I. Course Description

This course will investigate the changing structure of the human brain and the concomitant changes in human behavior from early development through old age. We will focus on both typical lifespan development, and the exceptions to typical development brought on by environmental factors which can influence biological trajectories. We will cover a wide range of topics including epigenetic effects on the young organism, the impact of early environmental deprivation on “normal” cognitive and sensory development, the potential of even the adult brain for structural alteration in response to behaviors like aerobic exercise, and the long-term effects of education and complex mental activities on later risk for dementia and diminished cognitive ability during old age. Such variations from the typical developmental processes are often called manifestations of “plasticity,” and a main theme running through this course is just how prevalent such plasticity is—raising questions about what terms like “typical development” even mean.

II. Prerequisites

Science of Psychology (PSYC 1001), Mind, Brain, & Behavior (PSYC 1010), or an equivalent Introductory Psychology course and permission of the instructor is required. It is recommended, but not required, that you have a good grasp of general psychological research methods, attainable by taking a class in Experimental Methods (PSYC1420, PSYC 1450 or PSYC 1455). In addition, Developing Brain (PSYC 2480) will provide a strong, directly relevant background in neural plasticity and will be especially helpful, but is not required. If you have little psychology background but have taken biology or neuroscience courses, you may be able to take this course with my permission.
III. Role of PSYC S3483 in the Psychology Curriculum:

PSYC S34xx is a seminar designed especially for undergraduates majoring in Psychology or Neuroscience and Behavior, and for students participating in the Psychology Post-Baccalaureate Certificate Program. It will help address several gaps in the psychology curriculum, including an absence of lifespan developmental courses. PSYC S34xx will fulfill the following degree requirements:

- For the Psychology major or concentration in the College and in the School of General Studies, for the Psychology minor in Engineering, and for the Psychology Post-Baccalaureate Certificate Program, this class will meet the Group II (Psychobiology & Neuroscience) distribution requirement.
- For the Neuroscience and Behavior joint major, it will fulfill the fifth Psychology requirement for “one advanced psychology seminar from a list approved by the Psychology Department advisor to the program.”
- For the Psychology Post-Baccalaureate students and for Psychology majors who enter Columbia in Fall 2013 or later, it will fulfill the seminar requirement.
- This class will meet one term of the social science requirement of G.S., provided that students obtain the necessary permissions and have taken the prerequisite psychology courses. Majors will have priority over students who are taking the course for social science credit.
- For the Barnard Psychology major, this class will fulfill the senior seminar requirement.

IV. Required Materials

There is no required textbook for this course. All readings will be posted on CourseWorks and can be downloaded free of charge or located within the holdings of the Columbia Libraries.

V. Course Goals

By the end of this course you should be able to:

1) Identify the major developmental stages human beings undergo, from birth until very old age and death, in terms of both the brain and human behavior.

2) Identify the major environmental factors which can play a role in shaping these developmental periods, and explain the psychological and neurocognitive mechanisms through which they act.

3) Communicate your ideas about scientific articles effectively to your peers, in both written and spoken form, and be able to carry on an intelligent dialogue about scientific findings that is well-informed, reason-based, and respectful.

4) Identify useful scientific background literature, and synthesize it in writing using your own words. You should also be able to add to this synthesis using your own ideas to advance or critique an existing theoretical position.

5) Think critically about claims concerning the constitution of “normal” or “typical” development or aging, and be able to extend such a critical outlook to other fields in psychology.
VI. Course Requirements and Grading Policy
Grades will be based on:

1) **Participation (15%)**: This course is a seminar, and is designed to facilitate communication between you and the instructor, and between you and your fellow students. To ensure that everyone is getting the maximum engagement with the material, participation will be an extremely important component of your grade. You are expected to make substantial contributions to the in-class discussions. (Note: If you are shy, or are hesitant to speak in class for whatever reason, please come and talk to me so we can discuss your situation.) Attendance is required and if you miss a class without a legitimate excuse (e.g. a documented illness or personal emergency), you will be required to make up the class by completing additional written assignments based on the readings (in addition to the discussion questions detailed below).

2) **Discussion Board (30%)**: In addition to our in-class discussions, we will utilize the CourseWorks discussion board. Each Friday I will post a discussion question on the discussion board for the following week. You are expected to post a substantive reaction of at least 400 words to either the prompt, or to another student’s comment, by the weekly deadline (Wednesday at 8:00 PM). Late posts will not receive credit. The purpose of writing these posts is both to guide your critical thinking as you read and synthesize the research articles, and to keep you in the habit of writing about complex scientific topics throughout the entire course. There are many ways to create a “good post”—a careful critique of an article’s conclusions based on flaws in its methodology, a synthesis of distinct theories from different articles throughout the semester backed by logical argument, a suggestion for new research approaches that would answer some open question in the field of lifespan psychology, etc. In general, your post should be based on critical thinking rather than feelings or opinion, and should provide evidence that you substantially engaged with the readings. Posts that meet these guidelines will receive full credit. If your posts are not meeting the criteria above, I will let you know and give you feedback to improve your posts. If your posts still don’t improve after receiving feedback, you will begin to lose credit on these. Likewise, not doing a post will result in a lower discussion board grade (by 10% per post) as well.

3) **Group Presentation (20%)**: With a partner (or, depending on enrollment, 2 partners) you will be required to lead one of the class discussions. On the first day of class, you will rank the later course topics by your degree of interest, and I will do my best to assign you to a topic which you have expressed interest in. The presentation should cover the assigned readings in their entirety, and you should plan to incorporate discussion throughout the presentation. (I will be presenting in this manner for the first half of the course, so you will have a model from which to work.) Your group should meet well in advance to prepare a PowerPoint presentation as well as several discussion questions for your fellow students. After this, you should arrange to meet with me as a group at least one week prior to your scheduled presentation (this will give you time to make any course corrections that need to be made). You will be graded based on not
just the quality of the PowerPoint but the quality of the overall presentation and discussion
(Note: In most cases the entire group will receive the same grade, so you should discuss with me
as early as possible if you are concerned with the effort one of your teammates is putting in.)
You will be informed of the schedule for presentations no later than the 3rd class. Group
presentations will all be held in weeks 4-6.

4) Final Research Paper (30%): On the last day of class you will be expected to submit a research
paper based on a topic you have cleared with me that is related to mechanisms of lifespan
plasticity. This can be directly related to any of the mechanisms we will discuss in class, or it can
be based on a topic you researched on your own (provided I have approved it). A brief paper
proposal will be due in the beginning of week 3 (see below), and a paper outline will be due at
the end of week 4. The research paper should be approximately 10-12 double-spaced pages,
and should review literature on your chosen topic beyond the assigned course readings. It
should include at least 10 references to peer-reviewed articles not already included in the
required readings, and should be formatted according to APA style. We will discuss appropriate
literature review strategies as well as the basics of APA formatting in class. For the paper, you
will not simply summarize information, but will be consolidating and expounding upon existing
theoretical perspectives in the academic literature. The goal will be to contribute unique
arguments to support your theoretical position. More details about the paper will be given later
in the class.

5) Research Paper Proposal (5%): At the beginning of week 3 you will hand in a brief proposal of
your final research project. This will be graded and I will give you extensive comments on the
feasibility of your project, the novelty of your ideas, the scope and general interest of your topic,
as well as the general quality of your writing. This will give you an early opportunity to revise any
aspects that may need polishing prior to crafting your actual research paper.

VII. Policy on Academic Integrity
(From the Faculty Statement on Academic Integrity)

The intellectual venture in which we are all engaged requires of faculty and students alike the highest
level of personal and academic integrity. As members of an academic community, each one of us bears
the responsibility to participate in scholarly discourse and research in a manner characterized by
intellectual honesty and scholarly integrity.

Scholarship, by its very nature, is an iterative process, with ideas and insights building one upon the
other. Collaborative scholarship requires the study of other scholars’ work, the free discussion of such
work, and the explicit acknowledgement of those ideas in any work that inform our own. This exchange
of ideas relies upon a mutual trust that sources, opinions, facts, and insights will be properly noted and
carefully credited.
In practical terms, this means that, as students, you must be responsible for the full citations of others’ ideas in all of your research papers and projects; you must be scrupulously honest when taking your examinations; you must always submit your own work and not that of another student, scholar, or internet agent.

Any breach of this intellectual responsibility is a breach of faith with the rest of our academic community. It undermines our shared intellectual culture, and it cannot be tolerated. Students failing to meet these responsibilities should anticipate being asked to leave Columbia.

For more information on academic integrity at Columbia, students may refer to the Columbia University Undergraduate Guide to Academic Integrity: http://www.college.columbia.edu/academics/academicintegrity

VIII. External Resources Available

Columbia has a wealth of resources available to you as a student for getting the most out of your academic experience:

1) If you are having trouble with any aspect of your written assignments, I would encourage you to utilize the Writing Center at Columbia: http://www.college.columbia.edu/core/uwp/writing-center. They can help you with any step of the writing process, from outlining and planning to drafting and revising.

2) If you are having trouble with APA formatting specifically, try consulting the OWL at Purdue: https://owl.english.purdue.edu/owl/resource/560/01/. They have a very useful guide to APA formatting.

3) If you are a student with a disability I encourage you to register with the Office of Disability services: Disability Services at 212-854-2388 and disability@columbia.edu. They can help you with issues like assistive technologies or note-taking accommodations, among other things. Also please see me early in the semester with your DS-certified “Accommodation Letter” to discuss your needed accommodations.

4) If you are feeling overwhelmed or are having some other feelings of distress, I would encourage you to seek out the Office of Counseling and Psychological Services: https://health.columbia.edu/counseling-and-psychological-services. They can help you with issues ranging from urgent mental health concerns to short-term individual counseling, or referrals for an appropriate long-term therapist.
IX. Schedule
(Please note that half of one class will have a guest lecture by Dr. Yaakov Stern of the Cognitive Neuroscience Division of the Department of Neurology at Columbia University Medical Center. Dr. Stern is an expert in “cognitive reserve,” or the theory that certain life experiences seem to allow the aging brain to compensate for its altered structure. He will be discussing this theory and his ongoing research. This lecture is tentatively scheduled for 7/02. Please let me know ASAP if for any reason you cannot attend this class.)

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<th>Week 1</th>
<th>Topics: Introduction, Prenatal Plasticity, Epigenetics and the Infant Environment</th>
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<th>Week 2</th>
<th>Topic: Early Childhood Learning, Enriched and Deprived Environments</th>
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<td>Week 3</td>
<td><strong>Topic: Adolescence and Neuroendocrine Influences</strong></td>
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| 6/9 | *Due: Research Presentation Proposal*  
| 6/11 |  

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<th>Week 4</th>
<th><strong>Topic: Young Adulthood, Executive Processes and Frontal Lobe Development</strong></th>
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| 6/18 | *Due: Research Outline*  
  - Selemon, L. D. (2013). A role for synaptic plasticity in the adolescent |
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<th>Week 5</th>
<th>Topic: The Adult Brain and Mechanisms of Structural Plasticity: Exercise and Cognitive Training</th>
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<th>Week 6</th>
<th>Topic: Aging and Lifelong Protective Factors</th>
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| 7/2    | *Due: Research Paper  
*Guest lecture by Dr. Yaakov Stern  
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