

Psychology 720
Essentials of Cognitive Neuroscience
Fall 2020

This course is intended to provide a broad overview of principles that underlie our understanding of how the structure and function of the brain give rise to cognition and intelligent behavior, and of the methods with which cognitive neuroscience research is carried out. The content covered can be summarized as *neuroscience with direct implications for understanding the neural bases of human behavior*, and will include anatomical, cellular, systems, behavioral, neuropsychological, and computational levels of analysis. The emphasis will be on domains of behavior traditionally covered by cognitive psychology and neurology, but with explicit consideration, when applicable, of implications for understanding affect, social behavior, and psychopathology.

The course will be organized under the topics of *Sensation, Perception, Attention, and Action; Mental Representation; and High-level Cognition*.

Throughout the course, in-depth consideration will be given to the methods of cognitive neuroscience: the assumptions that underlie them; their physical/biological/physiological bases; methods for analyzing the data that they produce; the pragmatics of their use; and the kinds of inference that they can (and cannot) support.

Learning Outcomes:

Upon satisfactory completion of this course, students will be able to:

- describe the anatomical structures, and neurotransmitter systems, associated with the following major classes of cognition: perception, attention, motor control, memory, and cognitive control;
- explain the key neural systems-level principles that underlie these same major classes of cognition;
- critically read and evaluate peer-reviewed publications of cognitive neuroscience experiments, specifically, experiments using invasive electrophysiological recordings (in humans and nonhuman model species), using non-invasive neuroimaging (electroencephalography and functional magnetic resonance imaging), and using neurostimulation (transcranial magnetic stimulation and transcranial electrical stimulation) and using neuropsychology
- design, at a conceptual level, experiments using these same methods

Instructor: Brad Postle, 515 Psychology, 262-4330, postle@wisc.edu

Office hours by appointment.

With the exception of time-sensitive emergencies, email is the most effective and preferred way for you to contact me.

Format: The format will be lecture, with ample opportunity for discussion and exploration of questions that are of specific interest to students in the class. Each lecture will be recorded and posted on course's canvas site. Assigned readings will come from Postle, B.R. (2020) *Essentials of Cognitive Neuroscience* (2nd ed., Wiley)*, with narrated videos linked to <https://postlab.psych.wisc.edu/cog-neuro-compendium/> ("CNC video"). Note that students are expected to have read all of each week's assigned readings, and viewed the assigned videos, prior to that week's class.

Coverage: The course is organized around the professor's textbook, and he cherishes every chapter as though it was one of his children. Nonetheless, there is only so much material that one can

* Any (modest) profits earned by the professor will be donated to the Dept. of Psychology, earmarked for programming by the Committee on Climate & Diversity.

cover in a single semester, and so three content domains are deemphasized, primarily because this campus (indeed, this department) boasts a remarkable wealth of expertise and learning opportunities in each of these areas: semantic memory; language; consciousness. The instructor will be happy to engage questions that pertain to these topics during class time (as they relate to the topics explicitly listed in this syllabus) or outside of class.

Grading will be based on class participation (10%), and three section exams (30% each). The exams will be short-answer essay format. Throughout the course, material assigned and presented for a particular week will assume an accumulation of knowledge of all that preceded it. Thus, although the second and third section exams won't test specific material from the first (and so, strictly speaking, won't be "cumulative"), they will both assume a command of all the material from the preceding section(s). If the class-mean final numerical grade is below 90, final letter grades will be assigned relative to the final mean numerical grades as follows: A \geq 1 SD above mean; AB $>$ mean; B \geq 1 SD below mean; BC \geq 1.5 SD below mean; C \geq 2.5 SD below mean; D \geq 3 SD below mean; F = $<$ 3 SD below mean. If the class-mean final numerical grade is 90 or above, final letter grades will be assigned as follows: A \geq 95; AB \geq 92; B \geq 90; BC \geq 85; C \geq 2 SD below mean; D \geq 3 SD below mean; F = $<$ 3 SD below mean.

Guidelines for evaluating class participation:

Outstanding Contributor: Contributions in class reflect exceptional preparation. Ideas offered are always substantive, provide one or more major insights as well as direction for the class. Challenges are well substantiated and persuasively presented. If this person were not a member of the class, the quality of discussion would be diminished markedly. (Outstanding contributors will receive full credit = 10 points.)

Good Contributor: Contributions in class reflect thorough preparation. Ideas offered are usually substantive, provide good insights and sometimes direction for the class. Challenges are well substantiated and often persuasive. If this person were not a member of the class, the quality of discussion would be diminished. (Good contributors will receive 9 out of 10 points.)

Adequate Contributor: Contributions in class reflect satisfactory preparation. Ideas offered are sometimes substantive, provide generally useful insights but seldom offer a new direction for the discussion. Challenges are sometimes presented, fairly well substantiated, and are sometimes persuasive. If this person were not a member of the class, the quality of discussion would be diminished somewhat. (Adequate contributors will receive 8 out of 10 points.)

Non-Participant: This person says little or nothing in class. Hence, there is not an adequate basis for evaluation. If this person were not a member of the class, the quality of discussion would not be changed. (Non-participants will receive 5 out of 10 points.)

Unsatisfactory Contributor: Contributions in class reflect inadequate preparation. Ideas offered are seldom substantive, provide few if any insights and never a constructive direction for the class. Integrative comments and effective challenges are absent. If this person were not a member of the class, valuable air-time would be saved. (Unsatisfactory contributors will receive 0-4 out of 20 points.)

****Please note:** A student's class participation grade will be negatively impacted if the professor has the impression that the student has spent an excessive amount of class time engaged in activities unrelated to class (e.g., checking Facebook, sending emails, etc.).

Class meets Tuesdays, from 9:30am - 12 pm, in room 338 Psychology

- Week 1 (9/08) Introduction and historical foundations; principles of anatomy and physiology**
Reading: Chpt. 1 & 2, Chpt. 3 pp 34-40; CNC video by Ding
- Week 2 (9/15) Sensation and perception of visual signals**
Reading: Chpt. 4, Chpt. 3 pp 40-55; CNC video by Romei
- Week 3 (9/22) Sensation and perception of auditory and somatosensory signals; Organization of the visual system**
Reading: Chpts. 5 and 6, Chpt. 3 pp. 56-60, 78-82; CNC videos by Birn, Alexander, and Baker
- Week 4 (9/29) Spatial Cognition and Attention**
Reading: Chpt. 7, Chpt. 3 pp. 61-78; CNC videos by Postle (x2), Wig, Saalman, and Slagter
- Week 5 (10/06) Skeletomotor Control**
Reading: Chpt. 8; (poor Chpt. 8 has no associated CNC videos ☹)
Exam 1 (covers Weeks 1-4; 1 hour-long, short-answer format; date and time t.b.a.)
- Week 6 (10/13) Oculomotor Control and the Control of Attention**
Reading: Chpt. 9; CNC videos by Luna, Noudoost, and Curtis
- Week 7 (10/20) Visual object recognition and knowledge**
Reading: Chpt. 10; CNC videos by Rogers (x2) and Parvizi
- Week 8 (10/27) Neural bases of memory**
Reading: Chpt. 11; CNC videos by Corkin, Stark (x2), Lisman, and Murray
- Week 9 (11/03) Declarative and semantic long-term memory**
Reading: Chpts. 12 and 13; CNC videos by Polyn, Barense, Simons, and Rogers
- Week 10 (11/10) Working memory**
Reading: Chpt. 14; CNC videos by Serences and Stokes
Exam 2 (covers Weeks 5-9; 1 hour-long, short-answer format; date and time t.b.a.)
- Week 11 (11/17) Cognitive control**
Reading: Chpt. 15; CNC videos by D'Esposito and Munakata
- Week 12 (11/24) Decision making**
Reading: Chpt. 16; CNC video by Green
- Week 13(12/01) Social behavior**
Reading: Chpts. 17; CNC videos by Somerville, van Horn, and Koenigs
- Week 14 (12/08) Emotion**
Reading: Chpt. 18; CNC video by Robinson
Exam 3 (covers Weeks 10-14; 1 hour-long, short-answer format; date and time t.b.a.)

Ethics of Being a Student in the Department of Psychology:

The members of the faculty of the Department of Psychology at UW-Madison uphold the highest ethical standards of teaching and research. They expect their students to uphold the same standards of ethical conduct. By registering for this course, you are implicitly agreeing to conduct yourself with the utmost integrity throughout the semester.

In the Department of Psychology, acts of academic misconduct are taken very seriously. Such acts diminish the educational experience for all involved – students who commit the acts, classmates who would never consider engaging in such behaviors, and instructors. Academic misconduct includes, but is not limited to, cheating on assignments and exams, stealing exams, sabotaging the work of classmates, submitting fraudulent data, plagiarizing the work of classmates or published and/or online sources, acquiring previously written papers and submitting them (altered or unaltered) for course assignments, collaborating with classmates when such collaboration is not authorized, and assisting fellow students in acts of misconduct. Students who have knowledge that classmates have engaged in academic misconduct should report this to the instructor.

Complaints:

Occasionally, a student may have a complaint about a TA or course instructor. If that happens, you should feel free to discuss the matter directly with the TA or instructor. If the complaint is about the TA and you do not feel comfortable discussing it with him or her, you should discuss it with the course instructor. If the complaint is about the instructor and you do not feel comfortable discussing it with him or her, make an appointment to speak to the Department Chair, Professor Craig Berridge (chair@psych.wisc.edu).

If your complaint has to do with sexual harassment, you may also take your complaint to Dr. Linnea Burk, Clinical Associate Professor and Director, Psychology Research and Training Clinic, Room 315 Psychology (262-9079; burk@wisc.edu).

If you believe the TA or course instructor has discriminated against you because of your religion, race, gender, sexual orientation, or ethnic background, you also may take your complaint to the Office of Equity and Diversity, Room 179-A Bascom Hall (www.oed.wisc.edu)

Accommodations Policy:

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations, as part of a student's educational record is confidential and protected under FERPA.

Privacy of Student Information and Digital Proctoring Statement

The privacy and security of faculty, staff and students' personal information is a top priority for UW-Madison. The university carefully reviews and vets all campus-supported teaching and learning tools, including proctoring tools and takes necessary steps to ensure that tool providers prioritize proper handling of sensitive data in alignment with FERPA, industry standards and best practices.

Under the Family Educational Rights and Privacy Act (FERPA – which protects the privacy of student education records), student consent is not required for the university to share with Honorlock those student education records necessary for carrying out the proctoring service. 34 CFR 99.31(a)(1)(i)(B). FERPA specifically allows universities to treat vendors as school officials and to share student education records with them where they perform services for the university and are subject to FERPA requirements governing the use and redisclosure of personally identifiable information from education records. Honorlock is FERPA compliant and is bound by the terms of its agreement with the university to comply with FERPA's restrictions on the use of student education records.

PRIVACY OF STUDENT RECORDS and the USAGE of AUDIO RECORDED LECTURES

See information about [privacy of student records and the usage of audio-recorded lectures](#).

Usage of Audio Recorded Lectures Statement

Lecture materials and recordings for Psychology 720 are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

STUDENTS' RULES, [RIGHTS & RESPONSIBILITIES](#)

During the global COVID-19 pandemic, we must prioritize our collective health and safety to keep ourselves, our campus, and our community safe. As a university community, we must work together to prevent the spread of the virus and to promote the collective health and welfare of our campus and surrounding community.

UW-MADISON [BADGER PLEDGE](#)

UW-MADISON [FACE COVERING GUIDELINES](#)

While on campus all employees and students are required to [wear appropriate and properly fitting](#) face coverings while present in any campus building unless working alone in a laboratory or office space.

Face Coverings During In-person Instruction Statement (COVID-19)

Individuals are expected to wear a face covering while inside any university building. Face coverings must be [worn correctly](#) (i.e., covering both your mouth and nose) in the building if you are attending class in person. If any student is unable to wear a face-covering, an accommodation may be provided due to disability, medical condition, or other legitimate reason.

Students with disabilities or medical conditions who are unable to wear a face covering should contact the [McBurney Disability Resource Center](#) or their Access Consultant if they are already affiliated. Students requesting an accommodation unrelated to disability or medical condition, should contact the Dean of Students Office.

Students who choose not to wear a face covering may not attend in-person classes, unless they are approved for an accommodation or exemption. All other students not wearing a face covering will be asked to put one on or leave the classroom. Students who refuse to wear face coverings appropriately or adhere to other stated requirements will be reported to the [Office of Student Conduct and Community Standards](#) and will not be allowed to return to the classroom until they agree to comply with the face covering policy. An instructor may cancel or suspend a course in-person meeting if a person is in the classroom without an approved face covering in position over their nose and mouth and refuses to immediately comply.

QUARANTINE OR ISOLATION DUE TO COVID-19

Student should continually monitor themselves for COVID-19 [symptoms](#) and get [tested](#) for the virus if they have symptoms or have been in close contact with someone with COVID-19. Student should reach out to instructors as soon as possible if they become ill or need to isolate or quarantine, in order to make alternate plans for how to proceed with the course. Students are strongly encouraged to communicate with their instructor concerning their illness and the anticipated extent of their absence from the course (either in-person or remote). The instructor will work with the student to provide alternative ways to complete the course work.

COURSE EVALUATIONS

UW-Madison now uses an online course evaluation survey tool, [AEFIS](#). In most instances, you will receive an official email two weeks prior to the end of the semester when your course evaluation is available. You will receive a link to log into the course evaluation with your NetID where you can complete the evaluation and submit it,

anonymously. Your participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

ACADEMIC CALENDAR & RELIGIOUS OBSERVANCES

- See: <https://secfac.wisc.edu/academic-calendar/#religious-observances>

ACADEMIC INTEGRITY STATEMENT

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES STATEMENT

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. (See: [McBurney Disability Resource Center](#))

DIVERSITY & INCLUSION STATEMENT

[Diversity](#) is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.