Psychology W2480x. The Developing Brain. Fall 2010

W2480x. The Developing Brain
Fall 2010: 3 pts. F. Champagne TR 9:10-10:25 AM. Room 614 Schermerhorn Hall
Prerequisite: Psychology W1001 or W1010 or the instructor's permission.

*Brain development across the life span, with emphasis on fetal and postnatal periods. How the environment shapes brain development and hence adult patterns of behavior.*

Course Description
This course is designed to provide students with an understanding of the process of brain development from embryogenesis through adulthood with emphasis on the role of the environment in directing this process. In the first 7 weeks of lectures, the origins of the central nervous system will be discussed. Topics will include the regional organization of the brain, neurogenesis, cellular differentiation, migration and targeting of neurons, synapse formation and refinement of the nervous system. In the second half of the course, lectures will focus on the infant brain and the role of experiences during infancy in modifying brain function. Topics will also include recent advances in our understanding of the role of gene-environment interactions and epigenetic programming and shaping brain development. Finally, the adaptive vs. maladaptive outcomes of environmental modifications to the nervous system will be discussed. Throughout the course, students will be guided through examples of how changes in the developing nervous system lead to behavioral patterns both in infancy and adulthood.

Course Evaluation
Grading: Midterm exam (30%), final exam (40%), and a short (6-8 pages) term paper (30%).

Textbook & Readings

Textbook:

The readings will consist of: (1) chapters from a textbook on brain development and (2) additional chapters/papers that provide literature reviews on specific topics (these will be posted on Courseworks)
Schedule of Topics & Readings:

September 7th, 2010
Course introduction, overview of brain development

September 9th, 2010
Basic principles of neuroscience

*Biological Psychology* Chapters 2 & 7 (will be posted on Courseworks)

September 14th, 2010
Influence of environment on brain development prior to fertilization


September 16th, 2010
Maternal regulation of early embryonic development


September 21st, 2010
Regional organization of the embryo & segmentation in the central nervous system

*Development of the Nervous System* Chapters 1 - 2
September 23rd, 2010

Generation of neurons

*Development of the Nervous System* Chapter 3

September 28th, 2010

Cellular differentiation

*Development of the Nervous System* Chapter 4

September 30th, 2010

Guidance and growth of axons

*Development of the Nervous System* Chapter 5

October 5th, 2010

Selecting targets for neural connection

*Development of the Nervous System* Chapter 6

October 7th, 2010

Death & survival of neurons

*Development of the Nervous System* Chapter 7

October 12th, 2010

Synapse formation

*Development of the Nervous System* Chapter 8

October 14th, 2010

Refinement of the nervous system

*Development of the Nervous System* Chapter 9

October 19th, 2010

Midterm review
October 21st, 2010
MIDTERM EXAM

October 26th, 2010
Behavioral development

Development of the Nervous System Chapter 10

October 28th, 2010
Prenatal programming of the infant brain


November 4th, 2010
Epigenetic influence on brain development


November 9th, 2010
Neurotransmitters and hormones


**November 11th, 2010**

**Maternal vs. paternal influences on brain development**


**November 18th, 2010**

**Sex differences in brain development**


**November 23rd, 2010**

**Reward and the brain**


**November 30th, 2010**

**Immune system and the brain**


**December 2\(^{nd}\), 2010**

**Gene-environment interactions in the CNS**


**December 7\(^{th}\), 2010**

**Plasticity in the adult brain**


**December 9\(^{th}\), 2010**

**Final review**