

## NEUROSCIENCE (BISC 4532) – Fall 2017 Syllabus

**Instructor: Marija Kundakovic, Ph.D.**

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Office: Larkin Hall 201

Office hours: Monday 4-5 PM;  
Thursday 11 AM - 2 PM

**Class schedule:** Mondays and Thursdays 2:30-3:45 PM

**Class location:** Keating Hall 121

**Recommended Textbook:** Mark F. Bear, Barry W. Connors, Michael A. Paradiso (2015).  
Neuroscience: Exploring the Brain, 4th Edition, Wolters Kluwer (ISBN 978-0781778176)

**Course page:** <http://fordham.blackboard.com>

**Class Description:** This course will serve as an introduction to the rapidly moving and very exciting field of Neuroscience. We will first cover the basic structure of the nervous system; types of brain cells; gene regulation in the brain, and will learn how brain cells work and communicate. Following this, we will learn the neural mechanisms underlying sensory and motor systems as well as complex behaviors, including emotion, sleep, and learning and memory. Finally, we will explore risk factors and mechanisms underlying mental disorders and will learn about their treatments. The class will be concluded with the emerging field of neuroepigenetics, and we will explore how the environment and our genes interact to shape brain structure and function.

**8/31 Lecture 1: Introduction to Neuroscience**

Readings: Chapter 1

**9/4 No Class (Labor Day)**

**9/6 Lecture 2: Basic Structure and Cells of the Nervous System**

Readings: Chapters 2 and 7

*Note: Classes Follow a Monday Schedule*

**9/7 Lecture 3: Gene Regulation and Action Potential**

Readings: Chapters 3 and 4; and TBA

**9/11 Lecture 4: Synaptic transmission and Cell Signaling**

Readings: Chapter 5

**9/14 Lecture 5: Neurotransmitter Systems**

Readings: Chapter 6

**9/18 Lecture 6: Methods in Neuroscience**

Readings:

Wong ML, Medrano JF. Real-time PCR for mRNA quantitation. *Biotechniques*. 2005 Jul;39(1):75-85.

Das PM, Ramachandran K, vanWert J, Singal R. Chromatin immunoprecipitation assay. *Biotechniques*. 2004 Dec;37(6):961-9.

Li Y, Tollefsbol TO. DNA methylation detection: bisulfite genomic sequencing analysis. *Methods Mol Biol*. 2011;791:11-21.

**Take-home exam #1 due**

**9/21 Lecture 7: Reading and Analyzing Neuroscience Research Papers**

Readings: Kundakovic M, Gudsnuk K, Herbstman JB, Tang D, Perera FP, and Champagne FA (2015). DNA methylation of BDNF as a biomarker of early life adversity. *Proc Natl Acad Sci U S A*. 112(22):6807-13.

**9/25 Recap 1 and Discussion**

**9/28 EXAM #1**

**10/2 Lecture 8: The Chemical Senses**

Readings: Chapters 8

**10/5 Lecture 9: The Eye and the Central Visual System**

Readings: Chapters 9 and 10

**10/9 No Class (Columbus Day)**

**10/12 Lecture 10: The Auditory System**

Readings: Chapter 11

**10/16 Lecture 11: The Somatic Sensory System**

Readings: Chapter 12

**10/19 Lecture 12: Control of Movement**

Readings: Chapters 13-14

**10/23 Lecture 13: Sex and the Brain**

Readings: Chapter 17

**10/26 Lecture 14: TBA**

**Take-home exam #2 due**

**10/30 Lecture 15: Chemical Control of the Brain and Behavior**

Readings: Chapter 15

**11/2 Recap 2 and Discussion**

**11/6 EXAM #2**

- 11/9 Lecture 16: Brain Mechanisms of Language, Brain Rhythms, and Sleep**  
Readings: Chapters 19 and 20
- 11/13 Lecture 17: Brain Mechanisms of Emotion**  
*Guest Speaker: Dr. Amy Roy*  
Readings: Chapter 18
- 11/16 Lecture 18: Mental Disorders I: Schizophrenia**  
Readings: Chapter 22 and TBA
- 11/20 Lecture 19: Mental Disorders II: Affective Disorders**  
Readings: Chapter 22 and TBA  
**Short Paper Due**
- 11/23 No Class (Thanksgiving Recess)**
- 11/27 Lecture 20: Substance Abuse and Dependence**  
Readings: Chapter 22  
Nestler EJ (2005) Is there a common molecular pathway for addiction? *Nat Neurosci.* 8(11):1445-9.
- 11/30 Lecture 21: Learning and Memory**  
Readings: Chapters 24 and 25  
**Take-home exam #3 due**
- 12/4 Lecture 22: Epigenetics, Environment, and Psychiatric Disorders**  
Readings:  
Kundakovic M and Jaric I (2017). The Epigenetic Link between Prenatal Adverse Environments and Neurodevelopmental Disorders. *Genes* 8, 104.  
Kundakovic M. Epigenetics of Psychiatric Disorders (2016). In Tollefsbol (ed) Medical Epigenetics. Elsevier. p 335-350.
- 12/7 Recap 3 and Discussion**

**12/12 - 12/20 Final Examinations: EXAM #3**

Class schedule is subject to change.

**Grading**

**In-class Exams (3):** multiple-choice questions and short essay questions - each 250 points

**Take-home exams (3):** multiple choice questions and short essay questions - each 50 points

**Short paper** - 100 points

**Final grades:** A = 94-100%, A- = 90-93.99%, B+ = 87-89.99%, B = 83-86.99%, B- = 80-82.99%, C+ = 77-79.99%, C = 73-76.99%, C- = 70-72.99%, D = 60-69.99%, F = BELOW 60