PSYCH 330: Introduction to Cognitive Science
Fall 2018

Course Description. Cognitive science studies the nature of cognition by drawing on the knowledge and approaches of different disciplines including, psychology, computer science, linguistics and philosophy. This course is a selective overview of cognitive science. It is a required course for the minor in Cognitive Science at UNC Chapel Hill serving to show how the approaches of different disciplines can be integrated in studying specific cognitive abilities. While this course is offered in the Psychology Department, it draws heavily on other disciplines, particularly linguistics and computer science. Students selecting this course should have a real interest in those disciplines and how they can be related to each other.

Course Overview and Policy. Class meetings will be a combination of lecture and discussion/activity. Students will be expected to attend class prepared to discuss relevant topics and engage in planned activities. Each student will be required to complete two short papers, each of which will ask you to think thoroughly about a specific topic, and a longer paper that will involve a component of research and writing. In addition, there will be 3 assignments that involve writing computer programming code. There will be two midterm exams and a final exam.

Evaluation

Exam 1	20%
Exam 2	20%
Short Paper 1	4%
Short Paper 2	4%
Programming 1	4%
Programming 2	4%
Programming 3	4%
Project	15%
Final	25%

Participation & Extra Credit. The participation grade will be based on a series of 9 short assignments in response to prompts. Your responses do not need to be long; a few sentences or a short paragraph is enough. To get credit for a participation assignment, you must complete the written portion of the assignment by the indicated time and you must attend class for discussion of the assignment. If assignments are missed because of an excused absence then a makeup exercise will be assigned. No makeups will be assigned for unexcused absences. Participation assignments will be graded Satisfactory (1 point) or Unsatisfactory (0 points). A total of 6 points will constitute satisfactory performance and will be counted as maintaining the grade level earned from the exams, other assignments and final. Each participation point beyond 6 will contribute 3 points to the score on the final exam (which will be on a 100-point scale). Each participation point less than 6 points will reduce the score on the final exam by 3 points.

Late Paper Policy. Unexcused late papers will be marked down by a full letter grade for each calendar day that they are late. Unexcused late papers will not be accepted after two calendar days.

Attendance. Regular class attendance is a student obligation and is essential to completion of this course.

Honor Code. The Honor Code is, as always, in effect in this course. The following explains what is expected from you in terms of meeting these standards. If you have any questions about these matters, please contact your instructor.

> **Pledge:** The Instrument of Student Judicial Governance requires that you sign a pledge on all written work. ("On my honor, I have neither given nor received unauthorized aid on this assignment."). This includes the exams, projects and papers.

Assignments
Short Papers.
Short papers should be approximately 2 pages each. The goal of the short papers is for you to develop and present your own thoughts. There is no need for you to do additional reading beyond those assigned in the class. However, you may consult other sources if you like. If you refer to ideas from other sources (assigned in class or not) you must cite those sources in your paper and include references at the end.

Short Paper 1: Human Technology-
Pick an example of a current technology that augments or replaces human ability by performing a function that was previously performed by the mind or body. Write a short (~2 page) paper that address the following questions:

What technology did you pick and which human ability does it augment or replace?
In what ways does this technology operate similarly to the human mind? In what ways does it operate differently?
Do you think that the technology could ever fully replace the human ability? Why or why not?

Short Paper 2: Reasoning under Uncertainty
Observe a real-world example of reasoning under uncertainty. Write a short (~ 2 page) paper that addresses the following questions:

What is the nature of the uncertainty?
How is it expressed by the person engaging in the reasoning?
Does the person's reasoning seem normatively correct? (Consider the different normative models that were discussed in the course)

Project
- Readings related to the project assignment can be found on Sakai.
- All papers should be submitted through Sakai by midnight on the due date. Unexcused late papers will be marked down by a full letter grade for each calendar day that they are late. Unexcused late papers will not be accepted after two calendar days.
- Please write clearly and concisely. You will not have a lot of space to lay out your argument, so think about what you want to focus on. Good papers will pick a specific example, focus on a few points to work out in detail, and refer to specific points in the text in order to show how the author's ideas can be applied to their example.
- You are encouraged to have another student in the class read your paper and provide feedback, although this is not required. If you do so, make sure to include an

acknowledgment section at the end of your paper (e.g., I would like to thank John Doe for helpful comments on a draft of this paper).

Please pick ONE of the two alternatives described below:

Alternative A: Intelligent Use of Space
- Read the article 'The Intelligent Use of Space' (Kirsh, 1995).
- Think of an activity that you perform (or have performed) often, in which you apply and/or benefit from intelligent use of space. This can be a routine daily activity or something you do that is related to a hobby, sport, job or or other activity that you are a relative expert in.
- Write a short (3-4 pages) paper that addresses the following points:
    o Briefly describe the activity: what are the goals and constraints of the task?
    o Describe how space is used intelligently in order to facilitate successful completion of the task. Make sure to apply the different types of intelligent use of space described by Kirsh (1995). Not all of the categories mentioned in the text will apply to your example, so pick the ones that you think are most important for yourparticular activity. Be as pecific as possible in explaining which of Kirsh's principles apply to your example.
    o Describe in what way they accomplish one or more of the main goals of intelligent use of space described by Kirsh(simplify choice, simplify perception, save internal computation). Again, make sure to refer to the article.
    o Describe what aspects of the task might be simplified or facilitated by introducing even more intelligent use of space. How would you do this? In what ways would it facilitate task performance?
    o Please include a (schematic) figure to clarify your example of intelligent use of space.

Alternative B: Cognitive Artifacts
- Read pp. 47- 113 in 'Things that make us smart' (Norman, 1993). Think of a cognitive artifact or representation that you are familiar with. This can be something that you use in your daily life, or something you have used in relation to a job, hobby, sport, or other activity that you are a relative expert in. Write a short (3-4 pages) paper addressing the following points:
    o What is the cognitive artifact and what is it used for?
    o In what ways does the cognitive artifact simplify the task? Make sure to refer to the article by Norman (1993) and apply his theory about artifacts to your specific example (e.g. What types of mental operations would be required if the artifact were not available, and what types of mental operations are required when using the artifact)?
    o In what ways does the artifact not facilitate the task? What mental operations still need to be carried out? Is there any way you could improve the artifact in order to change this?

- o Attach a picture of the artifact to your paper. This does not have to be the specific artifact you use or have used. Just make sure to have some kind of illustration or figure to clarify your example.

Programming Assignments

For this part of the course you will complete small projects writing computer programs (code). Specifics on these assignments will be presented well before they are due.

Readings

Barker-Plummer, David, "Turing Machines", *The Stanford Encyclopedia of Philosophy* (Summer 2013 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/sum2013/entries/turing-machine/>.

Cole, David, "The Chinese Room Argument", *The Stanford Encyclopedia of Philosophy* (Summer 2013 Edition), Edward N. Zalta (ed.), URL <http://plato.stanford.edu/archives/sum2013/entries/chinese-room/>.

Dawson, M.R.W. (2013). Mind, Body, World: Foundations of Cognitive Science. AU Press, Athabasca, Canada.

Gale, D., & Shapley, L. S. (1962). College admissions and the stability of marriage. *The American Mathematical Monthly, 69*(1), 9-15.

Keith, E. S. (2004). The robot's rebellion: Finding meaning in the age of Darwin. Chicago, IL: The University of Chicago Press.

Miller. (1981). A measure of information.

Moravec, H. (1988). *Mind children.* Cambridge, UK: Cambridge Univ Press.

Chomsky, N. (1957). *Syntactic structures*. The Hague, Netherlands: Mouton.

Prinz, J. (2008). Is morality innate. *Moral Psychology, 1*, 367-406.

Roth, A. E. (2008). Deferred acceptance algorithms: History, theory, practice, and open questions. *International Journal of Game Theory, 36*(3-4), 537-569.

Simon, H. A. (1996). *The sciences of the artificial.* Cambridge, MA: MIT press.

Skinner, B. F. (1984). Selection by consequences. *The Behavioral and Brain Sciences, 7*(4), 477-510.

Yudkowsky, E. (2003). An intuitive explanation of Bayesian reasoning. Retrieved from http://yudkowsky.net/rational/bayes.

Yudkowsky, E. (2008). Cognitive biases potentially affecting judgment of global risks. *Global Catastrophic Risks.* Oxford. UK: Oxford University Press,