LEARNING OUTCOMES:

By the end of the course, students should be able to:

1. identify and describe genetic and epigenetic factors that are important in the proliferation, growth, connectivity, and activity of neurons.
2. describe molecular cascades involved in neural induction, proliferation, and naturally occurring cell death.
3. propose hypotheses (and alternative hypotheses) for neural development; design experiments to test competing hypotheses to explain neural development; and interpret results of tests those hypotheses.
4. evaluate experimental procedures testing neural development, including identifying and proposing appropriate control experiments.

Course details: For this course we will be using the textbook: Development of the Nervous System (3rd edition, eds. Sanes, D., Reh, T., and Harris, W.), Academic Press 2012. Also, both review articles and primary research literature will be assigned occasionally to augment the textbook and lectures. Electronic copies of these readings will available through the “Course Materials” tab on the webpages in MyCourses. You are expected to complete these readings before each class.

Lecture slides and notes will also be posted under the “Course Materials” tab. I will attempt to post the slides before class. Please be aware that last minute changes may occur and will be announced in class.

Course evaluation: You will be graded based on your performance on 3 midterm exams. The first two midterms will be worth 35% of your final grade, and the third exam will be worth 30% of your final grade. The exam schedule is posted below. Please note that there is no comprehensive final exam, and you MUST take each exam to pass. Please do NOT ask for extra credit assignments to make up for other grades. There will be no substitutions for your midterm grades.

Note: No make-up exams will be given unless a written confirmation of a valid excuse is provided. If you know you will miss an exam in advance, please contact me ASAP to schedule a makeup. If you have any kind of emergency that prevents you from attending the exam, please contact me ASAP (email or leave a phone message) preferably before the end of the exam.

Grades will be assigned according to the following scale:

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>94-100%</td>
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<tr>
<td>A-</td>
<td>90-93</td>
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<tr>
<td>B</td>
<td>84-86</td>
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<td>C-</td>
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<tr>
<td>D</td>
<td>60-69%</td>
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<td>E</td>
<td>0-59</td>
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ACCOMMODATIONS: SUNY Geneseo will make reasonable accommodations for persons with documented physical, emotional or learning disabilities. Students should contact Disability Services (Assistant Dean Tabitha Buggie-Hunt, Erwin 106A) and their faculty to discuss needed accommodations as early as possible in the semester. (Webpage: http://www.geneseo.edu/dean_office/disability_services)
Course Schedule (Tentative and subject to change)

Jan. 22  Course overview and Neuroscience overview
Jan. 24  Basic concepts in developmental biology
Jan. 29  Neural induction and regionalization I
Jan. 31  Neural induction and regionalization II

Feb. 5  Cell production, migration and differentiation in the nervous system I
Feb. 7  Cell production, migration and differentiation in the nervous system II
Feb. 12  Cell production, migration and differentiation in the nervous system III
Feb. 14  Neurite outgrowth and pathfinding I
Feb. 19  Neurite outgrowth II: End of material for Exam I
Feb. 21  Review
Feb. 26  EXAM I (35%)

Feb. 28  Synapse formation

Mar. 5  Molecular cues underlying the specificity of connections I
Mar. 7  Specificity of connections II
Mar. 12  Programmed cell death in the nervous system
Mar. 14  Mechanisms of cell death and trophic factor action

Mar. 18-22  BREAK

Mar. 26  Early experience and synaptic rearrangement I
Mar. 28  Early experience and synaptic rearrangement II: End of material for Exam II

Apr. 2  Review
Apr. 4  EXAM II (35%)
Apr. 9  Hormonal influences on neural and behavioral development
Apr. 11  TBA
Apr. 16  GREAT DAY – No class
Apr. 18  Cellular mechanisms for learning and memory I
Apr. 23 Cellular mechanisms for learning and memory II
Apr. 25 Models of early learning: sound localization in owls
Apr. 30 Models of early learning: vocal learning in songbirds
May 2 Reorganization of sensory and motor maps in adulthood: cellular parallels with developmental plasticity: **End of material for Exam III**
May 7 Review

**Finals Week (TBA)  EXAM III (30%)**

**Reading list for Exam I**

**Jan. 22** Course overview and neuroscience review

**Jan. 24** Basic concepts in developmental biology


**Jan. 29** Neural induction and regionalization
& 31 Textbook; Chapter 1
& 31 Textbook; Chapter 2

**Feb. 5, 7, & 12** Cell production, migration & differentiation in nervous system
Textbook; Chapter 1, pp 17-21
Textbook; Chapter 3
Textbook; Chapter 4, pp 77-92 (and figures on pp. 93-95)

**Feb. 14** Neurite outgrowth and pathfinding
& 19 Textbook; Chapter 5

**Reading list for Exam II**

Feb. 28 Synapse formation
Textbook; Chapter 8

Mar. 5 Molecular cues underlying specificity of connections
& 7 Textbook; Chapter 6

Mar. 12 Cell Death and trophic factors
& 14 Textbook; Chapter 7
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Mar 26 &amp; 28</td>
<td>Early experience and synaptic rearrangement</td>
<td>Textbook; Chapter 9</td>
</tr>
<tr>
<td>Apr. 9</td>
<td>Hormonal influences</td>
<td>Textbook; Chapter 10, pp 308-313; Chapter 7, pp 186-188</td>
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<tr>
<td>May 2</td>
<td>Reorganization of sensory and motor maps in adulthood</td>
<td>Textbook; Chapter 6, pp. 164-166</td>
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