Psychology W2480x. The Developing Brain. Fall 2008

I. W2480x. The Developing Brain
Fall 2008: 3 pts. F. Champagne. TR 9:10 - 10:25. 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.

II. The rationale for giving the course, its role in the overall curriculum, and its relationship to any specific departmental major, degree program, specialization, or concentration.
This lecture course will contribute to the curriculum in several important ways. It will provide students with an introduction to the field of neuroscience through the study of the brain during different developmental stages. This background will provide a basis for advanced seminars and research in the department.

PSYC W2480 will fulfill the following degree requirements:
• For the Psychology major or concentration in the College and in G. S., for the Psychology minor in Engineering, and for the Psychology Post-bac, PSYC W2480 will meet the Group II (Psychobiology and Neuroscience) distribution requirement.
• For the Neuroscience and Behavior joint major, PSYC W2480 will meet the fourth Psychology requirement: “One additional 2000 or 3000 level psychology course from a list approved by the Psychology Departmental advisor to the program.”
For the science requirements of the College and G. S., PSYC W2480 will count as a single term of the requirement, provided that students who do not have the designated prerequisite obtain instructor permission.
We will initially cap enrollment at 95.

III. A full description of the content of the course
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.

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

IMPORTANT DATES:

October 21 – MID-TERM EXAM
December 18 – FINAL EXAM

Course outline:

Week 1
Course introduction, overview of brain development
Review of basic neuroanatomy

Week 2
Influence of environment on brain development prior to fertilization
Maternal regulation of early embryonic development

Week 3
Regional organization of the embryo & segmentation in the central nervous system
Generation of neurons

Week 4
Cellular differentiation
Guidance and growth of axons

Week 5
Selecting targets for neural connection
Death & survival of neurons

Week 6
Synapse formation
Refinement of the nervous system

Week 7
Midterm Review

Week 8
MIDTERM Exam
Week 9
Behavioral development
Programming of the infant brain

Week 10
Epigenetic influence on brain development
Neurotransmitters and hormones

Week 11
Maternal vs. paternal influences on brain development
Sex differences in brain development

Week 12
Social influence on the developing brain
Reward and the brain

Week 13
Gene-environment interactions in the CNS

Week 14
Plasticity in the adult brain

Week 15
Final Review

Reading List:
The readings will consist of: (1). Chapters from an textbook on brain development; (2). Additional papers that provide literature reviews or research articles; and (3). 2-3 suggested additional readings for interested students, and for guiding term papers. All readings will be available on the web.

Textbook:

Supplemental books:

Reading List:

Week 1
*Biological Psychology* Chapters 2 & 7

Week 2
Pre-conception Influences on Development


Maternal Regulation of Embryonic Development


**Week 3**
*Development of the Nervous System* Chapters 1 - 3

**Week 4**
*Development of the Nervous System* Chapters 4 & 5

**Week 5**
*Development of the Nervous System* Chapters 6 & 7

**Week 6**
*Development of the Nervous System* Chapters 8 & 9

**Week 7**
Midterm Review

**Week 8**
MIDTERM Exam

**Week 9**
*Development of the Nervous System* Chapter 10


**Week 10**


**Week 11**


**Week 12**


**Week 13**  


**Week 14**  


**Final Review**