

## Psych 391: Brain and Cognitive Developmental

**Instructor:** Matt Davidson

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**Office:** Tobin 416

**Office hours:** Monday & Wednesday from 11:30–12:30 (Tobin Patio West) or by appointment.

### Course Materials

*M.H. Johnson & M. de Haan (2014). Developmental Cognitive Neuroscience*, and supplemental readings. All assigned readings will be available on Moodle and must be completed for the course.

### Course Information

**Overview:** This course will provide an overview of current research in the field of Developmental Cognitive Neuroscience (DCN). We will start with a discussion of theories and research describing brain development, and the influence of genes, environments, and their interactions on development. Environmental influences will remain a focus for development of attention, language, and executive functions, as well as social and emotional abilities. When appropriate, these topics will be discussed in relation to both typically and atypically developing groups (i.e., ADHD, ASD, Fragile-X, PKU, etc.).

**Objectives:** There are several related objectives for this course, including: 1) learning to appreciate two overarching theoretical perspectives within the field of DCN, 2) being able to recognize some major themes of current debates surrounding development, 3) reading and critically evaluating research in these areas, 4) drawing your own conclusions about this research, 5) integrating these conclusions into your knowledge base, 6) conveying this integration to others in spoken and written form, and 7) have fun doing it. Read those again, please.

To achieve these objectives we will emphasize the big questions related to HOW development proceeds. We know a lot of about *what* develops *when* but lack many details about *how* development occurs. To approach these questions we (the field of DCN) are working to integrate three historically separate fields of Psychology. This integration has allowed large steps forward in our understanding of development and currently represents one of our most promising paths to a unified theory of all things psychological.

### Course Requirements

**Class participation: (20%)** This is a seminar class and you are required to do the readings and come to class prepared to discuss the material. The participation points will reflect active engagement on your part, more than attendance, and will be split between the first & second half of the semester (10% each).

**Reading responses: (10%)** To facilitate discussion, a reading rubric will be provided for most assigned readings. You will respond to these by answering the questions in the rubric and coming up with at least one question of your own (top 5 count 2% each toward grade). You are encouraged to contribute to the in-class discussion whenever you want and should be prepared to raise your question when called upon.

**Student presentations: (20%)** All of you will give a short presentation to the class (5%). Potential topics include a variety of developmental disorders and can be selected based on your specific interests. Teams of three students will focus on a review paper and lead the discussion for that topic. Toward the end of discussion, the team will propose a new experiment designed to answer an open question from the reading (5%). A draft of the presentation will be shared with me at least one week in advance (5%). Lastly, you will recommend an informative video for the class to view prior to your presentation (5%).

**Presentation feedback: (10%)** You will be asked to evaluate the presentations of the other student groups by providing constructive feedback about each presentation (top 5 count 2% each toward grade).

**Take home exams: (20%)** There will be two take-home exams (essay format, open source) to be assigned on approximately Oct 4<sup>th</sup> & Dec 2<sup>nd</sup>, and due back two weeks after release (10% each). Each will involve one or two questions that should allow you to demonstrate your understanding and integration of the material. Each will have a cap of 10 pages (SS) and details will be provided soon.

**In-class assignments: (20%)** There will be ~six in-class assignments that relate to the readings and/or real world events that occur during the semester. You will need to be present to complete these assignments but only the five highest scores will count towards your final grade (4% each).

**Final grades will be calculated as follows:**

<b>A</b> = 90 – 100	<b>C+</b> = 65 – 69
<b>A-</b> = 85– 89	<b>C</b> = 60 – 64
<b>B+</b> = 80 – 84	<b>C-</b> = 55 – 59
<b>B</b> = 75 – 79	<b>D</b> = 50 – 55
<b>B-</b> = 70 – 74	<b>F</b> = 49 or lower

**Course Policies**

**Participation:** Class participation is a requirement of this course and will count for 20% of your grade. I predict that your experience will be greatly enhanced if you arrive prepared to discuss the readings.

- Missing Class: Everyone gets sick once in a while and it is not expected (or desired) that students come to class while sick. However, if you have an extended illness (more than 3 consecutive classes), a doctor’s note will be required.
- If you have a legitimate University excuse for missing more than 3 classes, please provide appropriate documentation within the first two weeks of class.
- If you anticipate missing class due to religious holidays please let me know within the first two weeks of class.

**Incompletes:** A grade of “incomplete” will be granted only under the most unusual and incapacitating circumstances. If you are having trouble with the course 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 two weeks of class, (2) provide appropriate documentation of the illness or circumstances, and (3) make specific arrangements with me to complete the required coursework. Students will have one semester to complete any missed exams to convert the incomplete into a letter grade (University Policy).

**Individuals with Disabilities:** Students with special needs should contact me during the first two weeks of class to discuss any special arrangements that may be needed to facilitate their performance in the course. Disability Services is located in 231 Whitmore (413-545-0892). Information about Disability Services at the University of Massachusetts can be found at: <http://www.umass.edu/disability/index.html>

**UMass Policy on Academic Dishonesty:** All students are expected to adhere to the University policies concerning academic honesty. Cheating, in any way, shape, or form will not be tolerated in this course. Please see: <http://www.umass.edu/honesty/> for the University policies on academic honesty. You are responsible for reading and understanding the information on this site.

**Research Credits:** Human subject research credits will not be available in this course.

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\*\*THIS SYLLABUS IS SUBJECT TO CHANGE WITH APPROPRIATE DISCUSSION AND FOREWARNING\*\*

## **Developmental Psychopathology (potential topics for presentations)**

These could be more DCN, right

- Attachment, Disorders of Infancy
- Anxiety and Mood Disorders (generalized)
  - Obsessive Compulsive Disorder
  - Depression and Bipolar Disorder
- Attention Deficit/Hyperactivity Disorder
- Oppositional Defiant Disorder
- Autism Spectrum Disorder
- Down Syndrome
- Other mulitsomal disorders
- Dyslexia and Reading
- Schizophrenia
- Fragile X Syndrome
- Maternal Effects
- Paternal Effects
- Eating Disorders
- Phenylketonuria
- Prader-Willi Syndrome
- Turner Syndrome
- Williams Syndrome
- Reward and Addiction

## **Prenatal Environments (Meaney, Champagne)**

Early Environments (adoption research)

### **Individual Environments**

- Physical, Mental, Social activity
- Importance of sleep
- Diet/Nutrition
- Stress

Find a solid review for each of the topics and then ask teams to describe three key experiments (DCN) that tell us something about How.

Can we think of How in different ways? Reductionist, Mechanist, Functional,  
Theory of Interactive Specialization vs Dynamic

### **5 Assignments**

Darwin and Wallace –Theory of Evolution relative to Theory of Inheritance of Acquired Characters  
compare and contrast the theories – present/discuss evidence for both.

What did you do last year?

## Course Outline

**Please Note:** The following is a list of potential topics we could cover this semester. I will be leading most of the discussions but each of you will be responsible for leading one discussion. The topic you chose will be the basis for your research paper and you should use this overlap to enhance both assignments.

### History and Theoretical Perspectives

- Nature and Nurture main effects and interactions
- Neuroconstructivism and Interactive Specialization
- Bronfenbrenner's Bio-Ecological Systems model
- Sameroff's Unified Theory of Child Development
- Dynamic Systems Theory

### Brain Development

- Phases of brain development
- Cortical patterning
- Functional processing
- Levels of analysis perspective

### Genetic Influences

- Genetic factors
- Sources of variance
- Gene x Environment interactions
- Epigenetic mechanisms

### Methods and Techniques

- Overview of DCN Methods
- Metabolic methods
- Electrophysiological methods
- Genetic neuroimaging

### Perceptual Development

- Spatial cognition
- Objects and faces
- Sensitive periods
- Neural plasticity

### Cognitive Development

- Attention
- Executive control
- Working memory
- Implicit learning
- Explicit memory
- Language
- Consciousness