

## **Psych 391RR: Developmental Cognitive Neuroscience Course Syllabus**

**Time and location:** Tu/Th, 11:15-12:30 PM, in room 400 Herter Hall.

**Course Instructor:**

Dr. Lisa Scott, Ph.D.  
University of Massachusetts  
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**Office hours:** Tuesdays from 10-11 am and by appointment. Please email if you plan to come to office hours or would like to schedule an appointment.

### **Course materials**

*Text Book: C.A. Nelson, M. de Haan, & K.M Thomas. (2006). Neuroscience of Cognitive Development. Hoboken, NJ: John Wiley & Sons Inc.*

I highly recommend that you purchase this book. You can purchase this book at the University book store. I think it is about \$75.00. You can also get it used online from amazon for about \$60.00. I do have 1 extra copy of this book that I will check out to you for 2 days at a time (if needed). Other readings will be assigned for each class session. These reading can be downloaded from SPARK.

I will be using SPARK for this course. You can access this at: <https://spark.oit.umass.edu> I will be posting additional readings (articles, chapters, etc.), which accompany the readings in the book, on this site. Please make sure you download (and read) each of these articles.

### **Course Information**

**General Overview of topic covered:**

This course will be a broad overview of current research and methods in the field of developmental cognitive neuroscience. We will start with a basic overview of how the brain develops from conception into adulthood. We will then discuss different theories related to how the brain develops and the role of experience in this development. We will spend a substantial amount of time learning about the methods researchers use to study developmental cognitive neuroscience, including metabolic measures (PET and fMRI), electrophysiological techniques (including EEG and ERPs), and optical imaging. A part of this course will be devoted to learning to design studies, which use the above methods to study development (a final paper will be related to this). Another part of this course will examine what we know about the neural mechanisms involved in the development of memory, language, spatial cognition, object

perception, executive functions, and attention. We will also discuss research using neuroscience methods to investigate the development of emotion perception, as well as and other types of social processing. Throughout this course we will discuss both typical and atypically (i.e. Autism, ADHD, etc.) developing populations.

### **Course Requirements**

#### **General overview of class time:**

Students are required to attend class, take notes, do assigned readings, and complete all assignments. The required examinations, papers, in-class activities (including both group presentations and research proposals) must be completed and turned in to me, in order to receive a passing grade in this course. *Any student who does not complete all assignments (see below for details) will receive an incomplete for the course until the work is completed.*

Class sessions will usually consist of a lecture period followed by a discussion of the readings/lecture. In addition, I am going to try and schedule 1-2 "field trips" to different labs on (and possibly off) campus to learn more about the methods and current research in the field of developmental cognitive neuroscience.

#### **In-class discussions:**

You will be responsible for each week's assigned readings. The class will revolve around discussion of these readings. To facilitate discussion, you should prepare a short list of 2-3 questions or comments that you have related to each days readings. You should bring your questions to each class. I will collect these questions periodically.

#### **In-class activities:**

There will be 5 "in-class" activities, 4 of which will count toward your final grade. The in-class activities will be randomly distributed throughout the semester. You may drop one of these 5 in-class activities due to an absence, etc.

#### **Group-led discussions:**

Toward the end of the semester, student groups will be arranged, and each group will be responsible for co-leading one class discussion of the assigned reading. Groups will be assigned during the first couple weeks of class based on common interests.

#### **Research Proposal:**

A research proposal paper will be due on the day of the final exam. A short paper proposal and outline of this paper will be due mid-semester. You will give a final 10 to 15 minute presentation regarding your proposal. I will provide more details about my expectations for your proposals later in the semester.

#### **Take-home exams (x3):**

There will be three, open-book, open-note, take home exams throughout the semester. These exams will include a variety of questions, including short essay questions.

**Your course grade will be based on the following four factors:**

- 30% Class attendance (10%), reading/reaction questions (10%), in-class activities (10%)**
  - 10% Group presentations of class reading assignment**
  - 30% Research proposal paper (15%, 5-8 pages), short proposal and outline (5%) and final presentation (10%)**
  - 30% Take-home exams (3 total, 10% each)**
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### **Course Outline**

**Please Note:**

**No Class: 4/1 & 4/17**

**Last Day of Class Tuesday May 13th**

**Papers due: Tuesday May 18<sup>th</sup> at 12 noon**

- 1/29 Course Introduction
  - (1) Nelson Textbook: Introduction (pg. 1-3)
- 1/31 Brain Development
  - (1) Nelson Textbook: Chapter 2 (pg. 4-29)
  - (2) Moulson, M.C. & Nelson, C.A. (2008). Neurological Development.
- 2/5 Neural Plasticity and Critical/Sensitive Periods
  - (1) Nelson Textbook: Chapter 3 (pg. 30-43)
- 2/7 Overview of Methods of Developmental Cognitive Neuroscience
  - (1) Nelson Textbook: Chapter 4 (pg. 44-57)
  - (2) Munakata, Y. et al. (2004). Developmental cognitive neuroscience: Progress and potential. *TRENDS in Cognitive Sciences* 8(3), 122-128.
- 2/12 Electrophysiological Methods (EEG and ERP)
  - (1) Picton, T.W., & Taylor, M.J. (2007). Electrophysiological Evaluation of Human Brain Development. *Developmental Neuropsychology*, 31(3), 249-278.
- 2/14 Metabolic Methods (fMRI, PET, DTI)
  - (1) Davidson, M.C., Thomas, K.M., & Casey, B.J. (2003). Mental Retardation and Developmental Disabilities Research Reviews, 9, 161-167.

- (2) Casey, B.J., Tottenham, N., Liston, C. & Durston, S. (2005). Imaging the developing brain: What have we learned about cognitive development? *TRENDS in Cognitive Sciences*, 9(3), 104-110.

## **2/19 No Class Monday Schedule**

### 2/21 Magnetic Encephalography & Optical Imaging

- (1) Meek, J. (2002). Basic principles of optical imaging and application to the study of infant development, *Developmental Science*, 5(3), pp. 371-380.
- (2) Paetau, R. (2002). Magnetoencephalography in pediatric neuroimaging. *Developmental Science*, 5(3), pp. 361-371.

2/26 TBA (either field trip to a DCN lab or Review of DCN methods; take home exam 1 distributed)

### 2/28 Development of Speech and Language (*Take-home exam 1 due*)

- (1) Nelson Chapter 4 (pg. 58-70)
- (2) Bortfeld, H. Wruck, E. & Boas, D.A. (2007). Assessing infants' cortical response to speech using near-infrared spectroscopy. *NeuroImage*, 34, 407-415.
- (3) Dehaene-Lambertz, G., et al. (2006). Functional organization of the perisylvian activation during presentation of sentences in preverbal infants. *Proceedings of the National Academy of Sciences*, 103(38), 14240-14245.

### 3/4 Development of Explicit Memory and Implicit Memory

- (1) Nelson Chapter 5 (pg 71-99)
- (2) Bauer, P.J. (2006). Constructing a past in infancy: a neuro-developmental account. *TRENDS in Cognitive Sciences*, 10(4), 175-181.
- (3) Thomas, K.M. et al. (2004). Evidence of Developmental Differences in Implicit Sequence Learning: An fMRI study of Children and Adults. *Journal of Cognitive Neuroscience* 16(8), pp. 1339-1351.

### 3/6 Development of Spatial Cognition

- (1) Nelson Chapter 7 (pg. 100-106)
- (2) Stiles, J. et al. (2005). Cognitive development following early brain injury: evidence for neural adaptation. *TRENDS in Cognitive Sciences*, 9, 136-143.

### 3/11 Development of Object Recognition/Understanding

- (1) Nelson Chapter 8 (pg. 107-118)
- (2) Baird et al. (2002). *Neuroimage*, 16, pp. 1120-1126.

### 3/13 Development of Face Recognition (+ possible tour of my lab?)

- (1) Scott, L., & Nelson, C.A. (2004). The developmental neurobiology of face perception.

- (2) Tzourio-Mazoyer, N. et al., (2002). Neural correlates of woman face processing by 2-month-old infants. *NeuroImage*, 15, 454-461.

**3/18 & 3/20 No Class- Spring Break**

3/25 Development of Higher Cognitive Functions (with a focus on adolescence)

- Paus, T. (2005). Mapping brain maturation and cognitive development during adolescence. *TRENDS in Cognitive Sciences*, 9(2), 60-68.

3/27 Guest Lecture: Jane Couperus (Hampshire College) Development of Attention, Inhibition, and ADHD

- (1) Reading to be announced

**4/1 No Class**

4/3 Development of Emotion Processing

- (1) Nelson Chapter 9 (pg. 119-142)  
(2) Leppanen, J., et al. (2007). A ERP study of emotional face processing in the adult and infant brain. *Child Development*, 78(1), 232-245.

4/8 Development of Temperament and Emotion Regulation (Take Home Exam 2 Distributed)

- (1) Davidson, R.J. et al. (2000). Dysfunction in the neural circuitry of emotion regulation-A possible prelude to violence. *Science*, 289, 591-594.  
(2) Schwartz, et al., (2003). Inhibited and uninhibited infants “grown up”: Adult amygdalar response to novelty. *Science*, 300, 1952-1953.

4/10 Autism & Discussion of Final Paper (*Take Home Exam 2 Due*)

- (1) Dawson, G., et al. (2002). Neural correlates of face and object recognition in young children with Autism spectrum disorder, developmental delay, and typical development. *Child Development*, 73, pp. 700-717.  
(2) Grelotti D. J., et al., (2005). fMRI activations of the fusiform gyrus and amygdala to cartoon characters but not to faces in a boy with Autism. *Neuropsychologia*, 43, 373-385

4/15 Williams Syndrome

- (1) Bellugi, U., et al. (2007). Affect, Social Behavior and the Brain in Williams Syndrome. *Current Directions in Psychological Science*, 16(2), 99-104.  
(2) Grice, S., et al. (2001). Disordered visual processing and oscillatory brain activity in Autism and Williams Syndrome. *Brain Imaging*, 12, pp. 2697-2700.

**4/17 No Class**

4/22 Deprivation and the Brain: Romanian Orphanages (***Paper Outline Due***)

(1) Nelson, C.A. (2007). Cognitive Recovery in Socially Deprived Young Children: The Bucharest Early Intervention Project. *Science*, 318, 1937-1940.

(2) Eluvathingal, T.J., et al., (2006). Abnormal brain connectivity in children after early severe socioemotional deprivation: A diffusion tensor imaging study. *Pediatrics*, 117 (6) 2093-2100.

4/24 Developmental Cognitive Neuroscience and Education

(1) Ansari, D & Coch, D. (2007). Bridges over troubled waters: Education and Cognitive Neuroscience. *TRENDS in Cognitive Sciences*.

4/29 Developmental Cognitive Neuroscience and the Media (Take Home Exam 3 distributed)

(1) Thompson, R.A. & Nelson, C.A. (2001). Developmental Science and the Media. *American Psychologist*, 56(1), 5-15.

5/1 TBA (possible field trip or topic to be decided)

5/6 In class presentations of research proposals (***Take home exam 3 due***)

5/8 In class presentations of research proposals

5/13 In class presentations of research proposals

***Final Papers due on Tuesday May 18<sup>th</sup> at noon.***

### **Supplemental Materials (not required for the course):**

Interesting/Informative Websites:

1) Neuroscience for Kids: <http://faculty.washington.edu/chudler/plast.html>

2) Ethical Standards for Research with Children: <http://www.srcd.org/ethicalstandards.html>

3) Cognitive Neuroscience Society: <http://www.cogneurosociety.org/>

4) 3-D Brain Anatomy From PBS.org: <http://www.pbs.org/wnet/brain/3d/index.html>

5) The Secret Life of the Brain for episodes on brain development:

<http://www.pbs.org/wnet/brain/shop.html>

6) The Digital Anatomist: <http://www9.biostr.washington.edu/da.html>

### **Course Policies**

**Attendance:**

1) Class attendance is a requirement of this course

- a. Missing Class: Everyone gets sick once in a while and it is not expected (or desired) that students come to class while sick. Therefore, students will be provided with the materials, and given the opportunity to make up work for a maximum of 2 missed class periods. If the student has an extended illness, a

doctor's note will be required. The following policies apply to materials activities missed when the student is absent from class on the first two occasions only:

- i. **Class outlines, handouts:** The class outlines and handouts will be made available via email or on the web.
  - ii. **In class activities:** There will be 5 in-class activities, and only 4 will count toward your grade. If you miss more than 1 class during which an in-class activity is assigned, you may arrange to complete an "out-of-class" activity by emailing me prior to the first class period following your absence. You will not be able to make up more than 2 in-class activities (1 that you dropped, and 1 that you made up with an out-of class activity).
  - iii. **Lecture notes:** Students who miss class should arrange to get the lecture notes from another student. I will provide any handouts to students who miss 1 or 2 classes, however, there may be information not covered in these notes, which was covered in class so please check with other students for class notes.
- b. Class will not meet if the University is closed for any reason (including bad weather and holidays).
  - c. If you anticipate missing a class due to a religious holidays or obligations please let me know at least two weeks in advance of this holiday so arrangements can be made to accommodate this absence.

### **Late-Assignments/Exams:**

All assignments must be turned in at the beginning of class, unless otherwise specified. If you are unable to turn in an assignment, you must contact the instructor *before* the assignment is due. This must be done by *email*. Extensions for late assignments will *not* be granted. An assignment will be considered late if not turned in on the due date. **20% of the grade for the assignment will be deducted for each class period the assignment is late.** Late assignments should be turned in at the beginning of the class period.

### **Challenging Grades:**

Occasionally, a student disagrees with a grade they received on a paper or with certain points taken off on an exam. I welcome disagreements when it means that a student is thinking more deeply about a topic, or the student can appropriately justify their claim. Therefore, challenges to grades will be considered, but only when the student puts their reasons for challenging the grade in writing. Thus, a student who wants to challenge a grade should carefully explain their reason(s) in detail on paper, and turn into us the original paper or exam and their type-written justification by the next class period. Challenges to grades will not be accepted after the next class period following the return of the exam or paper. I will consider the reasons carefully, and then provide in writing, my reasons for adjusting or not adjusting the grade.

### **Incompletes:**

A grade of "incomplete" will be granted at my discretion only under the most unusual and incapacitating circumstances. If you feel that you are in danger of failing the course for any

reason, please come and see me as soon as possible. Any student seeking an incomplete must (1) request the “incomplete” in writing prior to the last week of class, (2) provide appropriate documentation of the illness or circumstances, and (3) make specific arrangements with me to complete the required coursework. Students who have completed less than 50% of the course work will not be granted an incomplete. Students who missed more than 50% of the coursework for medical reasons should apply for a medical withdrawal. Students will have one semester to complete any missed exams/assignments to convert the incomplete into a letter grade. Failure to complete the required work within this time frame will result in a “F” for the course.

### **Class Room Behavior Policies:**

Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance, and nationalities. Class rosters are provided to me with each student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

### **Individuals with Disabilities:**

I encourage students with disabilities or special needs to discuss with me whatever arrangements may be needed to facilitate their work in the course. Students with special needs should contact me during the first week of class to discuss any special arrangements. Information about Disability Services at the University of Massachusetts can be found at: <http://www.umass.edu/disability/index.htm>. Disability Services is located in 231 Whitmore, phone # (413)-545-0892.

### **Human Subjects:**

No human subjects credits will be used in this course.

### **Academic Dishonesty:**

#### **UMASS Policy on Academic Dishonesty**

Please see: [http://www.umass.edu/dean\\_students/code\\_conduct/acad\\_honest.htm](http://www.umass.edu/dean_students/code_conduct/acad_honest.htm) for the full University policy on academic dishonesty. You are accountable for the information on this web page. Below are several examples of academic dishonesty I have chosen to highlight:

*Cheating* - intentional use, and/or attempted use of trickery, artifice, deception, breach of confidence, fraud and/or misrepresentation of one's academic work.

*Fabrication* - intentional and unauthorized falsification and/or invention of any

information or citation in any academic exercise.

*Plagiarism* - knowingly representing the words or ideas of another as one's own work in any academic exercise. This includes submitting without citation, in whole or in part, prewritten term papers of another or the research of another, including but not limited to commercial vendors who sell or distribute such materials (see more below).

*Facilitating dishonesty* - knowingly helping or attempting to help another commit an act of academic dishonesty, including substituting for another in an examination, or allowing others to represent as their own one's papers, reports, or academic works.

### **More on Plagiarism:**

In this course PLAGIARISM ON ANY ASSIGNMENT WILL NOT BE TOLERATED. Collaboration with other students, with respect to sharing ideas, is encouraged. Students, however, must do all of their own writing. I will occasionally run papers through plagiarism detection software. With respect to written assignments, the follow apply:

- 1) Students must NOT duplicate passages from any source including (but not limited to) the text book, assigned readings, websites, or another students work without putting the passages in quotes and providing an appropriate reference. This includes copying a passage word-for-word, or substantially copying a passage or sentence while changing only a word or two here and there. **Any writing assignment which is plagiarized in this way will automatically receive a zero, with no possibility of making it up.**
- 2) Excessive use of quoted passages will NOT be tolerated, even when the appropriate references are provided. Students are expected to formulate and express their own ideas, inferences, and conclusions. This is an essential part of the learning process. Thus passages placed in quotations should be kept at a minimum and used only for compelling reasons. **Any writing assignment, which contains excessive quotations, will be returned to the student to be re-written; the assignment will be considered late until it is turned back in, and policies regarding grade reductions for late assignments will apply.**
- 3) Students may discuss the essay questions and their ideas for the answers *prior to any writing*, but students must NOT share with one another their completed, written assignments. **If you share your completed work with another student, and that student plagiarizes all or part of your work in their own assignment, you will both receive a zero for that assignment or exam.**

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\*\*\*THIS SYLLABUS IS SUBJECT TO CHANGE AT THE INSTRUCTORS DISCRETION\*\*\*

