

**Brain Development-Psychology 450**  
**Mondays 8:30-9:50, Thursdays 10-11:20, Jeffrey Hall, Room 115**

**Professor: Dr. Beth Kelley**

**Office: Room 351 Humphrey**

**Office Hours: Wednesdays 5-6 and Thursdays 12-1**

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**Book: “Developmental Cognitive Neuroscience, Fourth Edition” by Johnson & de Haan**

### **Course Description**

This course is designed to be a relatively broad discussion of brain development, with a particular focus on issues such as the developmental course of brain development, how to most effectively measure brain development and the changes in brain functioning, how and when the brain may develop atypically, the role of plasticity and pruning in brain development, and how brain development is related to various aspects of cognitive development.

There are a lot of readings in this course (all of which are available in the book or online through Queen’s journal system), particularly at the beginning of the course. I highly suggest that you at least skim each reading before coming to class that you can participate in the discussion-you can always go back and read them over in more detail when writing the final exam. Of course, if you are submitting a question for that day’s readings, you will need to read them in more detail. Instead of me just re-iterating what you read in the readings, I will make a real attempt to make each class more of a discussion of these readings and how they relate to broader themes in developmental cognitive neuroscience.

The latter part of the course will be taken up by group presentations on atypically-developing brains.

### **Learning Outcomes**

1. Construct the developmental course of brain development.
2. Evaluate the strengths and weaknesses of the various methods used to assess brain development over time.
3. Interpret the roles of plasticity and pruning as they are involved in brain development.
4. Compare and contrast the effects of different developmental disorders on the developing brain.
5. Appraise current research in the field.
6. Be able to argue a position using supporting evidence to back up your assertions.

### **Course Requirements**

1. *Questions on the readings-worth 15% (best three of four).* Four times during the semester, you will be asked to submit discussion questions on the readings. These questions should be as substantive as possible and make a real attempt to tie the readings/lecture into other things you have learned in psychology and especially developmental psychology. Think big picture, critical thinking, theoretical type of questions. You might also try to think of other ways that the issues under discussion might be addressed, that is, what sort of experimental design might be more appropriate, but please be sure to offer up constructive criticism, i.e., don’t just talk about how the methodology in the paper sucks! I am happy to answer questions of clarification, but these will not count toward your mark. Each day’s question will be worth 5 marks toward your overall grade and the best three of the four submitted will count toward your grade. These questions are due by noon the day before class so that I can organize

them and get them together for the whole class. The questions will be submitted through OnQ dropboxes and will be run through Turnitin. For the first few classes I will provide the discussion questions to give you an idea of what I am looking for.

- Attendance and participation-worth 10%.* You will be expected to attend every class and be engaged in the discussion. I know this is not always easy to do, but it is certainly not impossible! If you do need to be absent, please let me know the reason for your absence. In the past I have actually taken attendance and made check marks for people every time that they contributed to the discussion, but I found that this led to people just agreeing with what had already been said, just for the sake of getting a check mark. Thus, this mark will be more of a holistic one (though I will take attendance at the beginning, more so that I can get to know your names more than anything else). Thus, if you miss a couple of classes but contribute substantially to the discussion on the remaining days, your mark will remain a good one. I know that not everyone feels comfortable speaking up in class, so if you attend every class and only make the occasional substantial comment, your mark will also remain good. I will try to remain as fair as possible with this mark, and have attendance and participation weigh on it equally.
- Oral presentation-worth 30%.* Further on in the semester, topics will be presented by small groups on atypical brain development. You will be responsible for finding articles related to this topic, synthesizing the articles and presenting them as a group. You will also be responsible for trying to answer questions and lead the discussion on the topic, although I will certainly help in this regard. You will receive group marks for these presentations-if things are not going well in the group and someone is not pulling their weight, I would appreciate it if you would try to work it out amongst yourselves first, and if you cannot, I will mediate the discussion. Please come to me enough ahead of time so that we can make sure everything gets straightened out by the presentation date. Psychologists have to work together and learning to work together is an important part of the process. Those scheduled to present **MUST** be in class on the day of the presentation. Additionally, it is strongly encouraged that you come to me with **ANY** questions that you have about the topic itself. I strongly suggest that you start working on this presentation early in the semester as gathering all of this information and synthesizing it takes time.

Presentations should be roughly structured as follows:

1. What are the general symptoms of the disorder and what is its prevalence?
2. What are the major effects on brain development?
3. How are these effects on brain development related to cognitive development?
4. Are there any effective treatments to minimize the deleterious effects?

You will see that there are four topics here and there will be four of you in each group so you can certainly split things up by topic. However, I **STRONGLY** advise you to work closely on these presentations so that you're not repeating yourselves, you all know what each other are going to say, and you can share information more efficiently. Remember, you will get a group mark, so it behooves you to make sure that everyone's presentation in the group is the best that it can be.

- Article Review Assignment (15%-best one out of two):* You will read two of the articles provided for the assignments and answer a number of questions (which will be provided with each article) on that article which will ask you to summarize the content, critique the methods, identify limitations of the research, and comment upon how that particular study fits within the larger literature on that topic, etc.. The articles and questions on them will be placed in OnQ after we have discussed how to complete an article

review. You will only write two of these article reviews, though there will be a choice of 4 articles. Each of these article reviews will have its own due date listed in the class schedule and will not be accepted late. If you can't get it in on time, you will have to do another one. We will spend the better part of the first class talking about how to read primary source articles with a critical eye and how to situate them within the larger literature. We will also spend some time talking about plagiarism, as many people in last year's class lost a significant proportion of their grades because of (mostly inadvertent) plagiarism.

Each assignment will be worth 30 points and will be multiplied by .5 to be worth 15% of your final grade. It is not mandatory that you do two, but highly suggested. These assignments will be handed into a dropbox in OnQ but will pass through Turnitin.

5. *Final Exam-worth 30%*. The final exam will be a take-home exam which will be given to you when you come back after fall break. It will consist of short answers and essays that will cover the important themes running throughout the course. This exam will be due by 11:59 pm on Thursday, December 13<sup>th</sup> without exception-if you do not have a doctor's note, 1% of your overall grade (i.e., one mark out of 30) will be taken off each 24 hours that it is late. The paper will be submitted through OnQ dropboxes and will be run through Turnitin.

### **Grading Summary**

**Questions and Comments-15% (best three of four)**

**Attendance and Participation 10%**

**Oral Presentation 30%**

**Article Assignment 15% (best one of two)**

**Final Exam 30% (due December 13<sup>th</sup> at 11:59 p.m.)**

### **Grading Policy**

The Psychology Grading Policy, "mixed-marking method," is outlined on the following webpage:

<http://www.queensu.ca/psychology/Undergraduate/psycdepartmentalpolices/psycgradingpolicy.html>

A full list of Departmental Policies, including exam absences, can be found at:

<http://www.queensu.ca/psychology/Undergraduate/psycdepartmentalpolices.html>

### **Accommodations for Students with Disabilities**

*Queen's University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact the Student Wellness Services and register as early as possible. For more information, including important deadlines, please visit the Student Wellness Services website at: <http://www.queensu.ca/studentwellness/home>*

Please contact me by e-mail [kellyb@queensu.ca](mailto:kellyb@queensu.ca) if you need accommodation for the discussion questions, missing classes, or the final exam.

The Senate Policy on Academic Consideration for Students in Extenuating Circumstances 10. Academic Consideration for Students with Extenuating Circumstances Queen's University is committed to providing

academic consideration to students experiencing extenuating circumstances that are beyond their control and are interfering with their ability to complete academic requirements related to a course for a short period of time, not to exceed three months. Students receiving academic consideration must meet all essential requirements of a course. The Senate Policy on Academic Consideration for Students in Extenuating Circumstances was approved at Senate in April, 2017 (see

<http://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslclwww/files/files/policies/senateandtrustees/AcademicConsiderationsforExtenuatingCircumstancesPolicyFinal.pdf> ) Each Faculty has developed a protocol to provide a consistent and equitable approach in dealing with requests for academic consideration for students facing extenuating circumstances. Arts and Science undergraduate students can find the Faculty of Arts and Science protocol and the portal where a request can be submitted at:

<http://www.queensu.ca/artsci/accommodations> Students in other Faculties and Schools who are enrolled in this course should refer to the protocol for their home Faculty. If you need to request academic consideration for this course, you will be required to provide the name and email address of the instructor/coordinator. Please use the following: Beth Kelley [kelleyb@queensu.ca](mailto:kelleyb@queensu.ca)

### **Academic Integrity**

Academic integrity is constituted by the five core fundamental values of honesty, trust, fairness, respect and responsibility (see <http://www.academicintegrity.org>). These values are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University (see the Senate Report on Principles and Priorities: <http://www.queensu.ca/secretariat/senate/policies/princpri/>).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments conform to the principles of academic integrity. **See Academic Regulation 1 Academic Integrity** of the Arts & Science Calendar:

<http://www.queensu.ca/artsci/academic-calendars/regulations>.

Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

Please note that we have had issues in the past with unintended plagiarism in this course. Please visit these very helpful websites for how to make sure that you are able to write things in your own words:

<https://integrity.mit.edu/handbook/academic-writing/avoiding-plagiarism-paraphrasing>

[http://writing.wisc.edu/Handbook/QPA\\_paraphrase.html](http://writing.wisc.edu/Handbook/QPA_paraphrase.html)

<https://owl.english.purdue.edu/owl/resource/619/1>

### **Turnitin Statement**

This course makes use of Turnitin, a third-party application that helps maintain standards of excellence in academic integrity. Normally, students will be required to submit their course assignments to through

onQ to Turnitin. In doing so, students' work will be included as source documents in the Turnitin reference database, where they will be used solely for the purpose of detecting plagiarism.

Turnitin is a suite of tools that provide instructors with information about the authenticity of submitted work and facilitates the process of grading. Turnitin compares submitted files against its extensive database of content, and produces a similarity report and a similarity score for each assignment.

A similarity score is the percentage of a document that is similar to content held within the database.

Turnitin does not determine if an instance of plagiarism has occurred. Instead, it gives instructors the information they need to determine the authenticity of work as a part of a larger process.

Please read Turnitin's Privacy Pledge, Privacy Policy, and Terms of Service, which governs users' relationship with Turnitin. Also, please note that Turnitin uses cookies and other tracking technologies; however, in its service contract with Queen's University Turnitin has agreed that neither Turnitin nor its third-party partners will use data collected through cookies or other tracking technologies for marketing or advertising purposes. For further information about how you can exercise control over cookies, see Turnitin's Privacy Policy:

Turnitin may provide other services that are not connected to the purpose for which Queen's University has engaged Turnitin. Your independent use of Turnitin's other services is subject solely to Turnitin's Terms of Service and Privacy Policy, and Queen's University has no liability for any independent interaction you choose to have with Turnitin.

## **SUGGESTED TIME COMMITMENT**

Students can expect to spend approximately 10 hours a week (114 hours per term) in study, listening, attending seminars, reading articles and preparing for the presentation for Psyc 450.

## **CLASS SCHEDULE**

### **September 6**

Introduction to class, "getting to know you", go over syllabus, discuss expectations and grading

"How to critique an article"

### **September 10**

Textbook Chapter 1 "The Biology of Change"

Gottlieb, G. (2007). Probabilistic epigenesis. *Developmental Science*, 10, 1-11.

### **September 13**

Textbook Ch 2-"Methods and Populations"

Karmiloff-Smith, A. (2010). Neuroimaging of the developing brain: Taking "developing" seriously. *Human Brain Mapping*, 31, 934-941.

### **September 17**

Poldrack, R. A. (2010). Interpreting developmental changes in neuroimaging signals. *Human Brain Mapping*, 31, 872-878.

**September 19<sup>th</sup>-noon-last names A-B discussion question #1 on Peterson article due**

**September 20**

Peterson, B.S. (2003). Conceptual, methodological, and statistical challenges in brain imaging studies of developmentally-based psychopathologies. *Development and Psychopathology*, 15, 811-832.

**September 23<sup>rd</sup>-noon-last names C-C discussion question #1 on Dong & Greenough due**

**September 23<sup>rd</sup>-noon-last names D-G discussion question #1 on Shaw et al. due**

**September 24**

Dong, W. K., & Greenough, W. T. (2004). Plasticity of nonneuronal brain tissue: Roles in developmental disorders. *Mental Retardation and Developmental Disabilities Research Reviews*, 10, 85-90.

Shaw, P., Gogtay, N., & Rapoport, J. (2010). Childhood psychiatric disorders as anomalies in neurodevelopmental trajectories. *Human Brain Mapping*, 31, 917-925.

**September 26<sup>th</sup>-noon-last names H-Morris-discussion question #1 on Chapter 3 due**

**September 26<sup>th</sup> noon-last names Morrison-T-discussion question #1 on Chapter 4 due**

**September 27**

Textbook Chapters 3& 4- "From Gene to Brain" and "Building a Brain"

**September 30<sup>th</sup>-noon-last names U-Z discussion question #1 on Casey et al due**

**September 30<sup>th</sup>-noon-last names A-B-discussion question #2 on Thomas & Johnson due**

**October 1**

Casey, B. J., Galvan, A., & Hare, T. A. (2005). Changes in cerebral functional organization during cognitive development. *Current Opinion in Neurobiology*, 15, 239-244.

Thomas, M. S. C., & Johnson, M. H. (2008). New advances in understanding sensitive periods in brain development. *Current Directions in Psychological Science*, 17, 1-5.

**October 3<sup>rd</sup>-noon-last names C-C-discussion question #2 on Stevens due**

**October 3<sup>rd</sup>-noon-last names D-G discussion questions #2 on Fox et al. due**

**October 4**

Stevens, M. C. (2009) The developmental cognitive neuroscience of functional connectivity. *Brain and Cognition*, 70, 1-12.

Fox, S. E., Levitt, P., & Nelson, C. A. (2010). How the timing and quality of early experiences influence the development of brain architecture. *Child Development*, 81, 28-40.

**October 10-noon-last names H-Morris-discussion question #2 Chapter 5 due**

**October 10-noon-last names Morrison-T- discussion question #2 Richards et al. due**

**October 11**

Textbook Ch. 5 “Vision, Orienting and Attention”

Richards, J. E., Reynolds, G. D., & Courage, M. L. (2010). The neural bases of infant attention. *Current Directions in Psychological Science, 19*, 41-46.

**October 14-noon-last names U-Z discussion question #2 on Chapter 6 due**

**October 14-noon-last names A-B-discussion question #3 on Grill-Spector & Sayres due**

**October 15**

Textbook Ch. 6 “Perceiving and Acting on the Physical World”

Grill-Spector, K., & Sayres, R. (2008). Object recognition: Insights from advances in fMRI methods. *Current Directions in Psychological Science, 17*, 73-79.

**October 17 at 11:59 pm-Article Assignment #1 due**

Noble, K. G., Houston, S. M., Kan, E., & Sowell, E. R. (2012) Neural correlates of socioeconomic status in the developing brain. *Developmental Science, 15*, 516-527. DOI: 10.1111/j.1467-7687.2012.02247.x

**October 16-noon-last names C-C-discussion question #3 on Chapter 7 due**

**October 16<sup>th</sup>-noon-last names D-G-discussion question #3 on Blakemore & Frith due**

**October 18**

Textbook Ch 7-“Perceiving and Acting on the Social World”

Blakemore, S-J., & Frith, U. (2004). How does the brain deal with the social world? *NeuroReport, 15*, 119-128.

**October 21-noon-last names H-Morris-discussion question #3 on Somerville et al. due**

**October 22**

Somerville, L. H., Jones, R. M., Ruberry, E. J., Dyke, J. P., Glover, G., & Casey, B. J.(2013). The medial prefrontal cortex and the emergence of self-conscious emotion in adolescence. *Psychological Science, 24*, 1554-1562.

**October 28<sup>th</sup>-noon-last names Morrison-T-discussion question #3 on chapter 8 due**

**October 28<sup>th</sup>-noon-last names U-Z-discussion question #3 on Bauer due**

**October 29**

Textbook Ch. 8 “Learning and Long-Term Memory”

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

**October 30-11:59 pm. Article Assignment #2 Due**

Sylvester, C. M., Whalen, D. J., Belden, A. C., Sanchez, S. L., Luby, J. L., & Barch, D. M. (2018). Shyness and functional network connectivity over early adolescence. *Child Development*, 89, 734-745.  
DOI: 10.1111/cdev.13005

**October 31<sup>st</sup>-noon-last names A-B-discussion question #4 on Chapter 9 due**

**October 31<sup>st</sup>-noon-last names C-C-discussion question #4 on Kuhl & Rivera-Gaxiola due**

**November 1**

Textbook Ch. 9 “Language”

Kuhl, P., & Rivera-Gaxiola, M. (2008). Neural substrates of language acquisition. *Annual Review of Neuroscience*, 3, 511-534.

**November 4 at 11:59 pm. Article Assignment #3 due**

Thomas, K. M., Hunt, R. H., Vizueta, N., Sommer, T., Durston, S., Yang, Y., & Worden, M. S. (2004) Evidence of developmental differences in implicit sequence learning: An fMRI study of children and adults. *Journal of Cognitive Neuroscience*, 16, 1339-1351.

**November 4<sup>th</sup>-noon-last names D-G-discussion question #4 on Chapter 10 due**

**November 4<sup>th</sup>-noon-last names H-Morris-discussion question #4 on Thompson-Schill et al. due**

**November 5**

Textbook Ch. 10 “Prefrontal Cortex, Working Memory and Decision Making”

Thompson-Schill, S. L., Ramscar, M., & Chrysikou, E. G. (2009). Cognition without control: When a little frontal lobe goes a long way. *Current Directions in Psychological Science*, 18, 259-263.

**November 7<sup>th</sup>-noon-last names Morrison-T-discussion question #4 on Chapter 11 due**

**November 7<sup>th</sup>-noon-last names U-Z-discussion question #4 on Chapter 12 due**

**November 8**

Textbook Chs. 11 & 12-“ Cerebral Lateralization” and “Interactive Specialization”

**November 11 at 11:59 pm Article Assignment #4 due**

MacNeill, L.A., Ram, N., Bell, M. A., Fox, N. A., & Perez-Edgar, K. (2018). Trajectories of infants’ Biobehavioral development: Timing and rate of A-not-B performance gains and EEG maturation. *Child Development*, 89, 711-724. DOI: 10.1111/cdev.13022

**November 12**

Presentation group 1-The effects of premature birth on brain development

**November 15**

Presentation group 2-Brain development in children with Fetal Alcohol Spectrum Disorders

**November 19**

Presentation group 3-The effects of cancer on brain development

**November 22**

Presentation group 4-Brain Development in children with Fragile X syndrome

**November 26**

Presentation group 5-The effects of epilepsy on brain development

**November 29**

Textbook Ch. 13 “Toward an Integrated Developmental Cognitive Neuroscience”

Wrap-up, bake-off, and discussion of final exam