Course Syllabus
EDHD692: Cognitive (& Neural) Bases of Instruction

Fall 2017 Tues 4:30-7:15pm Shady Grove Bldg III Rm 3292
Instructor: Dr. Donald J. Bolger Office: 3304N Benjamin Building
Phone: 301-405-9103 Email: djbolger@umd.edu
Hours: Mondays 4-5pm by appt.

Texts: Selected readings will be placed on Blackboard (elms.umd.edu) or on Dropbox

Course Description and Objectives:

This course is an introductory survey into contemporary theory and research in cognitive development, including the neural basis of cognitive development and applications to classroom learning. This course will focus on typical areas of cognitive development including language (spoken and written), conceptual change, numerical/quantitative processing, and social cognition as well as burgeoning areas of developmental research in general cognitive processes such as attention, memory, and visual-spatial processing. These topics will be discussed with respect to typical and atypical development with some focus on developmental disabilities including autism, specific language impairment, reading and math impairment, and attention deficit disorders among others. This course will focus on theoretical distinctions and delve into the biological aspects of brain development.

Course Goals:

By the end of this course, students should be able to:

- Understand theoretical perspectives in cognitive development, including their strengths and weaknesses.
- Recognize the importance of the interaction between children and their environment, and how cognitive skills and abilities change with age and experience.
- Develop the ability to critically evaluate scientific research and interpret research findings.
- Explore implications for applied issues relating to education and public policy.

Evaluation & Course Grading:

1. Preparation each class (10%)

Students will be required to foster a critical and creative dialogue in class on the topic matter that will be discussed each day. Students will also be asked to come prepared with questions, commentary, and evaluations on the assigned readings (in addition to the artifact presentations). These questions should be poignant and directed at fostering critiques and discussion of how these topic connect with your practice as educators.

You cannot make-up participation for a missed class unless you provide a University-documented excuse or are exempted for religious reasons following the guidelines of the University. However you can miss up to two sessions (e.g., Back to School Night) without penalty.

2. Artifact Presentation (30%)

To demonstrate your ongoing efforts to bridge theory and practice, you will be required to present an artifact that connects to, critiques, or applies that week's reading. Over the course of the term you must present 5 artifacts. These artifacts can be from your own practice (e.g., a survey you give to students, a modified lesson or assessment from your curriculum, documentation of a professional development initiative, MCPS indicators) and/or from the larger field of education (e.g., an Op Ed article, Core Content standards). The artifacts can be premade (e.g., a lesson from your curriculum guide) or self-generated (e.g., a written description of an interaction you had with a student).

You are tasked with distributing copies of the artifact (i.e. deposit it into dropbox folder), briefly presenting the artifact, and then leading a discussion around it. Additionally, in a brief (1.5-2 page) reflection piece, you must describe and justify the artifact's relation to a specific topic in the assigned reading. In other words, how does the

artifact connect with/illustrate the topic, provide a counter-example/critique of the topic, or apply the topic (i.e., shows how you have used it in your own practice)?

Artifact presentation and discussion for each week will be graded out of five possible points. The point distribution for each session is as follows:

1 point—Bringing to class a relevant artifact (entered via dropbox, no need for hard copy)
2 points—Justifying the artifact's relevance, both in the journal entry and in discussion
2 points—Facilitating a discussion around the article and its relation to the reading

You cannot make-up artifact presentation for a missed class unless you provide a University-documented excuse or are exempted for religious reasons following the guidelines of the University.

3. Final Take-Home Exams (30%)

There will be an essay final that will be given during finals week. Students will have 1 week to complete the exam from the time it is administered.

4. Writing Assignment & Presentation (30%)

There will be a writing assignment due **the week after** the last week of classes (12/15). This assignment requires that the student address a particular research question of interest to them relevant to their professional experience and based upon the content material covered in the course. These papers will be roughly the length and scope of a *Trends In Cognitive Science* style review (7-10 pages) in APA format with complete references. These presentations will outline a specific research question, provide background summary of research on the topic, propose novel experimental design(s) (can be an intervention/curriculum change) or analysis that would answer the specific question posed, and discuss the possible implications of findings from such an investigation.

Course Evaluations:

As a member of our academic community, you as a student have a number of important responsibilities. One of these responsibilities is to submit your course evaluations each term though CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. Please make a note now of the dates for *Fall 2014 (Tuesday, November 30 through Sunday, December 12)* and the link at which you can access the submission system (www.courseevalum.umd.edu). If you submitted all of your evaluations in the fall or are a new student, you can also access all posted results from Fall 2007 forward via Testudo under CourseEvalUM Reporting. To retain this access, you must submit all of your evaluations each semester. If you do not have access right now, you can gain it by submitting all of your Fall 2017 evaluations.

CLASS POLICIES:

Academic integrity: The University of Maryland, College Park has a student-administered Honor Code and Honor Pledge. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.studenthonorcouncil.umd.edu/whatis.html. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. The code prohibits students from cheating, fabrication, facilitating academic dishonesty, and plagiarism. Instances of this include submitting someone else's work as your own, submitting your own work completed for another class without permission, or failing to properly cite information other than your own (found in journals, books, online, or otherwise). Any form of academic dishonesty will not be tolerated, and any sign of academic dishonesty will be reported to the appropriate University officials.

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Religious observances: The University of Maryland policy on religious observances states that students not be penalized in any way for participation in religious observances. Students shall be allowed, whenever possible, to make up academic assignments that are missed due to such absences. However, the must contact the instructor before the absence with a written notification of the projected absence, and arrangements will be made for make-up work or examinations.

Course evaluations: As a member of our academic community, students have a number of important responsibilities. One of these responsibilities is to submit course evaluations each term though CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to CourseEvalUM is confidential. Campus will notify you when CourseEvalUM is open for you to complete your evaluations for fall semester courses. Please go directly to the website (www.courseevalum.umd.edu) to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing online, at Testudo, the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

Missed single class due to illness: Once during a semester, a student's self-authored note will be accepted as an excuse for missing a minor scheduled grading event in a single class session if the note documents the date of the illness, acknowledgement from the student that information provided in the note is correct, and a statement that the student understands that providing false information is a violation of the Code of Student Conduct. Students are expected to attempt to inform the instructor of the illness prior to the date of the missed class.*

Major scheduled grading events: Major Scheduled Grading Events (MSGE) are indicated on the syllabus. The conditions for accepting a self-signed note do not apply to these events. Written, signed documentation by a health care professional, or other professional in the case of non-medical reasons (see below) of a University-approved excuse for the student's absence must be supplied. This documentation must include verification of treatment dates and the time period for which the student was unable to meet course requirements. Providers should not include diagnostic information. Without this documentation, opportunities to make up missed assignments or assessments will not be provided.

Non-consecutive, medically necessitated absences from multiple class sessions: Students who throughout the semester miss multiple, non-consecutive class sessions due to medical problems must provide written documentation from a health care professional that their attendance on those days was prohibited for medical reasons.

Non-medical excused absences: According to University policy, non-medical excused absences for missed assignments or assessments may include illness of a dependent, religious observance, involvement in University activities at the request of University officials, or circumstances that are beyond the control of the student. Students asking for excused absence for any of those reasons must also supply appropriate written documentation of the cause and make every attempt to inform the instructor prior to the date of the missed class.

Late Assignments: All assignments are expected on the day indicated in this syllabus. Any assignment received after the due date will automatically receive a 5% lower grade for every day it is late.
A complete list of academic policies can be found at:
http://www.ugst.umd.edu/courserelatedpolicies.html.

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Date	Topic	Assigned Readings
8/29	**Introduction**	
Syllabus Berninger, V & Richards, T. (April 18, 2011) "Reading, Writing, and Math Brains" and the relevance of brain research to teaching and learning. http://www.education.com/reference/article/brain-and-learning/ Blakemore, S-J, & Frith, T. (2005) The learning brain: Lessons for education: a précis. Developmental Science, 8, 459-471. Goswami, U. (2004) Neuroscience and education. British Journal of Educational Psychology, 74, 1-14.		
9/5	**Brain Development & Biological Changes**	
Casey, B.J., Tottenham, N., Liston, C., & Durston, S. (2005). Imaging the developing brain: what have we learned about cognitive development? Trends in Cognitive Science, 9, 104-110. Munakata, Y., Casey, B.J., & Diamond, A. (2004). Developmental cognitive neuroscience: Progress and potential. Trends in Cognitive Science, 8, 122-128. Supplemental: Diamond, A., & Amso, D. (2008). Contributions of neuroscience to our understanding of cognitive development. *Current Directions in Psychological Science, 17(2),* 136-140.		
9/12	**The Adolescent Brain**	
Paus, T. (2005). Mapping brain maturation and cognitive development during adolescence. Trends in Cognitive Science, 9, 60-68. Steinberg, L. (2005). Cognitive and affective development in adolescence. Trends in Cognitive Science, 9, 69-74. Atkins, S., Bunting, M., Bolger, D.J., & Dougherty, M. (2013). The Adolescent Brain: Neural Plasticity and the Acquisition of Cognitive Abilities.		
9/19	**Theoretical Perspectives of Cognitive Development**	
Piaget's Cognitive Stages Piaget, J. (1983). Piaget's theory. In P.H. Mussen (Ed.), *Handbook of child psychology* (Vol. 1, pp. 103-118). New York: Wiley.		
9/26	**Theoretical Perspectives of Cognitive Development**	
Socio-Cultural Perspective Vygotsky, L. S. (1978). *Mind in society.* Cambridge, MA: Harvard University Press. Kirschner, P.A, Sweller, J. & Clark, R.E. (2006): Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching, Educational Psychologist, 41:2, 75-86		

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10/3	**Attention & Executive Control**

Blair, C. & Diamond, A. (2008). Biological processes in prevention and intervention: Promotion of self-regulation and the prevention of early school failure. *Development and Psychopathology, 20,* 899-911.

Diamond, A. & Lee, K. (2011) Interventions shown to aid executive function development in children 4 to 12 years old. Science, 333, 959-964.

Optional Reading:

Diamond, A. (2006). The early development of executive functions. In E. Bialystok & F. Craik (eds.), *Lifespan Cognition: Mechanisms of Change (pp. 70-95).* NY: Oxford University Press.

10/10	**Memory**

Bauer, P. J. (2008). Toward a neuro-developmental account of the development of declarative memory. *Developmental Psychobiology, 50,* 19-31.

Nelson, C. A. (2000). Neural plasticity and human development: the role of early experience in sculpting memory systems. *Developmental Science, 3:2,* 115-136.

Shipstead, Z., Redick, T. S., & Engle, R. W. (2012). Is working memory training effective. *Psychological Bulletin*, 138, 628-654.

Chein, J. M., & Morrison, A. B. (2010). Expanding the mind's workspace: Training and transfer effects with a complex working memory span task. *Psychonomic Bulletin & Review, 17*, 193-199. ***(may substitute 2011 paper)***

10/17	**Learning, Reasoning, & Higher Order Cognition**

Wright, S.B., Matlen, B.J., Baym, C.L., Ferrer, E. & Bunge, S.A. (2008). Neural correlates of fluid reasoning in children and adults. Frontiers in Human Neuroscience, 1(8), 1-8.

Holyoak, K. J. (2005). Analogy. In K. J. Holyoak & R. G. Morrison (Eds.), The Cambridge Handbook of Thinking and Reasoning (pp. 117-142). Cambridge, UK: Cambridge University Press.

Gentner, D. (2010). Bootstrapping children's learning: Analogical processes and symbol systems. *Cognitive Science*, 34 (5). 752-775.

10/24	**Reading & Dyslexia**

Perfetti, C. A., & Bolger, D.J. (2004). The brain might read that way. Scientific Studies in Reading, 8(3):293-304.

Raynor, K., Foorman, B.F., Perfetti, C.A., Pesetsky, D. & Seidenberg, M.S. (2002). How should reading be taught? *Scientific American*, 85-91.

Schlaggar, B.L. & McCandliss, B. D. (2007). Development of Neural Systems for Reading. Annual Review Neurocience.

Dehaene, S. (2013). Inside the letterbox. *Cerebrum*. (Dana Foundation publication online)

10/31	**Mathematics**

Richland, L. E., Morrison, R. G., & Holyoak, K. J. (2004). Working memory and inhibition as constraints on children's development of analogical reasoning. In K. Forbus, D. Gentner & T. Regier (Eds.), Proceedings of the Twenty-sixth Annual Conference of the Cognitive Science Society (pp. 1149-1154). Mahwah, NJ: Erlbaum.

Carey, S. (2001). Bridging the gap between cognition and developmental neuroscience: The example of number representation. In C. A. Nelson & M. Luciana (Eds.), *Handbook of Developmental Cognitive Neuroscience 1st edition*. (pp. 415-431) Cambridge, MA: The MIT Press.

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11/7	**Scientific Thinking Conceptual Change**

Carey, S. (2000). Science education as conceptual change. *Journal of Applied Developmental Psychology, 21*(1), 13–19.

Dean, D. & Kuhn, D. (2006). Direct instruction vs. discovery: The long view. *Science Education, 91*, 382-397.

Chi, M. T. H., Slotta, J. D. and de Leeuw, N. (1994). From things to processes: A theory of conceptual change for learning science concepts. Learning and Instruction, 4: 27-43.

Chi, M.T.H., & Roscoe, R.D. (2002). The processes and challenges of conceptual change. In M. Limon and L. Mason (Eds.), Reconsidering Conceptual Change: Issues in Theory and Practice. Kluwer Academic Publishers, The Netherlands, pp 3-27

11/14	**Social /Affective**

Yugelun-Todd, D. (2007). Emotional and cognitive changes during adolescence. Current Opinions in Neurobiology, 17, 251-257.

Decety, J. & Sommerville, J.A. (2003). Shared representations between self and other: a social cognitive neuroscience view. Trends in Cognitive Science, 7, 527-534.

Meltzoff, A.N. & Decety, J. (2003). What imitation tells us about social cognition: a rapprochement between developmental psychology and cognitive neuroscience. The Royal Society, 358, 491-500.

11/21	**Effects of Poverty**

Kwon, D. (2015). Poverty Disturbs Children's Brain Development and Academic Performance. Scientific American: Mind, Online: July 22, 2015. http://www.scientificamerican.com/article/poverty-disturbs-children-s-brain-development-and-academic-performance/

Reardon, S. (2015). Poverty Shrinks Brains from Birth. Scientific American: Mind, Online: March 31, 2015. http://www.scientificamerican.com/article/poverty-shrinks-brains-from-birth1/

Ostrander, M. (2015). What poverty does to the young brain. The New Yorker, June 4, 2015. http://www.newyorker.com/tech/elements/what-poverty-does-to-the-young-brain

National Scientific Council on the Developing Child (May 2010). Early Experiences Can Alter Gene Expression and Affect Long-Term Development. Center on the Developing Child at Harvard University http://developingchild.harvard.edu/resources/early-experiences-can-alter-gene-expression-and-affect-long-term-development/

11/28	**Broader Impacts & Issues**

McCandliss, B. D. (2003). Brain based education. In J. Guthrie (Ed.), Encyclopedia of Education, Second Edition (Vol. 1, pp. 202-206). New York: Macmillan Reference.

12/5	**Final Presentations**

* This schedule is flexible depending on students' interest and other timing factors.