



**Department of Psychology - Columbia University**

**Fundamentals of Human Neuropsychology**

UN2470/ Course Syllabus / Spring 2020

**Instructor:** Alfredo Spagna, Ph.D.

**Office:** Schermerhorn 318B

**Class Meets:** MW 1:10-2:25PM

**Email:** [as5559@columbia.edu](mailto:as5559@columbia.edu)

**Pronouns :** He, him, his

**Office Hours:** Tuesday 2 – 4PM

**Room:** TBD

**Twitter:** @spagnaphd

**Teaching Assistants:** TBD

### **Course Bulletin Description**

Fundamentals of Human Neuropsychology is an intermediate-level lecture course, which explores how the analysis of lesion patterns extended across brain networks has offered invaluable insights on the relationship between brain and behavior and deepened our understanding of the causal relationships between brain lesions and their clinical consequences.

### **Prerequisites**

PSYC UN1001 The Science of Psychology, or an equivalent introductory course in psychology.

### **Full Description**

Before the advent of functional neuroimaging and noninvasive brain stimulation methodologies, the identification of brain areas subserving specific cognitive functions was mostly based on the evaluation of clinical deficits in neurological patients and post-mortem analysis of lesions present in their brains. Although the rapid development of neuroimaging techniques has greatly contributed to the understanding of the relationship between brain and behavior, its correlational nature poses hard theoretical limits to the conclusions that can be drawn from these studies. At the same time, the clinical neuropsychology field has fruitfully exploited the advantages provided by these methodologies, to localize in vivo and non-invasively gray and white matter lesions in neurological patients. In the past twenty years, the analysis of lesion patterns extended across brain networks has offered invaluable insights on the relationship between brain and behavior and deepened our understanding of the causal relationships between brain lesions and their clinical consequences. This course stems from these theoretical premises and constitutes a voyage in the structural and functional knowledge grown from the study of patients with naturally occurring focal lesions and includes an overview of the most common rehabilitation techniques used in clinical neuropsychology practice.

The course develops around three main questions:

- What is the advantage to study human cognition using causal methodologies? Before the advent of neuroimaging methodologies, the causal relation between brain areas and specific cognitive functions was mostly based on the evaluation of clinical deficits in neurological patients and post-mortem analysis of lesions present in their brains. Although the rapid development of neuroimaging has advanced current understanding of the relationship between brain and behavior, its correlational nature poses hard theoretical limits to the conclusions that can be drawn from these studies.
- What is the contribution of human neuropsychology to the broader neuroscientific field? At the same time, neuropsychologists have fruitfully exploited the advantages provided by neuroimaging to localize in vivo and non-invasively gray and white matter lesions in neurological patients. Imaging lesion patterns extending across brain networks has informed on the relationship between brain and behavior and deepened our understanding of the causal relationships between brain lesions and their clinical consequences.
- What can focal lesions tell us about how the brain works? Stemming from these theoretical premises, this course tries to disentangle the relationship between brain structure and function by looking at knowledge grown from the study of patients with naturally occurring focal lesions, and includes an overview of the most common rehabilitation techniques used in clinical neuropsychology practice.

### Learning Objectives

At the end of this course students will be able to:

1. Summarize the major assumptions that underlie the study of brain-behavior relationships;
2. Use the neuropsychological terminology in reviewing the history and explaining the essential concepts of the field.
3. Differentiate among major neuropsychological disorders and describe how they present to clinicians at both early and late stages of the disease
4. Evaluate the best assessment practices used by clinical neuropsychologists, through identifying inconsistencies and fallacies with current diagnostic processes.
5. Apply their knowledge to design a neuropsychological research study that draws from current state-of-the-art technological advancements in neuroscience.
6. Generate innovative diagnostic approaches using the current technology for the diagnosis and rehabilitation of patients with neuropsychological disorders.

### Role of PSYC UN2470 in the curriculum

PSYC UN2470 is an intermediate-level lecture course, open to undergraduates and students in the Post-baccalaureate Psychology program. It fulfills the following degree requirements:

- For the Neuroscience & Behavior major, this course can be used to fulfill either the P2 Course in Neuroscience requirement or the P4 Additional 2000-level Psychology lecture course, not both.
- For the Psychology major and concentration, and for the Post-baccalaureate Psychology program, this course meets the Group II – Psychobiology & Neuroscience – distribution requirement.

## Course website

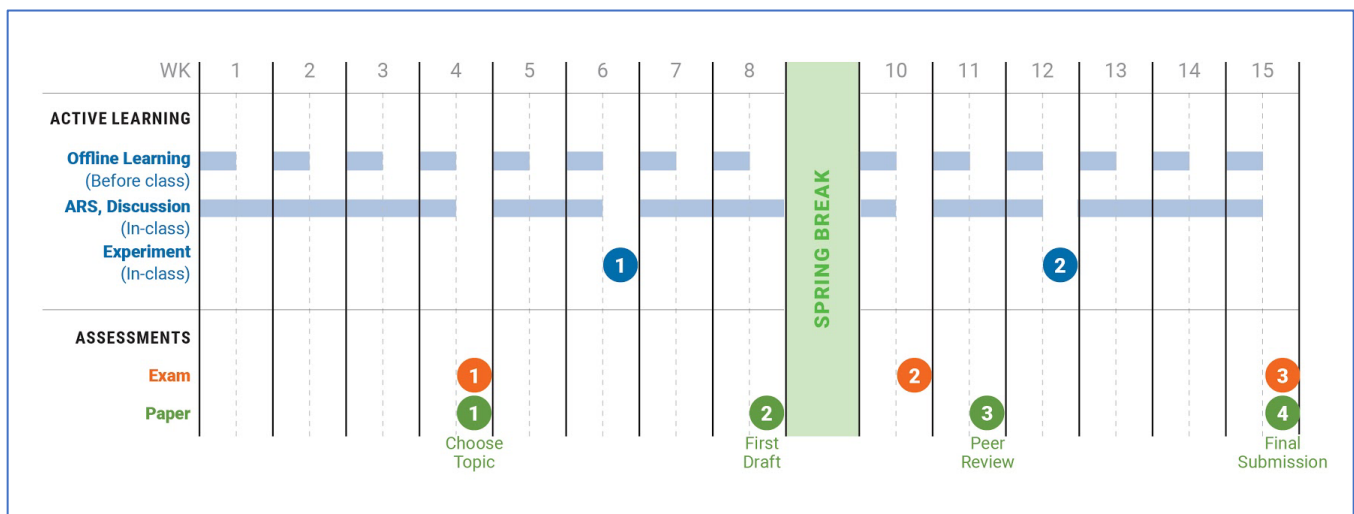
The most up-to-date information, including changes to the syllabus or to the class schedule, announcements, lecture slides and additional materials are contained on the course website on CourseWorks (Canvas). Be sure you are familiar with it, that you are easily able to login to the website, and that you always have the lecture slides with you (whether printed or electronic). If you have problems accessing the course website at any point during the semester, please let me know.

## Readings

- **Suggested Textbook:** Fundamentals of Human Neuropsychology, by Bryan Kolb and Ian Q Whishaw. MacMillian Education, 7<sup>th</sup> Edition, 2015. Various copies of the book are on reserve in the library. Yet, activities of the course are organized in a way that you are not “required” to have a copy of the book (flipped classroom, more info about).
- Additional Readings from the following texts will be provided as pdfs:
  - Clinical Neuropsychology, by Kenneth M Heilman, Edgard Valenstein. Oxford University Press, 5<sup>th</sup> Edition, 2012.
  - Principles of Neural Sciences, by Hudspeth, A. J., Jessell, T. M., Kandel, E. R., Schwartz, J. H., & Siegelbaum, S. A. (Eds.), 4<sup>th</sup> Edition, (2013).
  - Code, C., Wallesch, C. W., Joannette, Y., & Lecours, A. R. (Eds.). (1996). Classic cases in neuropsychology. Psychology Press.

## Timeline of the activities

This is a “flipped” classroom. Therefore, rather than depending mostly on the exams, your grade will be based on the following three activities: Active Learning (in-class participation and group projects), Formal Assessments (exams), and the Final Written Assignment.



## Active Learning

One of the goals of this course is to facilitate student engagement through experiential learning. Active engagement will be promoted by:

- In class experiments: students will watch videos on neuropsychological cases and will work in groups to collect and analyze data, discuss results, and relate them to the scientific literature. The opportunity to witness neuroscience experiments in action and to connect neuroscience to real-world problems will enhance student engagement and curiosity and promote a deeper understanding.
- Group Work: every week, a group composed of 5 to 6 students will be in charge of creating a digital concept map of weekly chapters, and progressively show how the main neuropsychological disorders relate to typical brain function and to each other. The maps will be created using Coggle® and will be made available to all students on Courseworks.
- PollEverywhere®, an Audience Response Systems (ARS), will be used to encourage all students to participate. Each class, intro questions and recap questions (at the beginning and at the end of each lecture) will be displayed on the screen, allowing students to review some of the key concepts of each class.

## Formal assessments

Exams will be a mix of multiple choice, fill-in, and short-answer questions. The majority of each test will focus on material covered in the lectures, and the corresponding sections in the textbook.

- While studying, try to emphasize *understanding* and *critical thinking*. Knowing key concepts and definitions is highly valued, of course, but successful students use that knowledge to scaffold a more comprehensive understanding of the material. This is highly advisable for these exams and in general for your career. Rather than simply “memorizing,” try to “understand” the material and consult with your Instructor and the TAs for clarification. Test questions will include more basic definitional / conceptual knowledge as well as application of that knowledge to new scenarios.
- Videos (with subtitles), transcripts of the videos, and slides in the videos will be posted on Courseworks; additional readings (including the case studies that will be discussed in class) will be also posted on Courseworks and may constitute material you will be tested on during the exam.

**Make-up exams:** will be allowed only with written justification (e.g., by your doctor or advising dean) and must be taken within one week *after* the exam. (Make-up exams will not be offered before the scheduled exam date.)

## Final Written Assignment

The culmination of this course is the redaction of a research proposal relating to the material of the class. Good writing is good thinking, and a primary goal of this assignment is to help students enhance writing and critical thinking skills by deepening their understanding of a course-related topic of their choice.

The process of writing the research paper follows four steps:

1. Choose topic (deadline Week 4): Early in the course students will be asked to identify a topic related to the class and submitting the proposal on Courseworks Assignment Page. The Instructor and the TA will promptly approve the topic or give some suggestions for changes if needed (e.g., if the topic chosen does not fit with the course’s content). This proposal is intended to be really short (it can come out down to a paragraph or so) and in the writing students must have clearly stated whether their final written assignment will be

about either: **path 1.** A seminar/colloquium/panel they plan to attend (and motivate which event and why); **path 2.** A literature search they plan to conduct (and motivate which topic and why).

2. Submit first Draft (deadline week 8): Once your topic is approved, students can begin work on a first draft of the paper. Generally, students want to choose a topic that is appropriately narrow to address in a 5 to 10-page manuscript (excluding references).

If you planned to follow the first option (you chose path 1 in the “choose a topic” step), you are expected to have attended a seminar given by a scientist about their work, and to write up a summary of their talk. The schedule of seminars and colloquia of potential interest will be shown in class, but you are also invited to conduct a search on your own, and to check in with your professor / TAs to see if the talk you chose adheres with the goal of this assignment.

If you planned to follow the second option (you chose path 2 in the “choose a topic” step) you are expected to have conducted a literature search (either on Pubmed, Google Scholar, or look at the "Publications" sections of the various Clinical Neuropsychology at CU and beyond – for this there is an attachment called List of Researchers for the Writing Assignment – Short Paper) to find a recent and exciting empirical paper in the current neuropsychology literature, and write up a summary of this study. Review papers are NOT a good fit for this assignment.

The instructor will provide comments and suggestions on the first draft, and students will be expected to make substantive changes.

3. Anonymous peer review (deadline week 11): In order to make this activity also an opportunity for students to actively learn, one of the steps in the revision process will be a round of “anonymous peer review,” in which each student will be asked to review the drafts of at least two of their colleagues. This will put each student in the position of the “reviewer,” by critically analyzing and understanding pitfalls, shortcomings, but also strengths of the writing of their peers; this is expected to influence also the student’s own writing by adjusting the focus and clarifying potential issues. Students will be randomly divided into small groups of 4 they will be asked to upload their writing to Courseworks and anonymously peer review the writing from two other students. Comments and suggestions from the peer-review process may (or may not) be included in the final writing, based on the student’s judgment. In case comments are not included, a response might be given to the group as to the reason why a specific comment was not implemented. The TAs will be in charge of evaluating both the student’s writing as well as the comments provided by the reviewers, grading all the three components. Make sure you provide valuable feedback to your peers in order to get full points on the final writing assignment.
4. Submit the final work on Courseworks (deadline week 14): The final draft of the paper will be graded not only as a standalone paper but also in how it demonstrates improvement upon the earlier draft.

While the format of the assignment is pretty “free”, what we want to know is:

- What you attended or read (include relevant information such as the date of the talk or year of publication)
- Why you chose to attend this talk or read this paper
- Who is the speaker for the talk you attended, or who the lead researcher on the paper is (this is usually indicated as either the first or last author, the latter signifies the senior author)
- What is the field of investigation
- What was the topic about

- What was the potential advancement in the literature proposed by the speaker or author
- What was the take-home message
- What are potential future research ideas that the talk or article inspired in you
- What are the potential societal contributions or effects of the research discussed in the talk or paper

**Formatting requirements:**

- A. Page length: between 5 and 10 pages, references excluded;
- B. Double spaced;
- C. One-inch margins.

More tips about how to successfully write this assignment can be found in rubrics that will be posted on Courseworks. There will be one rubric per each “path”; make sure you consult both of them before choosing what your writing assignment will be about.

**Grades**

- Active Learning: 20% of the final grade
  - In-class experiments (5%)
  - Groups work (5%)
  - PollEverywhere weekly responses (5%)
  - In-class participation to the discussion (5%)
- Formal Assessments: 50% of the final grade (15% exam 1, 15% exam 2, 20% exam 3)
- Course Final Project: 30% of the final grade
  - Choice of the topic (2.5%)
  - Timely submission of the first draft and accurate formatting (2.5%)
  - Quality of the peer-review given (5%)
  - Timely submission of the final writing, accurate formatting (5%)
  - Quality of the writing of the final assignment (10%)
  - Incorporate the comments received by peers and by TAs in the final submission (5%)

**Letter Grade Assignment**

97-100: A+	87-89: B+	77-79: C+	67-69: D+	<60: F
94-96: A	84-86: B	74-76: C	64-66: D	
90-93: A-	80-83: B-	70-73: C-	60-63: D-	

**Class policies: Important Information below – please read carefully!**

**Disability Services:** In order to receive disability-related academic accommodations for this course, students must first be registered with their school Disability Services (DS) office. Detailed information is available online for both the [Columbia](#) and [Barnard](#) registration processes. Refer to the appropriate website for information regarding deadlines, disability documentation requirements, and [drop-in hours](#) (Columbia)/[intake session](#) (Barnard).

For this course, Columbia students are not required to have testing forms or accommodation letters signed by faculty. However, students must do the following:

1. The Instructor section of the form has already been completed and does not need to be signed by the professor.
2. The student must complete the Student section of the form and submit the form to Disability Services.
3. Master forms are available in the Disability Services office or online:  
<https://health.columbia.edu/services/testing-accommodations>

**Religious observances:** If you are going to miss class(es) due to religious holidays, you must notify me during the first week of class so that accommodations may be made.

**Sexual Respect:** Any form of gender-based misconduct will not be tolerated. Columbia University is committed to fostering an environment that is free from gender-based discrimination and harassment, including sexual assault and all other forms of gender-based misconduct. Visit this website for more information:  
<http://sexualrespect.columbia.edu/>

**Academic integrity:** As members of this academic community, we are responsible for maintaining the highest level of personal and academic integrity: “Each one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity.... The 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... [and] you must always submit your own work and not that of another student, scholar, or internet agent” (from the Columbia University Faculty Statement on Academic Integrity) <http://www.college.columbia.edu/academics/academicintegrity> .

**Cheating and plagiarism** – whether intentional or inadvertent – is a serious violation of academic integrity. Plagiarism is the practice of claiming or implying original authorship of (or incorporating materials from) someone else’s written or creative work, in whole or in part, without adequate acknowledgement. If you have any questions about what constitutes plagiarism and/or how to properly cite sources, please come to me. I am more than happy to help. Similarly, if you put yourself in a situation in which you think your best option might be to cut some corners, see me. If you feel like you are falling behind, don’t understand the material, or are not confident about your ability to take tests, talk to me as soon as possible instead of taking measures that go against principles of academic integrity. We are here to learn, not to merely judge. It is a far better option to come talk to me than compromise your academic integrity and potentially put your academic standing in jeopardy.

**Attendance:** Coming to class is meaningless if class time is spent inappropriately. Chatting with friends, watching videos online, and browsing social media are not appropriate activities for the classroom. Also, remember to silence your cell phone before class. Generally, eliminate distractions as much as possible to respect your classmates, as well as increase your chance of staying focused and learning the material during class.

**Schedule**

The calendar below details topics, readings, and assignments for each class period. Students are responsible to be prepared to discuss the assigned readings for each class period.

Dates	Topics	Class Preparation	In-class activities	After class
Wed Jan 22 <sup>nd</sup>	Intro to the course	Chapter 1: material and Qs on CW or textbook pp 2 – 26		
Mon Jan 27 <sup>th</sup> and Wed Jan 29 <sup>th</sup>	Nervous System Organization	Chapter 3: material and Qs on CW or textbook pp 52 – 84	Case studies + ARS + Discussion	Coggle conceptual maps
Mon Feb 3 <sup>rd</sup> and Wed Feb 5 <sup>th</sup>	Principles of Neocortical Functions	Chapter 10: material and Qs on CW or textbook pp 254 – 281	Case studies + ARS + Discussion	Coggle conceptual maps
Mon Feb 10 <sup>th</sup> and Wed Feb 12 <sup>th</sup>	Neuropsychological Assessment	Chapter 28: material and Qs on CW or textbook pp 793 – 804	Case studies + ARS + Discussion	Coggle conceptual maps
Monday Feb 17 <sup>th</sup>	<b>Exam 1</b>	<b>Chapters: 1, 3, 10, 28</b>		
Wed Feb 19 <sup>th</sup> and Mon Feb 24 <sup>th</sup>	Organization of the sensory systems	Chapter 8: material and Qs on CW or textbook pp 201 – 230	Case studies + ARS + Discussion	Coggle conceptual maps
Wed Feb 26 <sup>th</sup> and Mon March 2 <sup>nd</sup>	Organization of the motor systems	Chapter 9: material and Qs on CW or textbook pp 231-252	Case studies + ARS + Discussion	Coggle conceptual maps
Wed March 4 <sup>th</sup> and Mon March 9 <sup>th</sup>	Cerebral Asymmetry and Variations	Chapters 11 & 12 : material and Qs on CW or textbook pp 252 – 348	In-class Experiment	Coggle conceptual maps
Wed March 11 <sup>th</sup> and Mon March 23 <sup>rd</sup>	Cortical Networks and Disconnection Syndromes	Chapter 17: material and Qs on CW or textbook pp 461 – 479	Case studies + ARS + Discussion	Coggle conceptual maps
SPRING BREAK (MONDAY 03/16 TO FRIDAY 03/20)				



<b>Dates</b>	<b>Topics</b>	<b>Class Preparation</b>	<b>In-class activities</b>	<b>After class</b>
Wed March 25 <sup>th</sup> and Mon March 30 <sup>th</sup>	Language Disorders	Chapter 19: material and Qs on CW or textbook 514 – 546	Case studies + ARS + Discussion	Coggle conceptual maps
<b>Wed April 1st</b>	<b>Exam 2</b>	<b>Chapters: 8, 9, 11, 12, 17, 19</b>		
Mon April 6 <sup>th</sup> and Wed April 8 <sup>th</sup>	Spatial Behaviors, Place cells, and Grid cells	Chapter 21: material and Qs on CW or textbook pp 574 – 605	Case studies + ARS + Discussion	Coggle conceptual maps
Mon April 13 <sup>th</sup> and Wed April 15 <sup>th</sup>	Hemispacial Neglect and Attentional Deficits	Chapter 22: material and Qs on CW or textbook pp 606 – 631	In-class Experiment	Coggle conceptual maps
Mon April 20 <sup>th</sup> and Wed April 22 <sup>nd</sup>	Neurodevelopmen- tal Disorders	Chapter 24: material and Qs on CW or textbook pp 669 – 697	Case studies + ARS + Discussion	Coggle conceptual maps
Mon April 27 <sup>th</sup> and Wed April 29 <sup>th</sup>	Plasticity, Recovery, and Rehabilitation	Chapter 25: material and Qs on CW or textbook pp 698 – 728	Case studies + ARS + Discussion	Coggle conceptual maps
Mon May 4 <sup>th</sup>	Psychiatric and Neurological Disorders	Chapter 27: material and Qs on CW or textbook pp 760 – 791	Case studies + ARS + Discussion	
<b>Date TBD</b>	<b>Exam 3</b>	<b>Chapters: 21, 22, 24, 25, 27</b>		