

**Psychology 720**  
**Essentials of Cognitive Neuroscience**  
**Fall 2018**

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. Assigned readings and video viewings will come from Postle, B.R. (2015) *Essentials of Cognitive Neuroscience* (Wiley), with video “Web Clips” hosted on the book’s companion Web page. Note that students are expected to have read all of each week’s assigned readings, and viewed the assigned Web Clips, prior to that week’s 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

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· The author will donate any resultant (modest) royalties to the Department of Psychology’s graduate program.

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  $\geq$  2 SDs above mean; AB  $\geq$  1 SD above mean; B  $\geq$  mean; BC  $\geq$  1 SD below mean; C  $\geq$  2 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 Wednesdays, from 9:30am - 12 pm, in room 634 Psychology*

- Week 1 (9/05) Introduction and historical foundations; principles of anatomy and physiology**  
*Reading:* Chpt. 1 & 2 + associated Web clips
- Week 2 (9/12) Sensation and perception of visual signals**  
*Reading:* Chpt. 3 + associated Web clips
- Week 3 (9/19) Sensation and perception of auditory and somatosensory signals; Organization of the visual system**  
*Reading:* Chpts. 4 and 5 + associated Web clips
- Week 4 (9/26) Spatial Cognition and Attention**  
*Reading:* Chpt. 6 + associated Web clips
- Week 5 (10/03) Skeletomotor Control**  
*Reading:* Chpt. 7 + associated Web clips
- Week 6 (10/10) First Hour: Exam 1**  
*Remainder of class: Oculomotor Control and the Control of Attention*  
*Reading:* Chpt. 8+ associated Web clips
- Week 7 (10/17) Visual object recognition and knowledge**  
*Reading:* Chpt. 9 + associated Web clips
- Week 8 (10/24) Neural bases of memory**  
*Reading:* Chpt. 10 + associated Web clips
- Week 9 (10/31) Declarative long-term memory**  
*Reading:* Chpt. 11 + associated Web clips
- Week 10 (11/07) No class – Annual meeting of the Society for Neuroscience**
- Week 11 (11/14) First Hour: Exam 2**  
*Remainder of class: Semantic long-term memory*  
*Reading:* Chpt. 12 + associated Web clips
- Week 12 (11/21) Short-term and working memory**  
*Reading:* Chpt. 13 + associated Web clips
- Week 13 (11/28) Cognitive control**  
*Reading:* Chpt. 14 + associated Web clips
- Week 14 (12/05) Decision making and Social behavior**  
*Reading:* Chpts. 15 & 16 + associated Web clips
- Week 15 (12/12) Emotion and Language**  
*Reading:* Chpts. 17, 18 + associated Web clips
- Finals Week Exam 3 (date, time, and place t.b.d.)**

### ***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. Complaints about mistakes in grading should be resolved with the TA and/or instructor in the great majority of cases. If the complaint is about the instructor (other than ordinary grading questions) and you do not feel comfortable discussing it with him or her, make an appointment to speak to the Associate Chair for Graduate Studies, Professor Kristin Shutts, [kshutts@wisc.edu](mailto:kshutts@wisc.edu).

If your complaint concerns 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](mailto:burk@wisc.edu)).

If you have concerns about climate or bias in this class, or if you wish to report an incident of bias or hate that has occurred in class, you may contact the Chair of the Psychology Department Climate & Diversity Committee, Karl Rosengren ([krosengren@wisc.edu](mailto:krosengren@wisc.edu)). You may also use the University's bias incident reporting system, which you can reach at the following link: <https://doso.students.wisc.edu/services/bias-reporting-process/>.

### ***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.