

TEACHERS COLLEGE

COLUMBIA UNIVERSITY

Program Guide **M.S. in Neuroscience and Education**



Academic Year 2024-2025

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PROGRAM FACULTY & STAFF

Program Director: Professor Karen Froud. NOTE: Dr. Froud is on sabbatical for Fall 2024, and Acting Program Director will be Professor Peter Gordon.

Core Program Faculty: Professors Karen Froud, Ph.D.; Peter Gordon, Ph.D.; Lisa Levinson, Ph.D.; Kimberly Noble, M.D., Ph.D.

Adjunct Program Faculty: Professors Adriel Brown, Ph.D.; Anlys Olivera, M.D., Ph.D.; Stephen Sands, Ph.D.; Paul Smith, M.S.

Program Support: Steven McCafferty (Program Administrator), Maria Lamadrid (Director of Academic Administration), Corey Allen (Department Administrator)

Academic Advisors: Each student is assigned to a core faculty member (Dr. Froud, Dr. Gordon, Dr. Levinson, or Dr. Noble) who will be your primary advisor throughout your time with us. These assignments typically happen during the summer. If you are not sure, please contact the program director.

Pathway Advising: In concert with TC Next, we collect information about your career interests and aspirations so that we can tailor our support to your academic and professional goals. Pathway Advising is supervised by Dr. Lisa Levinson.

This document provides an outline of the Program Plan for the Masters in Neuroscience and Education. Each student will take a slightly different path through the program, under the supervision of your advisor. This document explains the basic requirements, and shows some of the possibilities for different pathways to the M.Sc. in Neuroscience and Education.

IMPORTANT DATES FOR AY 24-25

Registration opens for Fall semester classes: June 17th, 2024

Fall semester classes begin: September 3rd, 2024

Add/drop Fall semester: September 16th, 2024

Registration opens for Spring semester classes: December 2nd, 2024

Fall semester ends: December 23rd, 2024

Spring semester classes begin: January 21st, 2025

Add/drop Spring semester: February 3rd, 2025

Registration opens for Summer classes: April 28th, 2025

Spring semester ends: May 12th, 2025

Add/drop summer: May 28th, 2025 (summer A) / July 14th, 2025 (summer B)

Here is a link to the [Academic Calendar for 2024–2025](#).

INTRODUCTION TO THE PROGRAM

Our program, started in 1979, was the first of its kind to integrate research in Neuroscience with education and clinical practice. Our multidisciplinary approach works to prepare students who wish to bridge the gaps between brain, cognition, and behavior, and apply their knowledge to problems encountered in schools and other applied settings. In doing so, we provide a foundation for those wishing to pursue doctoral study in allied disciplines, or to apply scientific knowledge of brain-behavior relationships to practice in their professional domains.

Preparation for the Masters degree consists of 32 credits of study at Teachers College. Outside of Teachers College, our students have taken opportunities to work in labs associated with Columbia University, Columbia University Medical Center and other research institutions within the New York Area. At the same time, students have access to other resources within Teachers College associated more directly with all aspects of Educational Research and Practice.

The M.S. degree provides a broad background of advanced learning in neuroscience and education, supporting students to develop skills for studying behavior and brain activity. For many of our graduates, this is the springboard for pursuing a career in research. For others, the program offers a pathway towards medical school, other experiences in higher education, or a return to the clinic or classroom with deeper expertise and understanding.

The core competencies addressed in the program are as follows:

- I. **Foundational (disciplinary) and/or interdisciplinary knowledge and skills:** Students will be systematically exposed to the fundamentals of neuroscience in developmental and cognitive domains, at several different levels of analysis: cellular and molecular neuroscience, systems neuroscience, and cognitive / psychological neuroscience. They will be trained in the scientific method, and will develop an understanding of the scientific foundations that underpin educational applications of neuroscience research.
- II. **Inquiry and research:** Students will become familiar with the critical evaluation of the primary literature in neuroscience and will develop the skills to understand and critically evaluate experimental and relevant clinical research. They will develop the theoretical and experimental skills needed for the conceptualization, design, and interpretation of neuroscientific research.
- III. **Diversity, equity, and inclusion:** Students will be equipped to explore and understand the neurobiological underpinnings of learning and cognition and how these insights can be applied to diverse learning and educational contexts. They will gain understanding of how neuroscientific research can inform inclusivity, address disparities, and ensure that practices and policies are applicable across diverse populations.
- IV. **Communication, collaboration, and leadership:** Students will be exposed to responsible stewardship of science, receiving instruction and training in the ways in which scientific research is disseminated in different arenas of engagement, from journal articles to conference presentations and outreach activities. They will gain experience in cross-disciplinary communication within neuroscience and from neuroscience to applied domains, so that they are prepared to disseminate and translate research findings for other researchers, practitioners, and stakeholders.

PROGRAM GUIDELINES

1. Academic Integrity

All members of our academic community are expected to uphold standards of academic integrity with respect to general conduct, and to avoid engaging in academic misconduct. Academic misconduct includes (but is not limited to) cheating, plagiarism, fabrication of data or information, misrepresentation of records, or the seeking of unfair advantage.

Please ensure that you are familiar with the Teachers College Student Conduct Code:

<https://www.tc.columbia.edu/policylibrary/policies/student-conduct-code-academic-integrity-and-general-misconduct-1222590/>

2. Plagiarism and Citation

In our program, we have a **zero-tolerance policy for plagiarism**. Plagiarism means using someone else's words or ideas as if they are your own without providing appropriate, clear citation. If any of your instructors detect evidence of plagiarism, they may apply one or more of the following sanctions, at their discretion:

- Requiring you to re-do the work;
- Grading the affected assignment as a zero;
- Assigning additional work to you;
- Failing you from the course; and/or
- Lodging a formal complaint against you that can lead to a Student Conduct Hearing.

Student Conduct Hearings may lead to significant sanctions, including but not limited to an official written warning, course or grade failure, academic probation, mandated training, suspension or dismissal from the College, revocation of course credit or a degree.

There is some excellent, and accessible, advice about plagiarism here:

Scribendi. (n.d.). *How do I know if I'm plagiarizing?*

https://www.scribendi.com/academy/articles/how_do_i_know_if_im_plagiarizing.en.html

An important way to avoid plagiarism is to cite your sources. When you write assignments in our program, you are expected to always cite your sources, following APA format. You can find more information about how to appropriately cite and reference your sources here:

<https://www.tc.columbia.edu/graduate-writing-center/writing-resources/citing-your-sources/>

FAQs about Citation and Referencing

What is the difference between citation and referencing?

Citation and referencing are two distinct components of academic writing. *Citation* refers to the brief acknowledgment within the text of the sources used. It typically includes the author's last name and the publication year, enclosed in parentheses. For example, Johnson and Lee (2020) or (Yang, 2019).

Referencing involves providing detailed information about the sources cited in the text. This information is listed in a Reference List at the end of your document, arranged alphabetically by the authors' last names. The format of a reference list entry varies depending on the source type (e.g., book, journal article, website). Here's an example of referencing for a book:

Yang, P. (2019). *The art of writing*. TCK Publishing.

A reference list must be included at the end of any submitted assignment, and it should include detailed information about ALL and ONLY the sources directly cited in your work. You can find out more about how to format specific kinds of references here:

<https://apastyle.apa.org/style-grammar-guidelines/references>

What is the point or purpose of citation?

As scientific writers, we provide evidence from previous work to support our claims and arguments or data. By doing so, we strengthen the credibility of our own work. Citations also allow readers to verify our sources, and allow us to demonstrate the range of sources and perspectives that contributed to and informed our work.

So as you can see, the point of citations and references about acknowledging the researchers who originated the research, ideas or writings. In this sense, citation is something like a copyright. You are acknowledging that your work builds on the ideas and work of others.

Can I cite a paper even if I have not read it?

Yes, if you have derived an idea from that source, then you should cite it. For example, if you are referring to an experiment that you came across in your textbook, cite that paper directly even if you have not read it. Do not cite indirectly via the textbook that you read, or via course lectures.

Is a direct quote from a published paper allowed?

In general, we discourage this practice because we would much rather read *your* description of ideas. Anyone (or any AI) can copy text. Remember, your assignments during the program are designed to show *YOUR* understanding and ideas.

The only reason to directly quote a text is if the authors uses wording that specifically pins the ideas very precisely in their own original way. If you do include a direct quote in your work (word for word), then you must set it off in quotation marks and follow this with the author, date and page numbers (if available). But take a look at journal articles to see how often they use direct quotations – not very much!

3. APA Formatting for Assignments

APA 7 format is expected for all your assignments in the program. In particular, your assignments must accurately apply the principles of citation and referencing, as described above. TC's Graduate Writing Center offers frequent training on APA format; please check their events page for upcoming dates:

<https://www.tc.columbia.edu/graduate-writing-center/workshops--events/>

Here are some additional online resources on APA format:

- The APA website: <https://apastyle.apa.org/>
- TC's Graduate Writing Center has compiled a whole set of great resources: <https://www.tc.columbia.edu/graduate-writing-center/writing-resources/citing-your-sources/>
- The Online Writing Center (OWL) hosted by Purdue University: https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html

4. AI policy

Do not use Chat GPT or any other AI program to write your papers for you. Such abuse is easily spotted and is considered cheating; hence, it will lead to immediate failure on the course, and perhaps other sanctions too (see under "Academic Integrity" above).

While AI is a fascinating new technology, it is essential to understand its limitations. To use it effectively, you need deep knowledge of a field of study to detect when it presents information inaccurately. In the context of your coursework, AI does not have a semantic understanding of the content, which can lead to inaccuracies. Most importantly, this is a critical time to develop your own critical thinking and writing skills. Use this time to work on finding your own voice, rather than relying on AI to speak for you.

In general, a much better strategy than AI to help you organize your materials and ideas, is to

check the relevant Wikipedia or Scholarpedia page – written by humans – for your topic, to see what is there (but again, don't copy it!). Even better would be if you just search for relevant articles in the literature yourself and digest them. Remember, you are here to train as a scientist!

In some of your courses, there are built-in opportunities to work with AI and investigate its strengths and limitations. Make sure you work within the guidelines provided by each professor.

5. Grading

You can find the Teachers College Grading Policy here:

<https://www.tc.columbia.edu/policylibrary/policies/grading-1222549/>

Some courses (notably BBSN 5500, the Thesis Course) are graded Pass/Fail only. Each of your instructors makes specific determinations about the grading structure for their own courses, and these may vary; so ensure that you are familiar with the grading rubric that is provided in each course syllabus.

A grade of B or above in Program Core Courses (listed below) is required to maintain academic good standing. The grade of C- is subject to academic review; no more than 3 points of C- may be credited toward any degree, certificate or diploma. Students who accumulate 8 points or more with grades of C- or lower may not continue study at the College and will not receive a degree or diploma.

In general, we all follow this framework:

Letter Grade	Typical percentage range	Notes
A+	99 – 100	Exceptional performance. May not be assigned based on extra credit points.
A	93 – 98	
A-	90 – 92	Minimum requirement for Program Core
B+	87 – 89	
B	83 – 86	
B-	80 – 82	
C+	77 – 79	
C	73 – 76	Subject to academic review
C-	70 – 72	
F	69 or lower	

PROGRAM STRUCTURE

COLLEGE REQUIREMENTS

To be awarded the Master of Science degree, Teachers College requires A MINIMUM OF 32 *graduate* degree credits from Columbia University, of which AT LEAST 20 must be taken at Teachers College. Undergraduate degree credits may not count towards this requirement. The College also has a breadth requirement: at least 6 of your credits must come from outside your home program, but within Teachers College more broadly. These are referred to as "breadth credits".

Following the Program Requirements below will ensure that you also meet the College requirements for the degree.

PROGRAM REQUIREMENTS

1. Core Courses

You must take *at least* 20 credits within the Neuroscience and Education program (BBSN courses). ***You can find more information about the in-program courses at the end of this document.*** Of these, 15 credits MUST come from the CORE COURSES listed below. Only BBSN 4001 and 4002 offer the opportunity for testing out; only BBSN 4005 offers the opportunity for equivalency from prior coursework. ** To remain in good standing, you must achieve a grade of B or higher in these courses.

COURSE NUMBER	COURSE TITLE	CREDITS	SEMESTERS OFFERED	NOTES
BBSN 4001	Foundations of Neuroscience 1: Anatomy & Physiology**	3	Fall	You may test out of the Foundations sequence if you have substantial neuroscience background. Please see the Foundations instructor for information. ***Typically the deadline for testing out is July 31st prior to the fall semester.
BBSN 4002	Foundations of Neuroscience 2: Systems**	3	Spring	
BBSN 4005	Research Methods in Neuroscience**	3	Fall	You may pass out of Research Methods if you already took a suitable similar course and achieved a grade of B or higher. Please provide a syllabus and your grade to the instructor for a decision.
BBSN 5007	Neuroscience Applications to Education	3	Fall and spring	Take this course AFTER you finish the Foundations sequence (or test out)
BBSN 5500	Thesis and Professional Development	3	Fall and Spring	Take this course in your last full semester (if you

				plan to graduate during the summer, take it in your last spring).
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2. Cognitive / Psychological Cluster Requirement

You must take AT LEAST 3 CREDITS from the *Cognitive and Psychological Neuroscience Cluster*, which includes the courses below:

COURSE NUMBER	COURSE TITLE	CREDITS	SEMESTERS OFFERED
BBSN 5070	Developmental Cognitive Neuroscience	3	Fall
BBSN 5005	Evaluation of Neuropsychological Instruments for Research	3	Fall
BBSN 5010	Neuroscience of Reading	3	Fall
BBSN 5003	Cognitive Neuroscience	3	Spring
BBSN XXXX (new course number due this year)	Neuroscience of Adolescence	3	Spring

3. In-Program Electives

You must take AT LEAST 6 elective credits within the program. Our current elective offerings are listed below; these may change from time to time.

Also note that any of the courses in the Cognitive / Psychological Cluster above could count as in-program electives, too. Consult with your advisor if you are unsure.

COURSE NUMBER	COURSE TITLE	CREDITS	SEMESTERS OFFERED
BBSN 5199	Neuroscience Perspectives for Educators	3	Fall
BBSN 5152	Neuroscience, Ethics and the Law	3	Fall
BBSN 5193	Neuroscience of Adversity	3	Spring
BBSN 5122	Psychoneuroimmunology & Ed	3	Spring
BBSN 5000	EEG Lab Methods	3	Summer
BBSN 5022	Eye Tracking Lab Methods	3	Summer

For most students, the Core Courses sequence plus the Cognitive/Psychological Neuroscience Cluster minimum plus the Electives minimum will add up to 24 credits (thus exceeding the required minimum within BBSN).

4. Breadth Course Requirement

You must take at least 6 breadth credits. BREADTH COURSES are within Teachers College, but outside of BBSN.

For students who do not have substantial background in psychology, statistics or data handling, we recommend that breadth courses are taken in those areas.

Suggested breadth courses are listed below. Almost any course outside of the BBSN listings could satisfy the breadth requirement, but there are a few exceptions (also see point #9 below: *Excluded Courses*). In some cases, instructor permission is required; some courses are limited to students in clinical or teacher training progressions; and some courses are not suited for our program. Always consult with your advisor first.

COURSE NUMBER	COURSE TITLE	CREDITS	SEMESTERS OFFERED	NOTES
STATISTICS AND DATA HANDLING				
HUDM 4120	Basic Concepts in Statistics	3	Fall and Spring	
HUDM 4122	Probability and Statistical Inference	3	Fall and Spring	
HUDM 5026	Intro to Data Analysis in R	3	Fall	Pre-req: HUDM 4122 or equivalent. Contact instructor.
HUDM 5122	Applied Regression Analysis (Advanced)	3	Spring	Pre-req: HUDM 4120 or 4122.
HUDM 5123	Linear Models and Experimental Design (Advanced)	3	Spring	Pre-req: HUDM 5122 or 5126.
HUDM 5126	Linear models and regression analysis	3	Fall	
PSYCHOLOGY AND RELATED AREAS				
HUDK 5024	Language Development	3	Fall	Taught by Dr. Gordon
HUDK 4023	Developmental Psychology: Adolescence	3	Fall	
HUDK 5023	Cognitive Development	3	Spring	Usually runs two sections
HUDK 4027	Development of Mathematical Thinking	3	Spring	
HUDK 4020	Theories of Human Development	3	Fall	
HUDK 4022	Developmental Psychology: Childhood	2 or 3	Spring	
HUDK 4035	Technology and Human Development	3	Fall	
HUDK 5121	Children's Social and Emotional Development in Context	3	Spring	
HUDK 5037	Psych of Children's TV	3	Spring	
HUDK 5040	Developmental Psychopathology: Atypical Contexts	2 or 3	Spring	
HUDK 5029	Personal and Social Development across the lifespan	3	Spring	
HUDK 5120	Development of Creativity: Case Study Methods	2 or 3	Spring	
HUDK 4015	Psychology of Thinking	3	Spring	
HUDK 4029	Human Cognition & Learning	2 or 3	Spring	
HUDK 5011	Cognition of Social and Emotional Learning	2 or 3	Spring	
HBSK 5096	Psychology of Memory	3	Fall	
HUDK 5025	Spatial Thinking	3	Fall	
HUDK 5030	Visual Explanations	3	Spring	
HUDK 4080	Educational Psychology	3	Spring	

COURSE NUMBER	COURSE TITLE	CREDITS	SEMESTERS OFFERED	NOTES
HUDK 5035	Psychology of Media	3	Spring	
HUDK 5125	Cross Cultural Psychology	3	Fall	

NOTE: although we check all listings each year, course offerings do change. ***Please always check current availability*** through the [course schedule search](#), and consult with your advisor if considering an elective or breadth course not listed here.

5. Additional Credits

For most students, the Core Courses, Cog/Psych Cluster requirement, Electives, plus the Breadth requirement, will add up to 30 credits. This leaves at least 2 more credits to meet the minimum for the degree. These credits can be ***additional courses from the cog/psych cluster, additional electives, additional breadth courses***, or Research / Independent Study credits (see # 8 below).

6. The Thesis

The Thesis, and the Thesis COURSE (BBSN 5500), are *both* required for graduation. **The Thesis Course is graded Pass/Fail.**

Detailed requirements for the thesis, and guidance and support during the writing process, are provided through the Thesis and Professional Development course (BBSN 5500, 3 credits) which *must* be taken by every student in their last regular (fall or spring) semester before graduation. The thesis course holds [full-time equivalent](#) status at the College. This means that, if you are registered ONLY for the Thesis course in your final semester, you are still considered a full-time student. It also means, importantly, that ***you are expected to work full time on the research and writing activities that will support your thesis development.***

The thesis document constitutes a summative assessment, demonstrating your learning throughout the program. The thesis usually takes one of these forms:

1. A compilation or portfolio, showcasing AT LEAST THREE of the course assignments you have produced during your time in the program. You will write an Introduction, that provides background for the assignments and describes an overarching perspective. Then you will present the three edited assignments themselves, representing knowledge you have gained and developed during the program. Finally, you will write a Discussion section that offers critiques of the work, describes future directions for relevant research, and provides conclusions that relate the presented work back to your Introduction. APA formatting, including comprehensive citations and referencing, are required.
2. An in-depth review of literature pertaining to a specific area of neuroscientific research. We follow established guidelines for literature reviews and seek to conduct replicable, comprehensive, theoretically-grounded reviews that contribute to a deeper understanding of the empirical evidence.
3. In some exceptional circumstances, the thesis can take the form of an empirical report of experimental work. Consult with your thesis director if you are considering this option; their decision is final. Strict criteria must be met for this exception to apply:
 - The experimental work should have been undertaken, at least in part, directly by the student. For example, if you have been working in a lab during your program, and have been involved with data collection in an experiment, you may consider an empirical report.
 - The student must have the requisite permissions to work with the data. This may require institutional permissions for data sharing, and/or IRB approvals. Consult with the thesis director on your specific circumstances.

- The data to be reported must ***already have been collected*** and ***at least partially analyzed*** by the start of the thesis semester. Experiments currently in progress will not be considered, due to constraints on the time available for thesis writing.

The thesis course instructor will be the first reader for all theses, and will provide your feedback and request any needed edits or changes before the submission deadline. After submission, your thesis may be reviewed by a second faculty member, who will confirm that the thesis meets acceptable standards.

7. Optional: Research / Independent Study, BBSN 4904, 0-3 credits

This course allocation is for students who undertake a significant practical learning component during their program. For example, if you volunteer in a lab, or if you attend external trainings such as fMRI training at the Martinos Center, you may wish to have this reflected on your transcript as a practicum experience. This should be discussed with your advisor.

- If you are working on a project with a faculty member within the program, and wish to take Research / Independent Study credits to reflect this, you should develop a specific and clear plan for the experience and make sure this is approved by your advisor.
- If you are working in a lab for Independent Study credits, please see the relevant policy (supplied as an appendix to this Program Plan).
- The number of credits associated with Independent Study registration will reflect the hours you are working and your needs for registration, at the discretion of your academic advisor and in consultation with your independent study supervisor. [Please see the TC credit hours policy here.](#)
- If you are undertaking the Martinos Center fMRI training (see # 9 below), you may register for 0 or 1 credit of BBSN 4904, under the section operated by your academic advisor. Please see your advisor if you wish to add this registration to your transcript.

8. Excluded courses

- Do not register for Brain and Behavior I or II (BBS 5068, 5069) for intro courses, since these are not tailored for neuroscience students.
- Previous undergraduate or graduate coursework in various areas may be petitioned to fulfill program requirements (discuss with your advisor), but [credits cannot be transferred from other institutions](#). In order to have a course from another institution "count" towards a program requirement, you must provide an original syllabus and evidence of your grade. A copy-paste of a catalog or web entry is not sufficient.
- Courses that offer non-traditional or alternative approaches to neuroscience may not be allowed to count toward your degree if they are not considered by program faculty to be scientifically rigorous. Always consult with your advisor before taking an elective or breadth course that is not listed in this document.

MORE RESOURCES

Websites for Registration and Course Selection:

- [Teachers College Programs A-Z](#)
- [Teachers College Course Search](#) (updated every semester)
- [Columbia University Directory of Classes](#)

Note: For courses taken at Columbia, only 4000 level (graduate) classes and above can count towards program requirements.

Degree Audit

The College maintains an online [Degree Audit system](#) that gives you a way to monitor your progress towards the degree. You can access your own degree audit through your myTC page. Please check this regularly - it is your MAIN RESOURCE for tracking requirements and progress!

Neuroscience and Education Research Guide

- The Gottesman Libraries manages the [Neuroscience and Education Research Guide](#), that provides ideas and support for neuroscience-based research. Here you will find links to relevant peer-reviewed journals, ideas for tracking references, and much more.
- Our subject librarian is **Ava Kaplan**. You can book a research consultation with Ava through the [Neuroscience and Education Research Guide](#) web page.

The Synapse

The Synapse is your student organization, established and run by members of the program. Each semester they organize talks and activities, and support connections among the student community and the TC and Columbia communities - and beyond. Get involved!

Facebook: <https://www.facebook.com/groups/386945710620299/> ;

Discord: <https://discord.gg/TarRgtCZ>

Getting started in Labs / Research

Many of our students gain volunteer or other experience in research labs at TC, Columbia or elsewhere during their program. With contributions and advice from some of our past students, we put together [this guide to help you get started in research](#).

Training in Neuroscience Methods

We offer two in-program courses for training in widely-used methods in cognitive neuroscience: BBSN 5000 EEG Lab Methods, and BBSN 5022 Eye-Tracking Lab Methods. We do not have on-site capabilities for fMRI training. However we strongly recommend the excellent [functional MRI Visiting Fellowship training experience](#) offered as a five day, residential course at Massachusetts General Hospital, by the Martinos Center. If you register for the fMRI training, you may wish to also register for BBSN 4904 (Research / Independent Study) so that this experience is reflected on your transcript. Please discuss with your advisor if you wish to do this. *Please note that Teachers College cannot offer financial support to attend the Martinos fMRI fellowship, as this is completely external to our institution.*

2024-2025 Neuroscience and Education Graduation Checklist

(This checklist is for planning purposes only. It does not substitute for the Degree Audit or the registrar's review.)

	# of credits	Semester Taken (or substitution info) and grade
Core Courses (must take or substitute all of the following)		
BBSN 4001 Foundations of Neuroscience 1: Anatomy & Physiology	3	
BBSN 4002 Foundations of Neuroscience 2: Systems	3	
BBSN 4005 Research Methods in Neuroscience	3	
BBSN 4007 Neuroscience Applications to Education	3	
BBSN 5500 Thesis and Professional Development	3	
Cognitive & Psychological Neuroscience Cluster (minimum 3 credits, 1 course)		
BBSN 5003 Cognitive Neuroscience	3	
BBSN 5070 Developmental Cognitive Neuroscience	3	
BBSN 5005 Evaluation of Neuropsychological Instruments for Research	3	
Neuroscience Electives (minimum 6 credits, 2 courses)		
BBSN 4904 Research and Independent Study (if taken)		
TOTAL BBSN CREDITS (must add up to at least 20)		
Breadth Courses (minimum 6 credits, 2 courses)		
TOTAL CREDITS (must add up to at least 32)		

Thesis submitted (date): _____

Checklist reviewed and approved by advisor:

Advisor Signature _____

Date _____

NEUROSCIENCE & EDUCATION (BBSN) COURSE DESCRIPTIONS 2024-25

Course offerings, descriptions, and instructors are subject to change. Not every course is offered in every academic year. The course descriptions offered here are derived from the AY 2023-24 syllabi for these courses; they are subject to change, and are provided for information only.

Course Number and Name	# of credits	Usual Instructor	Semester(s) typically offered	Course Description
BBSN 4001 Foundations of Neuroscience 1: Anatomy & Physiology	3	Paul Smith	Fall	This course provides an introduction to the mammalian nervous system, with emphasis on the structure and function of the human brain. It provides foundational knowledge for students with little or no background in neuroscience and a basic review for students with limited course work in neuroscience. Topics to be covered include the history of neuroscience, function of brain cells, intra- and intercellular communication, and the anatomy of the human nervous system.
BBSN 4002 Foundations of Neuroscience 2: Systems	3	Paul Smith	Spring	This course provides an introduction to the systems of the mammalian brain, with emphasis on the structure and function of the human brain. The course is intended to provide foundational knowledge for students with little or no background in neuroscience. Topics to be covered include visual, auditory, and motor systems, as well as the circuitry underlying complex behaviors such as memory and learning.
BBSN 4005 Neuroscience Research Methods	3	Dr. Karen Froud	Fall	This course provides an overview of the scientific methods used in the field of neuroscience. We will be discussing the basic tenets of experimental design and statistical analysis as they are used by all behavioral and cognitive scientists. We will work to apply those design and analysis concepts to the specific methodologies used by neuroscientists.
BBSN 5000 EEG Lab Methods	3	Dr. Lisa Levinson	Spring	This course provides a theoretical foundation and hands-on training for the application of electroencephalography (EEG) and event-related potential (ERP) methods to investigations of language and cognitive processes. We will discuss the neurophysiological bases of the EEG signal, principles of experiment design, and methods for data processing. Principles of signal localization and transcranial stimulation techniques will also be introduced.
BBSN 5003 Cognitive Neuroscience	3	Dr. Lisa Levinson	Spring	This course reviews the history of cognitive neuroscience, provides an overview of the structure and function of the nervous system, and delves into the methods used to investigate the cognitive and neural processes that support visual object recognition, attention, language, memory, numeracy, and executive function. We will consider evidence from healthy study participants as well as patients with neurological disorders.

BBSN 5005 Evaluation of Neuropsychological Instruments for Research	3	Dr. Stephen Sands	Fall	This course is an introduction to the theory and practice of neuropsychology. The field of Neuropsychology aims to assess and interpret the relationship between nervous system function, cognition, emotion and behavior; and to apply this knowledge to the design of individualized patient interventions. Students will gain an understanding of the field through review of adult and pediatric mental diseases and psychological disorders. The course integrates an interdisciplinary approach from several fields of medicine (neurology, neuroradiology, and psychiatry) and psychology (cognitive, abnormal, developmental, biological, health psychology).
BBSN 5007 Neuroscience Applications to Education	3	Dr. Kimberly Noble	Fall, Spring	This course will survey the application of current neuroscience research to educational practice. We will discuss how neuroscience can (and cannot) inform current pedagogical methodologies, including neuroethical issues as they pertain to education. We will cover the neural bases of selected cognitive and academic systems (including literacy and self-regulation), as well as the current science of intervention in these domains. We discuss experience-based brain plasticity across a variety of contexts (sleep, physical activity, stress, socioeconomic status, discrimination). Finally, we will discuss the future of neuroeducational research and policy. Throughout the course, we focus on the ability to evaluate, critique and interpret scientific evidence as it relates to educational practice and policy.
BBSN 5010 Neuroscience of Reading	3	Dr. Lisa Levinson	Fall	This course considers what we have come to know about the reading brain. It introduces students to the neuroscientific investigation of reading, reading development, and disorders. Theoretical frameworks are outlined to provide a foundation for discussing the neurological underpinnings of sub-processes related to reading. Experimental findings from the field of neuroscience are presented to provide evidence supporting the organization of these sub-processes across the lifespan and linguistic communities. We will discuss acquired and developmental reading disorders and how the neuroscientific perspective contributes to reading intervention. Additionally, we will consider how one reads when sensory perception is disrupted. Over the semester, we will review a sampling of the research that sheds light on how the brain acquires a skill such as reading and how that subsequently changes the brain. Finally, we will consider the educational challenges that make reading instruction controversial and for many, ineffective.
BBSN 5019 Human Functional	3	Dr. Anlys Olivera	Fall	This course will review neuroanatomical terminology and identify structure and function of major landmarks and pathways in the human

Neuroanatomy				brain, peripheral nervous system, and spinal cord using clinical cases, MRI images, brain models, and preserved human brain specimens. We will also discuss neurological disorders and pathology as is relevant to each structure. Lab sessions at Columbia University and NYU provide the opportunity to examine human brains and practice identifying structures.
BBSN 5022 Eye Tracking Lab Methods	3	Dr. Peter Gordon	Summer A	This course aims to explore the applications, methods, neurophysiology, and psychometrics associated with the use of eye tracking in cognitive, linguistic, developmental and clinical research. Students will learn to use TOBII eye trackers and will explore the use of other head mounted systems as well. Students will design, run and analyze an experiment employing these technologies. In addition, we will learn to use other dynamic event recording systems, including ELAN, MACSHAPA/DATAVYU, PRAAT and CHILDES. These systems are designed for coding video, sound, speech, language and other event based data sets. We will also explore the contents of the shared datasets on CHILDES and DATABERY.
BBSN 5044 Current Issues in Neuroscience	3	Dr. Karen Froud	Summer A	This course is built around a series of talks by visiting speakers presenting their cutting-edge neuroscientific research. By introducing graduate students to a range of topics and researchers, the format provides an opportunity for students to engage directly with scientists in a professional arena. For each talk, students will be required to read background papers that describe aspects of the work presented by a visiting speaker. Assigned groups will submit questions/topics of interest for discussion after the talks. Lecture topics seek to expand student exposure to a diversity of neuroscientific research methods and topics. Assignments encourage reflection on the topics presented and how the material covered contributes to a deeper understanding of neuroscience more generally.
BBSN 5070 Developmental Cognitive Neuroscience	3	Dr. Peter Gordon	Fall	This course offers an in-depth review of developmental cognitive neuroscience. We will consider questions such as: What is the nature of developmental change? What are the brain mechanisms underlying cognitive, linguistic and sensory-motor development during infancy and childhood? We will also evaluate implications of findings from developmental cognitive neuroscience for broader scientific issues including nature vs. nurture, critical periods in development, and the modularity of mental functions. We will investigate current methodologies that are used to address questions about neural development. Finally, we ask what changes in brain development underlie disorders such as Specific Language Impairment, Dyslexia,

				Autism and Williams syndrome, and how such disorders inform us about the theoretical questions that drive research in developmental cognitive neuroscience.
BBSN 5080 Social and Affective Neuroscience	3	Dr. Adriel Brown	Fall	Social and affective neuroscience are research disciplines in which researchers investigate how the brain mediates social and emotional behavior. In this course, we will discuss a broad- spectrum of topics related to socioemotional behavior that is evidenced by neuroscientific research. We will review foundational concepts in neuroscience including aspects of neuroanatomy, neurophysiology, neuropharmacology, and brain imaging techniques. Special topics will include evolutionary origins of social intelligence, emotion and motivation, inter- personal and group processes, and relationships. Through in-depth case study analyses, we will examine various socioemotional-related mental disorders including antisocial personality, bipolar, generalized anxiety, major depressive, obsessive-compulsive, posttraumatic stress, and schizophrenia spectrum disorders. Additionally, we will explore how mind-body practices can be used as treatments for socioemotional disturbances. Finally, students will have an opportunity to self-assess their own socioemotional abilities by participating in an emotional intelligence standardized test.
BBSN 5122 Psychoneuroimmunology and Education	3	Dr. Anlys Olivera	Spring	Psychoneuroimmunology (PNI) is a field that integrates behavioral sciences, cellular neuroscience, endocrinology, and immunology to explain how immune-brain interactions can affect health and behaviors. The course will begin by introducing the principles of neuroscience, immunology, endocrinology, and research methods in PNI. We will then survey foundational work and current research related to brain-immune interactions and how they influence health and disease including topics that are relevant to cognitive neuroscience and education such as learning, memory, and cognitive disorders.
BBSN 5152 Neuroscience, Ethics, and the Law	3	Dr. Adriel Brown	Spring	As our ability to measure and understand the functioning of the human brain has rapidly advanced, so too has our need to grapple with the ethical and legal implications of these neuroscientific tools and discoveries. This seminar will introduce students to the emerging fields of Neuroethics and Neurolaw and create a forum for discussion and debate about a range of timely topics. Topics will include brain development in adolescence (related to issues of driving laws, school start times, and adolescents being tried as adults in courts of law); the use of neuroimaging as “brain reading” technology (and its applicability in court); the neurobiology of memory and its

				legal application; the use of neuropharmacological agents and brain stimulation for cognitive enhancement; the neurobiology of addiction (and implications for the voluntary control of behavior); and death, unconsciousness, and the law. Throughout the course, we focus on the ability to evaluate, critique and interpret scientific evidence as it relates to ethical and legal practice and policy. With each topic we consider, our goal will not be to achieve consensus on what's right and what's wrong but rather to understand the ethical quandaries and to think critically about ways that the field could go about addressing them. Students should leave this course with an enhanced appreciation of the many ways in which our work impacts society and a heightened commitment to public engagement.
BBSN 5193 Neuroscience of Adversity	3	Dr. Kimberly Noble	Spring	This course will survey the state-of-the-art research into the brain's response following the experience of adversity. We will consider adversity broadly defined, including common forms of adversity such as poverty and racism, as well as more extreme forms of adversity, such as abuse and institutionalization. We will consider adversity across the lifespan, and will also focus on plasticity and resilience. Throughout the course, we focus on the ability to evaluate, critique and interpret scientific evidence as it relates to the neuroscience of adversity.
BBSN 5199 Neuroscience Perspectives for Educators	3	Dr. Lisa Levinson	Fall	This is a revolutionary new course developed by a collaborative team of educators and neuroscientists. It aims to assist educators to acquire a basic understanding of neuroscience and to consider common issues and practices in education from the perspective of the brain. By delving into the intersection of neuroscience and education, students will gain knowledge to inform their pedagogy and philosophy, while ensuring their methods are grounded in evidence-based practices. This perspective will allow students to critically engage with educational resources and research, to assess and enhance instructive plans and curricula, and to connect neuroscientific research with their learners and their own professional practice. A significant focus will be placed on recognizing and appreciating how experience and individual differences profoundly impact brain development and function. This course charts a journey into the brain's role in learning, offering valuable insights for enhancing teaching effectiveness and student outcomes. This 3-credit course will meet in-person weekly. The anticipated time commitment outside of class is 7 to 9 hours per week, including readings and videos, preparation materials, and assignments.

BBSN 5500 Thesis and Professional Development	3	Dr. Karen Froud	Fall, Spring	This course support students in their final regular semester of the program, to engage in the research and writing for their thesis experience. Students are supported to generate a thesis topic of appropriate breadth and depth, and to conduct literature searches as needed to support development of the project. They will evaluate the quality of literature obtained from databases and libraries, review research articles critically, and summarize relevant content to support the thesis. Ultimately each student must structure and format a thesis document following APA format and style requirements. During the semester students gain practice in effectively communicating the structure, content, and contribution of the selected thesis topic and format, responding critically and supportively to peer writing, and providing detailed and supportive peer reviews. They will also respond professionally and with resilience to critiques of their own work, and employ such critiques to strengthen their writing. This course is full time equivalent.
BBSN XXXX (new course number due this year) Neuroscience of Adolescence	3	Dr. Lisa Levinson	Spring	This course covers some of the many contributions that the field of neuroscience has made in expanding our understanding of adolescence. We will define this transitional stage from childhood through adulthood considering biological, cultural, evolutionary, and historical perspectives. We will review theoretical models of adolescence and their alignment with the current understanding of brain development. We will discuss how puberty is different from, yet a part of, adolescent development. We will consider brain plasticity and its relationship to cognitive development. Additional topics will include motivational systems, the social brain, the emergence of psychological disorders, and vulnerabilities to drugs and alcohol as they relate to this unique developmental period. Finally, we will consider the implications of adolescent neuroscience on education and policy.

APPENDIX: POLICY ON LAB EXPERIENCE FOR INDEPENDENT STUDY CREDITS

NOTES:

- “Internal Labs” or “Program Labs” are those directed by program faculty members: The Language & Cognition Lab (Dr. Gordon), the NEED Lab (Dr. Noble) and the NCLLab (Dr. Froud).
- “External Labs” means those outside the program - including other labs in Biobehavioral Sciences.
- “Sponsor” or “supervisor” of the independent study experience is a member of the host lab, usually the faculty member in charge
- “Advisor” refers to the TC faculty member who is overseeing the independent study experience and is responsible for inputting the grade at the end of the semester; this will usually be Dr. Froud, Dr. Gordon, Dr. Levinson, or Dr. Noble
- This policy applies to independent study credits taken by master’s students in the Neuroscience & Education program, that are based on a lab experience. Independent study credits may also be used for non-lab experiences, sponsored and supervised by a faculty member. Always discuss with your advisor.

A student wishing to engage in independent study in a lab either within or outside of the Program must have a TC faculty member willing to sponsor the independent study and to ensure that it is graded and monitored. For an external lab experience, this will usually be the student's advisor. For a program-internal lab experience, this will usually be the director of that lab.

For external labs, the advisor must be in contact with the student's direct supervisor at the hosting lab. That may be a PI or a postdoc or PhD student, or someone who is professionally engaged with the host lab who has a master's degree or higher. It cannot be another master's level student, or someone with an undergraduate qualification only, unless there is some exceptional reason to consider an alternative (e.g. a highly skilled fMRI tech).

For external labs, the advisor should ask the host lab sponsor at the start of the independent study semester to set goals for the student, to be willing to communicate about their progress and contributions during the semester, and to be willing to suggest a grade for the independent study at the end of the semester. Only if the advisor and the supervisor agree on this, can the independent study be approved.

Depending on student needs and the scope of work and number of hours to be completed, the independent study may be for 0-3 credits per semester. This should be arranged by the advisor and is at their discretion. [Here is the TC credit hours policy](#). As a guideline, 1 credit is at least 45 hours of supervised independent study. During a regular semester, therefore, one credit would reflect a minimum of 3 hours per week.

No more than 6 credits of independent study should be allocated per student during their program.

Any student undertaking independent study, either internally or externally to the program, should first complete at least Neuroscience Research Methods (BBSN 4005) and Foundations of Neuroscience 1 (BBSN 4001) (passing the waiver exam or having an approved course substitution also meets this requirement). Depending on the sponsor of the independent study, other coursework may also be required (e.g., Dr. Froud usually requires EEG Lab Methods for people who undertake independent study in her lab).

Frequently Asked Questions

Almost all of your questions will have been answered in this program handbook! Make sure you read it carefully.

Here are a few additional questions that we often get.

Who is my advisor?

Your academic advisor will be either Dr. Froud, Dr. Gordon, Dr. Levinson or Dr. Noble. You should have received an email over the summer from your academic advisor. If you didn't get that email, or can't find it, or can't remember - [email Dr. Froud](#). Any of us are happy to answer questions though!

I am working during the semester, and find my schedule clashes with a class I want/need to take. Can the classes be recorded for me?

Our program is designed to be mainly in-person. Most of our courses are designed for synchronous, in-person engagement. This is why much of our programming happens in the evenings.

However, we have always worked to support students from a diverse range of backgrounds and circumstances, so *some* professors might be willing to record classes and / or make other accommodations, on a temporary basis, if some *exceptional circumstance* arises. If you find yourself in this situation, please contact the course instructor directly and let them know what your situation is and what you would need. Keep your advisor in the loop, too!

How do I get involved in research?

Many of our students gain volunteer or other experience in research labs at TC, Columbia, or elsewhere during their program. Start by getting online and looking around the city for labs that are doing work of interest to you. Then contact those labs!

It can be better to contact a lab manager, or a postdoc, rather than reaching out to a lab director in the first instance. Try to figure out from the website who is the person helping with day-to-day lab operations. You may need to be persistent.

When you write to a lab, you can let them know you are in this program. That is often helpful (and sets you apart from volunteers who may have less credibility). Also think about what you have to offer that lab. For example, do you speak several languages? Do you have prior research experiences or skills? Can you code? Have you worked with children? Try to let them know how you can help with their work, rather than just asking for them to help you.

With contributions and advice from some of our past students, we put together [this guide to help you get started in research](#).

Can I take classes at Columbia (or Barnard, or the Medical School)?

Yes, with some conditions. Remember, you must take AT LEAST 20 credits here at TC (out of the 32 minimum required for the masters program). Our Core Courses sequence adds up to 15 of those credits, and you are also required to take 6 breadth credits here at TC; plus the cog/psych cluster and in-program electives. In practice this means that taking courses at Columbia will probably take you over the required minimum of 32 credits. Which is certainly permitted!

You can also discuss with your advisor whether some specific Columbia course could count as an elective. *NOTE THAT COLUMBIA COURSES DO NOT COUNT AS BREADTH CREDITS* (these must be taken at TC but outside of your home program).

If you do decide to take a course at Columbia, there are some things you should know:

- Only 4000-level and above can count towards a graduate degree
- First discuss the course with your advisor, and then - with their approval - reach out directly to the course instructor to see if you could be accepted
- If you have both your advisor and the instructor on board, then you must complete [cross-registration](#) procedures through the registrars at TC

As ever, keep your advisor informed! They can help you through the process.

Can I take a leave of absence?

We know that life can throw unexpected curveballs at times. However, taking a leave from the program may affect not only your academic progress but health care coverage, financial aid, housing, and immigration status. If you are considering a leave, please FIRST discuss with your advisor, and then also consult with all other appropriate offices at Teachers College, including but not limited to [Financial Aid](#), Office of [International Scholars and Students](#) (for international students), [Student Health and Wellness](#) (concerning insurance coverage) and the [Office of Residential Services](#) (if you are in College housing). For more information see the College policies on [Continuous Enrollment](#) and on [Leaves of Absence](#).

Is there a PhD program in neuroscience at TC?

Not yet! Many of our students go on to doctoral studies at Columbia or at other institutions. The good news is that a doctoral program in Educational Neuroscience is currently under development here at TC. We will keep you posted on progress, but it will likely take 2-3 years before we are in a position to accept students.

I need financial support. What can I do?

First please contact the Office of Financial Aid. They are your first stop for information about the possibilities for financial support. Our Financial Aid liaison is [Alan Cordoba](#).

There may also be limited financial support available through the College or the Program - you can always ask your advisor, as these opportunities change quickly. The Wendy M. Dressell Student Emergency Fund allocates up to \$250 as a one-time emergency support - please see your Student Portal (myTC) for relevant materials. The Student Portal also lists food insecurity resources.

The Program also sometimes has support for students who are attending conferences, presenting their work, or undertaking some other research-related experience. Announcements of these awards are made via the student list serve. If you find yourself needing to undertake travel directly related to your training, please discuss with your advisor who will help to determine what (if any) resources might be available.

What is the fastest I can complete this program?

The program is not designed to be completed in a hurry - we want you to get the most out of your experience and we want to send you on to your future experiences as a well-rounded scholar. This usually means taking your time, exploring different avenues, and building your experiences gradually. Students have reported the greatest satisfaction with their program when they have spent two years with us (typically a fall, spring, summer, and a second fall and second spring). We do not typically recommend that students take more than 9 credits per semester (which is full time registration).

However, in principle it is possible to complete program requirements within four semesters: a fall, spring, summer and a second fall. This would require taking 12 credits the first fall and spring, 6 credits during the summer, and the thesis course plus any outstanding requirements in the second fall. Students find this schedule very difficult: it does not allow time for labs or independent study experiences, for taking deeper dives into topics of interest, for selecting breadth courses based on interest rather than timing, or working (even part-time) during the program. *If you need to complete the program requirements quickly, please discuss this with your advisor as early as possible in your program.*

What's the longest time I can take to complete the program?

Just as we don't want people to rush through the program, we also don't recommend taking too long! There is a time limit of five years from first registering to completing program requirements.

What other requirements are there for getting a master's degree at Teachers College?

TC requires students to meet requirements for [continuous enrollment](#), candidacy, and recency. You can find more information through the [registrar's website](#), and always check with your advisor if there is something you're not sure about.

Where can I find descriptions of the courses in the Neuroscience and Education Program?

Right here in this document! Please see the Course Listings on earlier pages (just before the Appendix about Independent Study Policies). You can also find course listings online in the TC catalog: <https://www.tc.columbia.edu/catalog/>. This is updated every year.