 20%
- **Quiz 2:** 20%
- **Final Exam:** 25%

**Total** 65%

*(Note: Quizzes and the final exam will consist of multiple choice and short answer questions).*

- **Homework (x2):** 25% total.
- **Group-prepared lecture notes (x1 in groups of 4):** 10% *(groups responsible for notes specified in syllabus)*

Your final grade will be calculated in the following manner:

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<thead>
<tr>
<th>Numerical Average (%)</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>100-93</td>
<td>A</td>
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<tr>
<td>92.9-90</td>
<td>A-</td>
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<tr>
<td>89.9-87.5</td>
<td>B+</td>
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<td>87.4-82.6</td>
<td>B</td>
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<tr>
<td>82.5-80</td>
<td>B-</td>
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<tr>
<td>79.9-77.5</td>
<td>C+</td>
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<tr>
<td>72.5-70</td>
<td>C-</td>
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<td>69.9-67.6</td>
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<tr>
<td>67.5-62.6</td>
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<tr>
<td>62.5-60</td>
<td>D-</td>
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Course Schedule/Readings (Bear: "Neuroscience: Exploring the brain 4th edition")
The course schedule outlined below is subject to revision. Any revisions will be announced in class and/or via Moodle

Week 1: January 24

**Thursday:** Introduction and overview of course

Week 2: Jan 29, 31  (Group #1 responsible for lecture notes)

**Tuesday:** Cells of the nervous system *(Chapter 2)*
**Thursday:** Neuronal membrane potentials *(Chapter 3)*

Week 3: February 5, 7  (Group #2 responsible for lecture notes)

**Tuesday:** Action potentials *(Chapter 4)*
**Thursday:** Voltage-gated ion channels *(Chapter 4)*

Week 4: February 12, 14 (Group #3 responsible for lecture notes)

**Tuesday:** Synaptic transmission *(Chapter 5)*
**Thursday:** Neurotransmitters and receptors *(Chapter 5/6)*

Week 5: February 19, 21  (Group #4 responsible for lecture notes)

**Tuesday:** Neurotransmitters and receptors continued *(Chapter 5/6)*

**HOMEWORK 1 DUE in class**

**Thursday:** Guest Lecture: Prof. Lisa Mangiamele.

Week 6: February 26, 28

**Tuesday:** Neuronal signaling pathways *(Chapter 6)*  (Group#4)
**Thursday:** Neuroanatomy *(Chapter 7)*  (Group#5)

Week 7: March 5, 7

**Tuesday:** QUIZ 1 *(administered in class)*
**Thursday:** Neuroanatomy, Imaging techniques and Neurological disorders *(Chapter 7)*  (Group#5)

**SPRING BREAK - No Classes March 12,14**
Week 8: March 19, 21 (Group#6)

**Tuesday:** Visual system: the Retina (Chapter 9)
**Thursday:** Visual system: the retina (Chapter 9)

Week 9: March 26, 28

**Tuesday:** Visual system: central processing (Chapter 10)
**Thursday:** Touch and Pain (Chapter 12) (Group#7)

Week 10: April 2, 4 (Group#8)

**Tuesday:** Lower motor neurons (Chapter 13)
**Thursday:** Upper motor control (Chapter 14)

Week 11: April 9, 11

**Tuesday:** QUIZ 2 (administered in class, ACH away)
**Thursday:** Neurogenesis and plasticity (Chapter 23) (Group#9)

Week 12: April 16, 18 (Group#9)

**Tuesday:** Guest Lecture: Prof. Mary Harrington on Memory Processes
**Thursday:** HOMEWORK 2 DUE in class
Memory and plasticity (Chapter 24)

Week 13: April 23, 25 (Group#10)

**Tuesday:** Plasticity (Chapter 25)
**Thursday:** Evolution of cognition (if time!)

Week 14: April 30

**Tuesday:** Review for final exam