Course Syllabus

Course Information

Developmental Cognitive Neuroscience
Tuesday and Thursday 4:00 p.m. – 5:15 p.m., CB3 1.308
Spring 2014

Professor Contact Information

Instructor: Dr. Mandy J. Maguire
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Please use my university email to contact me
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Office: GR 4.820

Office hours: Mondays 10:00-11:00 or by appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions

None.

Course Description

The focus of this course in *Development Cognitive Neuroscience* is on how the human brain develops and changes throughout childhood to support a range of essential cognitive processes.

The course will include the following topics:

- The development of the neuronal structures underlying imperative cognitive processes including: Attention, Object Knowledge, Social Cognitive, Memory, Language, and Planning.
- How genetic and environmental factors interact to shape brain networks underlying human behavior
- Methods for studying cognitive neuroscience across the lifespan, including fMRI, EEG, rTMS, and DTI.
- Neuroplasticity and the changing brain throughout development
- The impact of Developmental Cognitive Neuroscience on society, including education and media.

Student Learning Objectives

Students will:

- Be able to understand the basics of neurological development
- Understand how cognitive neuroscience is studied across the lifespan
- Understand the neurological correlates of the development of language, memory and problems solving.
- Recognize and differentiate among fundamental concepts and theories in cognitive development and processing
- Compare, discuss, and critically assess research findings and theories in developmental cognitive neuroscience

Required Textbooks and Materials
This class will require readings from the textbook as well as additional readings from articles that will be available on eLearning. You are required to do all readings prior to class. The textbook is also available as an ebook on through UTD's library.

Required Textbook:
Nelson, C.A., de Haan, M., & Thomas, K.M. *Neuroscience of Cognitive Development: The role of experience and the developing brain.*
ISBN-10: **0-471-74586-3**

Lecture outlines and announcements will be placed on eLearning weekly. It is the student's responsibility to check eLearning regularly for class information.

Assignments & Academic Calendar
These descriptions and timelines are subject to change at the discretion of the instructor.

The book for this course is a good starting point, but for many topics there have been important findings since the book was published. The readings here will provide some background on the topic of interest. The lectures will go into more detail and usually cover more recent findings. In the past, some students have found it helpful to have more information on a topic to get a better understanding of it so I have provided "Additional Readings that may be of interest" below. These readings are not required, but may help if some information is unclear. They will be available on eLearning in a folder called "Additional Readings".

Jan 14: Class expectations and syllabus

PART 1. BRAIN DEVELOPMENT AND HOW WE STUDY IT

Jan 16: Introduction to Developmental Cognitive Neuroscience
Munakata, Y., Casey, B.J., & Diamond, A. (2004). Developmental Cognitive Neuroscience: Progress and Potential. *Trends in Cognitive Neurosciences, 8(3),* 122-128. doi: 10.1016/j.tics.2004.01.005

Jan 21 and 23rd: Building a brain
Nelson Chapter 1

Jan 28: Neuroplasticity in humans:
Nelson Chapter 2.

January 30 (and half of Feb 4th) Methods Overview
Nelson Chapter 3.

Feb 4th- Feb 6: Genetics and neurosciences
Ramus, F. (2006). Genes, brain and cognition: A roadmap for the cognitive scientist. *Cognition, 101,* 247-269. Doi: 10.1016/j.cognition.2006.04.003

Feb. 11: Exam 1. Introduction to Developmental Cognitive Neuroscience.

PART 2. SOCIAL DEVELOPMENT

Feb 13th Vision and Object Processing
Johnson, M.H., Mareschal, D., & Csibra, G. (2008). The development and integration of the dorsal and ventral visual pathways in object processing. *Handbook of Developmental Cognitive Neuroscience,* 467-478.

Feb 18th. Attention
Nelson Chapter 11 (very short)

Feb. 20th Object and face recognition
Nelson Chapter 8

Feb. 25th & Feb 27th. Face perception, Social development and Theory of Mind
Nelson Chapter 9

March 4th The Neuroscience of Empathy
Singer, T. & Lamm, C (2009) The Social Neuroscience of Empathy. *Annals of the New York Academy of Sciences, 1156,* 81-96 (or Chapter from new book on Developmental Social Neuroscience).

March 6th: Exam 2 Objects and people.

Spring Break: March 10-16

PART 3. MEMORY & LANGUAGE DEVELOPMENT

Mar 18th Human memory in general and the development of declarative memory
Nelson Chapter 5

Mar 20th (into the 25th): The development of implicit memory
Nelson Chapter 6

Mar 25th, 27th & April 1st: Neurolinguistics in Adults and Language Development
Kuhl & Rivera-Gaxiola (2008) Neural Substrates of Language Acquisition*, Annual Review of Neuroscience,* 511-534.

April 3rd: Exam 3 Memory and Language

PART 4. PREFRONTAL CORTEX AND SPECIAL TOPICS

April 7th and 9th Prefrontal cortex, working memory and decision making
Nelson Chapter 10
Zelazo, Carlson & Kesek. (2008). The Development of Executive Function in Childhood. From the *Handbook of Developmental Cognitive Neuroscience*. Charles A. Nelson & Monica Luciana (Eds). Pages 553-574.

April 15: Higher Cognitive Functions in Adolescence and Risk Behavior
Steinberg, L. (2008) A social neuroscience perspective on adolescent risk taking behavior. *Developmental Review, 28,* 78-106.

April 17: Developmental Cognitive Neuroscience in the Media
Pasquinelli, E (2012). Neuromyths: Why do they exist and persist? *Mind, Brain and Education, 6(2),* 89-96.

April 22: Developmental Cognitive Neuroscience in Education
Ansari, D & Coch, D. (2007). Bridges over troubled waters: Education and Cognitive Neuroscience. *TRENDS in Cognitive Sciences.*

April 24: Environment and Brain Development: Poverty and Deprivation

Raizada, R. D. S. & Kishiyama, M. M. (2010). Effects of socioeconomic status on brain development, and how cognitive neuroscience may contribute to leveling the playing field. *Frontiers in Human Neuroscience, 4,* 1-11. DOI: 10.3389/neuro.09.003.2010

Nelson (2007). Cognitive recovery in socially deprived young children: The Bucharest Early Intervention Project, Science, 318, 1937-1940.

April 29: Exam 4

May 1: Study Day

May 7th: Final Exam

Attendance/Quizzes (10% of Your Grade):
I will take attendance some days. Attendance will be monitored with a quiz about the readings at the beginning of class. The quiz will typically include 2 questions and will be graded as follows: 90% correct for your name (attending class), 100% for your name + 1 question answered correctly, 110% for your name + 2 correct answers. This means you can get extra credit points by showing you have completed the readings and performing well on the quizzes. If you are late to class you will only have the opportunity for the 90% for attendance.

Exams (90% of your grade_

- Please arrive on time for exams. If you are 10 minutes late, **5 points** will be deducted from your exam. If you are more than 15 minutes late, you will have to receive permission from the instructor before you may take the exam.
- Acquired knowledge will be assessed via exams, which will cover information presented in lectures and readings. You will have 4 exams and a cumulative final. **YOU WILL BE ABLE TO DROP THE LOWEST EXAM GRADE.** As a result there will be no make up exams offered. If you miss an exam it counts as your dropped grade. Your final grade will be calculated with equal weighting (25%) to the remaining 4 exams.

Final Grade

Top 4 Exams:	90%
Attendance/Quizzes:	10%

Course & Instructor Policies

- Four exams will be given throughout the semester, and students are expected to arrive for the exams on time. Students who arrive late for an exam will not be permitted to take that exam.
- MAKE-UP EXAMS WILL NOT BE OFFERED. A missed exam, for any reason, will be recorded as a 0%. This will be your lowest grade and will count as your dropped exam.
- Exams will cover assigned readings, class lectures and discussions.

Professional Dispositions

Professional dispositions refer to the values, commitments, and professional ethics that influence behaviors toward instructors, peers, and those in the community. Dispositions are guided by beliefs and attitudes related to values such as caring, fairness, honesty, responsibility, and social justice. Students will demonstrate professional dispositions by exhibiting the following professional behaviors:

1. Arriving at class at the designated class start time.

2. Turning off all cell phones and pagers prior to entering the classroom. This also means not using your phone during class, for talking or texting. If you need to be in touch with someone please leave the room to use your phone.
3. Preparing for class by reading the assigned materials.
4. Participating in class discussions in a constructive manner.
5. Interacting in a professional manner (verbally and nonverbally) with the instructor and other students.
6. Taking responsibility for his/her professional learning.

This list of professional behaviors is not limited. Other professional behaviors may be taken into account by the instructor when grading the student at the end of the semester.

Study Skills

If you need ideas about how to study for the course, please go to the following web address:

http://www.ucc.vt.edu/stdyhlp.html

Pay specific attention to the following links:
(1) Increasing Textbook Reading Comprehension by Using SQ3R
(2) Strategies for Improving Concentration and Memory

You can use the same strategies in #1 when reviewing your class notes.

For every hour you spend in class, you should spend 3 hours studying. This means that for this class, you should study the material about 9 hours a week.

Also:

1. Make sure that you read the book as described in #2 above BEFORE attending class.
2. Bring questions to class so that you can participate during lecture. This will help you be more pro-active in your learning and will keep you awake during class. 3 hours is a long time to listen.
3. Take your own notes during class so you are more engaged in the material.
4. Review your class notes and the ppt slides the day following lecture and at least one other day so that you give your brain time to learn the vocabulary and consolidate the information.
5. Make sure that you are studying in a distraction-free environment - no computer, phone, music etc...
6. Study in 45 to 90 minute blocks and take short breaks. Exercise is a great break to take.

ADDITIONAL READINGS THAT MAY BE OF INTEREST.

Introduction:
Pennington, B.F., Snyder, K. A., Roberts, R. J. (2007). Developmental Cognitive Neuroscience: Origins, issues and prospects. *Developmental Review, 27,* 428-441. doi: 10.1016/j.dr.2007.06.003

Neuroplasticity:
* May, A. (2011). Experience-dependent structural plasticity in the adult human brain. *Trends in Cognitive Sciences, 15(10),* 475-482. doi: 10.1016/j.tics.2011.08.002

Kolb, B., Teskey, G.C. (2012). Age Experience Injury and the Changing Brain. *Developmental Psychobiology, 54,* 311-325. doi: 10.1002/dev.20515

Anderson, B.J. (2001) Plasticity of gray matter volume: The cellular and synaptic plasticity that underlies volumetric change. Developmental Psychobiology, published online by Wiley Online *Library*. doi: 10.1002/dev.20563

Methodologies:
* Casey B.J., Tottenham, N., Conor, L., & Durston, S. (2005) Imaging the developing brain: What have we learned about cognitive development? *Trends in Cognitive Sciences, 9(3),* 104-110. doi: 10.1016/j.tics.2005.01.011

Picton & Taylor (2007). Electrophysiological evaluation of human brain development"

Genetics and neuroscience:
Lenroot & Giedd (2011). Annual Research Review: Developmental considerations of gene by environment interactions. *Journal of Child Psychology and Psychiatry, 52(4),* 429-441.

D.V.M. Bishop (2009). Genes, Cognition, and Communication: Insights from Neurodevelopmental Disorders. *Annals of the New York Academy of Sciences, 1156*, 1-18.

Vision
Braddick, O. & Atkinson, J. (2011). Development of Human visual function. *Vision Research, 51,* 1588-1609. DOI: 10.1016/j.visres.2011.02.018

Attention:
* Richards, Reynolds, & Courage, (2010). The neural bases of infant attention. *Current directions in Psychological Science, 19(1),* 41-46. DOI: 10.1177/0963721409360003

Atkinson & Braddick (2012). Visual attention in the first years: typical development and developmental disorders. *Developmental Medicine & Child Neurology,* 589-595. DOI: 10.1111/j.1469-8749.2012.04294.x

Face Processing:
O'Reilly, H. & deHaan, M. (2009). The neural basis of face processing in infancy and its relationship to the development of empathy. *Cognition, Brain, Behavior: An Interdisciplinary Journal, 4,* 429-448.

Social Neuroscience:
Liu, D., Sabbagh, MA, Gehring, WJ, Wellman HM (2009). Neural correlates of children's theory of mind development. *Child Development 80(2):* 318-326.

Memory:
The Student's guide to cognitive neuroscience, "The Remembering Brain"

Language:
A Student's Guide to Cognitive Neuroscience, The Speaking Brain.

Gervain, J., & Mehler, J. (2010). Speech perception and language acquisition in the first year of life. *Annual Review of Psychology. 61,* 191-218. DOI: 10.1146/annurev.psych.093008.100408

Prefrontal Cortex:
Diamond, A (2011). Biological and social influences on cognitive control processes dependent on prefrontal cortex. *Progress in Brain Research, Vol. 189.* 319-332

Cognitive Neuroscience and the Media:
Gonon, F., Bezard, E., & Boraud, T. (2011). Misrepresentation of Neruoscience Data might give rise to misleading conclusions in the media: The case of Attention Deficit Hyperactivity Disorders ,PLoS One, 6(1), 1-8

Thompson & Nelson (2001) Developmental Science and the Media, American Psychologist, 56(1), 5-15.
Racine, E. Ealdman, S., Rosenberg, J., Illes, J. (2010). Contemporary neuroscience in the media. Social Science & Medicine, 71(4), 725-733.

Article in the New York Times:
http://www.newyorker.com/online/blogs/newsdesk/2012/12/what-neuroscience-really-teaches-us-and-what-it-doesnt.html?mobify=0&goback=.gde_978717_member_202084183

Poverty and Deprivation: impact on Brain Development
Hackman, D. A. & Farah, J. J. (2009). Socioeconomic Status and the developing brain. Trends in Cognitive Science, 13(2), 65-73.

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

Noble, K. G., Houston, S.M., Kan, E., & Sowell, E.R. (2012). Neural correlates of socioeconomic status in the developing human brain. *Developmental Science, 15(4),* 516-527.