**Developmental Neuroscience**

**NROSCI 1041/2041 - 1060**

**(12028/12598)**

**Fall Term 2015 (2161)**

**Instructor**:

Debra Artim, Ph.D.

Department of Neuroscience

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Office hours: Monday 3:00 PM – 4:00 PM; Wednesday 1:00 PM – 2:30 PM, or by appointment

**Office hours:** If you have any questions or need help with any course material, please feel free to stop by during office hours or contact the via e-mail to set up an appointment.

**Lecture:** Monday and Wednesday, 4:30 – 5:45 PM, A221 Langley Hall

**Textbook (recommended):** *Development of the Nervous System* by Sanes, Reh, and Harris, 3rd ed., 2012

Figures are available at: <http://www.elsevierdirect.com/companion.jsp?ISBN=9780123745392>

Much lecture material will come from the textbook, and students are encouraged to read the assigned chapters / sections. However, we will cover examples, experiments and some concepts that are not covered in the textbook. These notes will be provided on CourseWeb. Additionally, we will have guest lecturers who will give talks on their area(s) of expertise, which will go beyond what is covered in the text. Therefore, students are strongly encouraged to attend class and take good notes. In addition to the textbook, there will occasionally be handouts &/or research papers assigned as readings. Students should consider all handouts and assigned readings as essential.

**Course website:** [courseweb.pitt.edu](https://courseweb.pitt.edu/) Check here for announcements, handouts, grades, and useful links. Lecture handouts will generally be posted on the class CourseWeb site the day prior to lecture. There is also an online discussion board for the course. Please feel free to post (or answer!) questions or comments regarding the material.

**Course Description:**

This course examines the principles that govern the developmental assembly of a complex nervous system. Topics range from the earliest steps of induction of neural tissue and birth of neurons to the plasticity within developing circuits and the development of behavior. By the end of this course students should be able to describe the major steps in neural development and to interpret key experiments using vertebrate and invertebrate models that have helped to elucidate these steps.

**Assignments and Grading:**

There will be three exams, each worth 100 points. These exams consist of objective, short answer and short essay questions; you will be asked to use information learned to evaluate issues or defend principles and to design experiments to test various hypotheses. If you have to miss an exam you must make arrangements with Dr. Artim **ahead of time** or else provide a doctor’s note; **you must provide official documentation** in order to make up an exam.

There will also be three take-home assignments, one in each unit, each worth 25 points. Due dates are specified in the syllabus, the assignments will be posted on Courseweb prior to the due date. Late assignments will not be accepted.

Final grade = Three exam scores (300 points) + three assignments (75 points) / 375 total points

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| **Grading Scale** |
| Letter Grade | Percentage Range |  | Letter Grade | Percentage Range |
| A+ | 98.0-100 |  | C+ | 78.0-79.9 |
| A | 93.0-97.9 |  | C | 72.0-77.9 |
| A- | 90.0-91.9 |  | C- | 70.0-71.9 |
| B+ | 88.0-89.9 |  | D | 60.0-69.9 |
| B | 82.0-87.9 |  | F | Below 60 |
| B- | 80.0-81.9 |  |  |  |

**Graduate students:**

Those registering for the graduate course (PITT 2041) are required to write a 10-12 page paper (double-spaced) on a topic within developmental neuroscience. The paper should evaluate the current state of research in the chosen field (what is already known, what current experiments are being done/models are being used, what are the major unanswered questions) – imagine that you are writing a journal review article. Although you may also use review articles, you must use at least 6 papers from the primary literature; be sure that all are properly cited. This paper will be worth 100 points.

A one-page summary of your topic plus a reference list with at least 6 references from the primary literature is due by **October 12th**. The final paper is due by **December 9th** ; late papers will not be accepted.

**Other Course lecturers:**

**Name e-mail**

Eva Bach evabach@pitt.edu

Stephen Meriney meriney@pitt.edu

Linda Rinaman rinaman@pitt.edu

Heather Szabo-Rogers hsrogers@pitt.edu

**Academic Integrity:**

Please refer to the School of Arts and Sciences web page for details on academic integrity: <http://www.as.pitt.edu/faculty/policy/integrity.html>

**Disabilities and Special Needs:**

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 216 William Pitt Union, 412-648-7890 or 412-383-7355 (TTY) as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course. Please go to the Student Affairs website at <http://www.drs.pitt.edu/> for more information.

**Statement on Classroom Recording:** To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student’s own private use.

**Course Schedule**

**Date Topic Lecturer Text (ch)**

Aug. 31 Introduction/Gene Regulation Artim

Sept. 2 Model systems of vertebrate development Artim

Sept. 7 Induction Artim 1

Sept. 9 Polarity and Segmentation Artim 2

Sept. 14 Genesis Artim 3

**Sept. 16** Determination and Differentiation Artim 4

 **Assignment 1 due**

Sept. 21 Neural Crest Szabo-Rogers

Sept. 23 Determination – Cell lineage, Cell fate Artim 4

**Sept. 28** **EXAM I (Neuronal Birth and Differentiation)**

Sept. 30Cortical development Artim 3

Oct. 5 Axon Guidance / Pathfinding Artim 5

Oct. 7 Target Selection / Neurotrophic factors Artim 6

\*\*\*Oct. 12 Arborization Artim 6

Oct. 14 Neuronal Death7

**Oct. 19** **NO CLASS - Fall Break**

**Oct. 20 NO CLASS – Society for Neuroscience meeting**

**Oct. 21** Development of Excitability / Role of Ca2+ Artim

 **Assignment 2 due**

Oct. 26 Synapse Formation Meriney 8

Oct. 28 Synapse elimination Meriney 9

Nov. 2 Spike-timing dependent plasticity Artim

**Nov. 4** **EXAM II (Formation of Connections)**

Nov. 9 Behavioral Development: Genes and Identity Artim 10

Nov. 11 Behavioral Development: Language and Plasticity Artim 10

Nov. 16 Development of the Visual System Artim 9

Nov. 18 Auditory development Bach

Nov. 23 Development of brain gender Artim 10

Nov. 25 **NO CLASS (Thanksgiving break)**

Nov. 30 Plasticity in the Adult Nervous System

Dec. 2Development of Feeding Behavior Rinaman

**Dec. 7** Developmental Disorders Artim

 **Assignment 3 due**

\*\*\*Dec. 9 Developmental Disorders II Artim

**Dec 18 Exam 3, 12:00 – 1:50 PM**

**\*\*\*** Graduate students: paper outline and final paper due on these dates.