PSYC G4480y – Psychobiology of Infant Development (seminar)

Spring 2015

I. Bulletin description

PSYC G 4480y. Psychobiology of Infant Development (seminar) 
4 pts. William P. Fifer. Tu 4:10-6 PM in 405 Schermerhorn Hall
wpf1@columbia.edu

Prerequisites: PSYC W1001 or 1010, a course in developmental psychology, and the instructor’s permission.

Course Description: The focus of the seminar is on human development during the fetal period and early infancy. We will examine the effects of environmental factors on perinatal perceptual, cognitive, sensory-motor, and neurobehavioral capacities, with emphasis on critical conditions involved in both normal and abnormal brain development. Other topics include acute and long term effects of toxic exposures (stress, smoking, and alcohol) during pregnancy, and interaction of genes and the environment in shaping the developing brain of "high-risk" infants, including premature infants and those at risk for neurodevelopmental disorders such as Sudden Infant Death Syndrome.

II. A full description of the content of the course

Through research on neurobehavioral development in the womb and early infancy, the roots of human psychological development are being uncovered. Throughout life, normal development demands constant and complex interactions between genes, environment, and the emerging organism. Fuller appreciation now exists regarding the long-term implications of fetal adaptation to a changing in utero environment and subsequent infant interaction in the ex utero world that is unique for each maternal/child dyad. The impact of perinatal experience occurs on multiple levels, from biochemical factors influencing gene expression in the fetus’s neuronal circuitry to characteristics of the mother’s lifestyle affecting the pre and post natal environment. Exquisitely timed, complex interactions between the genes and environmental input affect acquisition of neuronal identity and interconnections. At another level, sensory systems are being sculpted by environmental input. The need to study the complexities of intrauterine stimulation and growth, as well as origins of the capacity to adapt to life outside the womb, are now more fully appreciated.

The first segment of the course is devoted to fetal neurobehavioral development throughout gestation and, in particular, the role of the uterine environment in facilitating and directing fetal growth and behavior. Subsequent weeks cover neonatal perceptual and cognitive abilities, the causes of consequences of premature birth, early and long term effects of maternal exposures during pregnancy, early development of
emotional regulation, the interaction of socioeconomic status with neurodevelopment and the importance of sleep dependent processes from autonomic control dysregulation in SIDS to learning and memory consolidation throughout infancy.

This course should provide students with a strong foundation in understanding critical psychobiological processes in the fetus and infant that support every aspect of later development. Readings and discussion will focus on both typical and atypical neurobehavioral developmental.

III. The rationale for giving the course

The purpose of this course is to introduce students to the emerging field of behavioral perinatology and the early origins of health and disease. The topics cover a wide range of sub-areas within the fields of infant development and developmental neuroscience.

Goals

1. Course Goals
Successful participation in this course will advance many of the program goals set out by the Columbia University Psychology Department (http://www.columbia.edu/cu/psychology/dept/ugrad/goals.html).

Completing readings and activities throughout this course will expand your knowledge on the roots of infant and child development. Through participation in class discussions and through written assignments you will have the opportunity to develop your ability to think critically about past and current research in the area and have a more thorough understanding of what we know and still need to study in order to more fully understand this critical period of brain behavior. Having successfully completed this course, you will be better able to design a study of your own that focuses on some aspect of perinatal development that you come to see as meriting further attention. In addition, you will learn to skillfully use appropriate sources and media for literature searches as you design your own mini-grant proposal.

2. Top course learning objectives, specifying specific skills and expertise that students will gain:
OBJECTIVE 1: Interpret and critically evaluate primary research as well as review papers on fetal and infant development. This objective is accomplished through active class participation, weekly assignments consisting of generating questions based on assigned readings, and a final paper

OBJECTIVE 2: Effectively communicate your questions generated from the readings and the class discussions. This objective is accomplished via the weekly assignments and a brief presentation to the class at the end of the semester that reviews your ideas for a research proposal in the form of a mini-grant application. Through these activities, students will develop their writing and speaking skills, and gain expertise in discussions on the state of the science of early development.
Role in the curriculum

With its focus on the psychobiology of early development, this seminar will complement seminars on the psychophysiology of emotion (W3410), on developmental affective neuroscience (G4486), and on social cognitive neuroscience (W3680/G4685).

PSYC G4480 is an advanced seminar, designed particularly for graduate students, for advanced undergraduates who are majoring in Psychology or in Neuroscience and Behavior, and for students participating in the Postbac Psychology Program. These students will have priority, followed by junior majors, followed by non-majors.

PSYC G4480 fulfills the following degree requirements:

• For Psychology Graduate Students, PSYC G4480 will apply toward the “two seriously graded seminars” requirement of the Master’s degree.

• 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, G4480 meets the Group II (Psychobiology and Neuroscience) distribution requirement.

• For the Neuroscience and Behavior joint major, G4480 will fulfill the 5th Psychology requirement: “one advanced psychology seminar from a list approved by the Psychology Department advisor to the program.”

• For the Psychology Major and the Psychology Post-bac certificate, PSYC G4480 will fulfill the advanced seminar requirement.

• For the Barnard Psychology major, PSYC G4480 will fulfill the senior seminar requirement.

• For students who obtain prior departmental approval this class will meet one term of the (natural) science requirements of the College and of G.S. We anticipate that this class will never be used for the science requirement, however, because in the process of completing the prerequisite courses the science requirement will already have been met. Furthermore, demand for the course is expected to be strong and Psychology Majors, Psychology Post-Baccalaureate students, and Psychology graduate students will have priority.

IV. The reading list and weekly syllabus – subject to revision
All readings are available online through http://courseworks.columbia.edu.

January 20th
Course overview, requirements, and summary of weekly readings*
January 27  
**Fetal ontogeny: early brain development**  
Reading Assignment:  


February 3  
**Fetal environment: early effects of maternal exposures during pregnancy**  
Reading Assignments:  


February 10  
**Fetal programming: long term effects of prenatal exposures**  
Reading Assignments:  


February 17  
**Premature birth: causes, altered early brain development, and long-term outcome**  
Reading Assignments:  


**February 24**

**Full-term newborn: perceptual and cognitive abilities**

Reading Assignments:


**March 3**

**Early Development of emotional regulation**

**Guest Speaker: Nina Burtchen MD, PhD, MSc**

Reading Assignments:


March 10
Sudden Infant Death: causes, prediction and prevention
Reading Assignments:


March 17
Spring Break - No Class

March 24
Language Development
Guest Speaker: Natalie Brito, PhD.
Reading Assignments:


March 31
Sleep in Infancy
Reading Assignments:


**April 7**

**Socioeconomic Status and Development**
Reading Assignments:


**April 14**

**Attention and Memory Development – and some 5 minute student presentations**
Reading Assignments:


**April 21**

**Student 5-minute presentations and discussions**

**April 28**

**Student 5-minute presentations and discussions**

**May 5**

**Final Papers Due**

**V. Course Requirements and Grading**

Your final grade will be based on:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly written assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Class participation</td>
<td>30%</td>
</tr>
<tr>
<td>Final paper and presentation</td>
<td>40%</td>
</tr>
</tbody>
</table>
Weekly Written Assignments

Readings will be posted on CourseWorks and written assignments based on these readings are due every Monday (via email).

Class Participation

Each class period is largely centered around the discussion of questions submitted weekly by each student. Each student will be given the opportunity to amplify or build upon questions they have submitted as well as offer answers/opinions/related issues that are generated by the other students’ questions. In addition, each student will put together a PowerPoint presentation which describes their ideas for a mini-grant proposal. A major part of the process is to receive feedback from peers with the aim of generating discussion and providing constructive criticism as students are drafting their final assignments.

Final Paper and presentation

Your final paper will be a research proposal in the form of a mini-grant application.

• Topic title due - 3/31
  Send me a tentative title for your paper, a one paragraph abstract, and at least two relevant references.

* Presentation due 4/14, 4/21, or 4/28
  Give a 5-7 minute PowerPoint presentations of paper outline to class. *(Recommended 4-6 slides, covering the four bolded sections below)*

• Paper due - 5/5
  12-15 pages, excluding references. Sample outline below. (These are recommendations, not hard and fast rules.)

  Research Grant Format and Page Distribution

  a. Specific Aims
  This section is meant to “grab” the reader. Briefly summarize the broad, long-term objectives and what the specific research proposed in this application is intended to accomplish and what specific hypothesis(es) you will be testing. **One page (or so) is recommended.**

  b. Background and Significance
Provide the background leading to the proposal, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill. **5-7 pages are recommended.**

c. Research Design and Methods

Describe the research design and the procedures to be used to accomplish the specific aims of the project. Include how the data will be collected, the general approach for analyzing and interpreting the data. Describe any new method or technique that you might be using and why. As part of this section, provide a possible sequence or timetable for the project. Also include any procedures for acquiring informed consent and any situations, or materials that may be considered invasive or could place the subject at risk.

This section can be broken down into sub-sections (one for each experiment to be carried out if you are planning more than one) such as

1. **Rationale** (the reasons you chose this specific experimental approach/protocol)
2. **Methods** (specific information about: subjects and how exactly the experiment will be carried out and include a very general statement about how you will analyze the data)

**5-7 pages are recommended.**

d. Predicted Results

Predict your results. Then end with a paragraph or two on the potential difficulties and/or limitations you foresee in the proposed procedures and other approaches that might be considered for future studies. **One page is recommended.**

e. References

APA format is required. Remember not to cite articles unless you have read them. You can refer to papers you haven't read by referencing the results as "reviewed by X et al" or as summarized in …, including web sources.

VI. Course Policies:

- **Academic Integrity** – Academic integrity is a vital aspect of the scientific enterprise and, importantly, its written output. Hence, plagiarism is not permissible and will not be tolerated. I want to know what you think. This means that all of the work that you submit must be your own, with appropriate citations to work that others have done (including URLs and titles for websites) upon which you are building. Please read Columbia’s policy on academic integrity at: [https://www.college.columbia.edu/academics/integrity](https://www.college.columbia.edu/academics/integrity). Each time you submit an assignment in this class you will be asked to affirm that you have not plagiarized, used unauthorized materials, or given or received illegitimate help.

- **Assignment Submission** – All assignments are to be submitted on time. For every day they are late, 5 points will be deducted from your final score. If additional time is
needed to complete an assignment because of an unexpected emergency, you must contact me directly and provide appropriate documentation.

- **Attendance Policy** – Your active participation in this class via contributions to the discussions is an integral aspect of the structure of the seminar. If you cannot attend a class you must notify me in advance. If your absence is due to an emergency, you must provide documentation from either a doctor or your dean.

- **Technology Usage** – Using cell phones, laptops, or other electronic devices is not permitted, unless they are used for reasons related directly to class discussion (for example, for note taking).

Preliminary syllabus, subject to revision.