

EDUC16:
EDUCATIONAL PSYCHOLOGY

Fall Term, 2016
2A: Tuesday, Thursday @ 2:25-4:15
x-period: Wednesday @ 4:35-5:25
Haldeman 28

Professor: David J.M. Kraemer, PhD
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Office hours: Weds. @ 1:00-4:00
Office: Raven House 212

COURSE DESCRIPTION

This course challenges students to think critically about the relationship between what we know about the mind from experimental research in the lab and how we teach students to learn in classrooms. The main focus is on reading empirical articles and reviews of research that highlight the major concepts and theories from Psychology and Neuroscience that have bearing on Education. We will discuss the relationship between learning and such topics as working memory, reinforcement, semantic knowledge, experience and practice, and what should be the role of neuroscience research in informing educational practice.

The main goals of this course are to:

- Become proficient at reading empirical research articles in experimental psychology, neuroscience, and education
- Become familiar with the major concepts and theoretical models from psychology and neuroscience that relate to education
- Become adept at evaluating the merit of claims from proposed educational interventions (and from the media) regarding neuroscience or psychology concepts

COURSE REQUIREMENTS

- All readings will be available on Canvas and you are required to read the assigned papers before class.
- In-class discussion of assigned readings is a critical component of this course and will be facilitated by bringing the printed articles to class for your reference.
- Developing the skills of critically reading empirical research articles and writing for a scientific audience are central to achieving the course goals.

GRADING OVERVIEW

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| 30% | Midterm Exam |
| 30% | Final Exam |
| 15% | Research Paper |
| 10% | Group Presentation |
| 10% | Quizzes: 6 total |
| 3% | Class Participation and Attendance |
| 2% | Research Participation (<i>or alternative assignment</i>) |

GENERAL POLICIES

1. **Read all materials and prepare for class.** You are expected to read the materials posted on Blackboard *before* each class. Be prepared to discuss that material *in class*. Everyone is expected to come to every class and to arrive on time. You are also expected to contribute to class discussion. You will learn the material better and others will learn from you. The success of this course depends on everyone coming to class prepared and ready to discuss the material. Both attendance (on-time) and preparation for class will determine a portion of your grade (see “Assignments and Assessments” below).
2. **Tell me sooner rather than later.** If you know ahead of time that you will be missing a class, e.g., for sports, please let me know in advance in order to avoid losing participation credit. Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.
3. **ASSUME THAT I WILL NOT ACCEPT LATE ASSIGNMENTS.**
4. **Cell phones are not to be used in class.** If an emergency arises that requires the use of a phone, please quietly excuse yourself from the room to respond.
5. **Accommodations.** Students with learning, physical, or psychiatric disabilities enrolled in this course who may need disability-related classroom accommodations are encouraged to make an office appointment to see me early in the semester (i.e., within the first two weeks). If you have not done so already, students requiring disability-related accommodations should register with the Student Accessibility Services office (301 Collis Student Center).
Dartmouth’s policies and resources: <http://www.dartmouth.edu/~accessibility>
Contact info: 646-9900, Student.Accessibility.Services@Dartmouth.edu
6. **Plagiarism is unacceptable.** All work submitted as your own must be written by you and not previously submitted for any other class. It is important to attribute material that is the work of others to the original source. If you are unsure how to properly cite a source, please consult with me prior to handing in an assignment (and see: <http://www.dartmouth.edu/~writing/sources/>). You should be familiar with Dartmouth’s Honor Principle, which applies to all courses at Dartmouth (available here: www.dartmouth.edu/~uja/honor/). I do not expect any violations of this code, but if any concerns do arise I will forward all related materials to Dartmouth’s Committee on Standards.
7. **Formatting of papers...** make sure that you use 12-point Times New Roman font, that you double-space the whole document, that your print margins are 1-inch on all sides (not the default in *Word*), that all your pages are numbered, and that your document is stapled together (if printed). For citations in all papers, you must use APA Style formatting (refer to the APA Style Manual or online guides, such as: <http://owl.english.purdue.edu/owl/resource/560/01/>)

ASSIGNMENTS and ASSESSMENTS

Midterm examination (30%) – **TUESDAY, OCTOBER 18TH**

- Mix of short answer and fill-in-the-blank questions
- Covers all material presented so far (readings, slides, discussions, etc.)

Final examination (30%) – **SUNDAY, NOVEMBER 20TH @ 11:30am**

- Mix of short answer and fill-in-the-blank questions
- Covers all material (emphasis on material since midterm)

In-class Quizzes (10%) – **Six quizzes throughout the term**

- Will consist of short answer and fill-in-the-blank questions
- These are intended to be low-stakes opportunities for you and I both to gauge your understanding of the material
- Each quiz will include a collaborative component that will count for half the grade

Research Paper (15%) – **DUE: THURSDAY, NOVEMBER 3RD**

- A well-researched, well-reasoned, 8-10-page paper relating your chosen topic of interest to an educational intervention (see assignment posted on Canvas for more details).
- This is an individual assignment (not a group project), and will be graded as such – *you are expected to do your own research and convey your own assessment of the material*
- Paper must reference at least 7 scientific sources (peer-reviewed articles) not assigned in class
- Of critical importance: always cite your sources when you assert a fact

Group Presentation (10%)

- During the second week of class, we will divide into small groups
- During several classes, groups will break out periodically for discussion or for an in-class activity, and then we will return to larger group discussion as a class
- At the end of the term, each group will present a summary of each group member's research paper, either in poster or in powerpoint form. Each group member will teach their co-members about their topic and then present together as a group.

Class Participation and Attendance (3%)

- Arrive on time for each class
- Prepare for all class discussions and be an active class member (e.g., read the assigned materials, stay awake during class, stay off internet, etc.)

Research Participation (2%)

- The goal of this assignment is to provide you with an insightful perspective on research studies. Please complete one of the following options by **Tues, Nov 15th**:

Option #1:

Volunteer to participate in lab research in the Education Department (2 hours total)

Volunteer to participate in one or more research studies conducted by any research lab in the Education Department, totaling **two hours** of participation (e.g., one two-hour study or two one-hour studies). Specific instructions on how to sign up for a research study are posted on Canvas. To get credit, you must hand in a signed *EDUC16 Participant Confirmation Form* (one signed copy for each study in which you participate) to me in class anytime before the last day of regular classes on **Tuesday, Nov 15th**. A copy of the form is posted on Canvas.

Option #2:

Write two methods critiques of published research articles (approx. 1 page each)

If you are unable to participate or uninterested in participating in a research study, you may write an in-depth critique of the methods employed in a published research article. First, locate two empirical articles that were not assigned for this course. Then, for each study, you will write approximately half a page (double-spaced, 12pt font) that explains one aspect of the study procedure that you think the researchers could improve upon without sacrificing the scientific integrity of the study. Be sure to explain why this change is relevant to the authors' conclusions and to how the authors expect the results will generalize to other individuals or other situations that were not directly tested. Lastly, on the remainder of the page, briefly describe a research question that builds on the current study but that is not fully addressed by the methods in this article. In other words, given the results of the current study, *what is the next question you would like the researchers to address?* Describe how this research question follows from the results of the current study and briefly outline the new methods that the researchers could use to address this question. Hand in your overview to me in class anytime before the last day of regular classes on **Tuesday, November 15th**. Attach a copy of the first page of the empirical article, including the abstract.

Option #3:

You may also combine the first two options. If you choose to do so, each 1-page critique is equivalent to 1 hour of research participation.

SCHEDULE
(READINGS MAY CHANGE SLIGHTLY FROM THIS LIST;
ASSIGNED READINGS ARE POSTED ON CANVAS)

1. Tuesday, September 13

INTRODUCTION and COURSE OVERVIEW

Thursday, September 15

NO CLASS TODAY

2. Tuesday, September 20

APPLYING THEORIES AND EVIDENCE FROM EDUCATION, PSYCHOLOGY, AND NEUROSCIENCE

Readings:

- Excerpts from Chapters 1 & 2 in: *Ed Psych*, Snowman & McCown (eds.)
- Willingham, D. T., & Lloyd, J. W. (2007). How educational theories can use neuroscientific data. *Mind, Brain, and Education*, 1(3), 140–149.
- Sigman, M., Peña, M., Goldin, A. P., & Ribeiro, S. (2014). Neuroscience and education: prime time to build the bridge. *Nature Neuroscience*, 17(4), 497–502.

ATTENTION AND MEMORY SYSTEMS

3. Wednesday, September 21 (x-period)

MULTI-TASKING

- Watson, J. M., & Strayer, D. L. (2010). Supertaskers: Profiles in extraordinary multitasking ability. *Psychonomic Bulletin & Review*, 17(4), 479–485.
- Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M. I. (2002). Testing the Efficiency and Independence of Attentional Networks. *Journal of Cognitive Neuroscience*, 14(3), 340–347.
- Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard advantages of longhand over laptop note taking. *Psychological science*, 25(6), 1159–1168.

4. Thursday, September 22

ATTENTION and WORKING MEMORY

Readings:

- Moreno, R., & Mayer, R. E. (1999). Cognitive principles of multimedia learning: The role of modality and contiguity. *Journal of Educational Psychology*, 91(2), 358–368.
 - Gathercole, S. E., & Alloway, T. P. (2008). Working memory and classroom learning. *Applied cognitive research in K-3 classrooms*, 17–40.
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5. Tuesday, September 27

COGNITIVE CONTROL and EXECUTIVE FUNCTIONS

Readings:

- St Clair-Thompson, H. L., & Gathercole, S. E. (2006). Executive functions and achievements in school: Shifting, updating, inhibition, and working memory. *The Quarterly Journal of Experimental Psychology*, 59(4), 745-759.
- Miyake, A., & Friedman, N. P. (2012). The Nature and Organization of Individual Differences in Executive Functions: Four General Conclusions. *Current Directions in Psychological Science*, 21(1), 8-14.
- Shaw, P., Greenstein, D., Lerch, J., Clasen, L., Lenroot, R., Gogtay, N., Evans, A., Rapoport, J. & Giedd, J. (2006). Intellectual ability and cortical development in children and adolescents. *Nature*, 440(30), 676-679.

6. Thursday, September 29

SELF-REGULATION and GRIT

Readings:

- Mischel, W., Ayduk, O., Berman, M. G., Casey, B. J., Gotlib, I. H., Jonides, J., ... Shoda, Y. (2011). "Willpower" over the life span: decomposing self-regulation. *Social Cognitive and Affective Neuroscience*, 6(2), 252-256.
- Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, 126(2), 247-259.
- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92(6), 1087-1101.

MOTIVATION AND REINFORCEMENT

7. Tuesday, October 4

LEARNING and REINFORCEMENT

Readings:

- Schultz, W. (2007). Behavioral dopamine signals. *Trends in Neuroscience*, 30, 203-210.
- Olson, M. & Fazio, R. (2001). Implicit attitude formation through classical conditioning. *Psychological Science*, 12, 413-417.
- McAllister, L., Stachowiak, J., Baer, D., & Conderman, L. (1969). The application of operant conditioning techniques in a secondary school classroom. *The Journal of Applied Behavioral Analysis*, 2(4), 277-285.

8. Thursday, October 6

MOTIVATION and PRAISE

- Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology*, 75(1), 33-52.
- Mangels, J. A., Butterfield, B., Lamb, J., Good, C., & Dweck, C. S. (2006). Why do beliefs about intelligence influence learning success? A social cognitive neuroscience model. *Social Cognitive and Affective Neuroscience*, 1(2), 75-86.

9. Tuesday, October 11

POSITIVE BEHAVIORAL INTERVENTION

- Horner, R. H., Sugai, G., Smolkowski, K., Eber, L., Nakasato, J., Todd, A. W., & Esperanza, J. (2009). A Randomized, Wait-List Controlled Effectiveness Trial Assessing School-Wide Positive Behavior Support in Elementary Schools. *Journal of Positive Behavior Interventions*, 11(3), 133-144.
- Sugai, G., & Horner, R. R. (2006). A promising approach for expanding and sustaining school-wide positive behavior support. *School Psychology Review*, 35(2), 245.

10. Thursday, October 13

GENDER DIFFERENCES IN SCHOOL PERFORMANCE

Readings:

- Harker, R. (2000). Achievement, Gender and the Single-Sex/Coed Debate. *British Journal of Sociology of Education*, 21(2), 203-218.
- Furnham, A., Chamorro-Premuzic, T., & McDougall, F. (2003). Personality, cognitive ability, and beliefs about intelligence as predictors of academic performance. *Learning and Individual Differences*, 14(1), 47-64.

11. Tuesday, October 18

MIDTERM EXAM

KNOWLEDGE, TRAINING, AND EXPERTISE

12. Thursday, October 20

TESTING EFFECT and DISTRIBUTED RETRIEVAL

Readings:

- Rohrer, D. & Pashler, H. (2007). Increasing retention without increasing study time. *Current Directions in Psychological Science*, 16, 183-186.
- Roediger, H. L., & Karpicke, J. D. (2006). Test-Enhanced Learning: Taking Memory Tests Improves Long-Term Retention. *Psychological Science*, 17(3), 249-255.
- Kornell, N. & Son, L.K. (2009). Learners' choices and beliefs about self-testing. *Memory*, 17(5), 493-501.
- Semb, G., Ellis, J., Araujo, J. (1993). Long-term memory for knowledge learned in school, *Journal of Educational Psychology*, 85(2), 305-316.

13. Tuesday, October 25

REMEMBERING and FORGETTING

Readings:

- Roediger, H. & McDermott, K. (2000). Tricks of memory. *Current Directions in Psychological Science*, 9(4), 123-127.
- Altmann, E. & Gray, W. (2002). Forgetting to remember: the functional relationship of decay and interference, *Psychological Science*, 13(1), 27-33.
- Brady, T. F., Konkle, T., Alvarez, G. A., & Oliva, A. (2008). Visual long-term memory has a massive storage capacity for object details. *Proceedings of the National Academy of Sciences*, 105(38), 14325-14329.

14. Thursday, October 27

ORGANIZATION OF KNOWLEDGE and MEMORY

Readings:

- Smith, Glenberg, & Bjork. (1978). Environmental context and human memory. *Memory & Cognition*, 6(4) 342-353.
- Allport, D. A., & Funnell, E. (1981). Components of the Mental Lexicon. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 295(1077), 397-410.
- Thompson-Schill (2003). Neuroimaging studies of semantic memory: Inferring "how" from "where". *Neuropsychologia*, 41, 280-292.

15. Tuesday, November 1

HOW EXPERIENCE LEADS TO KNOWLEDGE and EXPERTISE

- Carey S. (2004). Bootstrapping and the origin of concepts. *Daedalus*, Winter, 59-68.
- Carpenter, T. P., Fennema, E., & Franke, M. L. (1996). Cognitively guided instruction: A knowledge base for reform in primary mathematics instruction. *The Elementary School Journal*, 3-20.

- Kalyuga, S., Ayres, P., Chandler, P., & Sweller, J. (2003). The Expertise Reversal Effect. *Educational Psychologist*, 38(1), 23-31.

HIGHER-ORDER COGNITION

16. Thursday, November 3

INTELLIGENCE

Readings:

- Deary, I. J., Strand, S., Smith, P., & Fernandes, C. (2007). Intelligence and educational achievement. *Intelligence*, 35(1), 13-21.
- Nisbett, R. E., Aronson, J., Blair, C., Dickens, W., Flynn, J., Halpern, D. F., & Turkheimer, E. (2012). Intelligence: New findings and theoretical developments. *American Psychologist*, 130-159.
- Gray JR, Chabris CF, Braver TS. (2003). Neural mechanisms of general fluid intelligence. *Nature Neuroscience*. 6(3), 316-22.
- Owen, A. M., Hampshire, A., Grahn, J. A., Stenton, R., Dajani, S., Burns, A. S., Howard, R. J., et al. (2010). Putting brain training to the test. *Nature*, 465(7299), 775-778.

17. Tuesday, November 8

ANALOGICAL REASONING and CREATIVITY

Readings:

- Gentner, D., Loewenstein, J. & Thompson, L. (2003). Learning and transfer: A general rule for analogical encoding. *Journal of Educational Psychology*, 95, 393-405.
- Green, A. E., Fugelsang, J. A., Kraemer, D. J. M., Shamosh, N. A., & Dunbar, K. N. (2006). Frontopolar cortex mediates abstract integration in analogy. *Brain research*, 1096(1), 125-137.

18. Wednesday, November 9

PRESENTATIONS – DAY 1

Readings: TBA, selected by groups

19. Thursday, November 10

PRESENTATIONS – DAY 2

Readings: TBA, selected by groups

Tuesday, November 17

NO CLASS TODAY

Sunday, November 20 – FINAL EXAM @ 11:30am
