

Syllabus P143 (68555) and P192K (50965)

Human Problem Solving and Reasoning

Time/Location. 12:30-1:50pm, Tues/Thurs., PSCB120, Fall Quarter 2004

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Office hours. 2-3pm, Thursday or by appointment.

Course Website. <http://psiexp.ss.uci.edu/research/teachingP143/>

Course Description. The goal of this course is to introduce research on problem solving and reasoning. How do humans reason? How do we solve problems? How *should* humans reason and solve problems? Throughout the course, we will discuss experimental findings about human thinking in problem solving and reasoning situations and explore various methods of computer simulation to describe and explain human behavior.

The format of the course will be lecture/discussion. There will be two multiple choice/short answer exams. There will be no final exam. Instead, a written assignment will be due at final's week.

Required Text. Mayer, R.E. (1992). Thinking, Problem Solving, Cognition. Second Edition, New York: W.H.

In addition, several handouts will be given in class with additional reading material. The exams will cover material from the textbook, the handouts as well as the classroom discussions/lectures.

Grading Basis. Grades will be calculated on a total point basis (100 point maximum):

EXAM 1	10/26	25 points	(multiple choice/short answer)
EXAM 2	11/30	25 points	(multiple choice/short answer)
PAPER: OUTLINE	11/2	10 points	(pass/fail)
PAPER: FIRST DRAFT	11/23	20 points	
PAPER: FINAL DRAFT	12/6	20 points	

TOTAL 100 points

Total class points	Grade	Total class points	Grade
94-100	A	74-76	C
90-93	A-	70-73	C-
87-89	B+	67-69	D+
84-86	B	64-66	D
80-83	B-	60-63	D-
77-79	C+	<=59	F

Class Schedule and Readings.

Week	Date	Topic	Readings	Activity
1	9/28	Discussion of syllabus		
	9/30	Learning by reinforcement	Ch. 2	
2	10/5	Restructuring problems	Ch. 3	
	10/7	Inductive reasoning: hypothesis testing	Ch. 4	
3	10/12	Inductive reasoning: Bayes rule	Ch. 4 + handout	
	10/14	Heuristics & Rationality	Ch. 4 + handout	
4	10/19	Inductive reasoning: Language understanding	handout	
	10/21	Computer simulation I	Ch. 6	
5	10/26	--		EXAM 1
	10/28	Computer simulation II	Ch. 6 + handout	
6	11/2	Cognitive development	Ch. 10	BRIEF OUTLINE OF PAPER DUE
	11/4	Intelligence & Creativity	Ch. 11	
7	11/9	Expert problem solving	Ch. 13	
	11/11	NO CLASS (Veteran's day)		
8	11/16	Analogical reasoning	Ch. 14	
	11/18	Problem solving & brain	Handout	
9	11/23	Moral judgment & brain	Handout	FIRST DRAFT OF PAPER DUE
	11/25	NO CLASS (Thanksgiving Day)		
10	11/30	--		EXAM 2
	12/2	Discussion about paper		
11	12/6	--		FINAL DRAFT OF PAPER DUE AT MY OFFICE BEFORE 3pm

Written Assignment.

You will have to write a paper related to problem solving and/or reasoning. It can be based on one of the topics discussed in class, the textbook, or the handouts. The paper has to adhere to APA formatting standards except that Tables and Figures can be included in the main text. Excluding the title, abstract and reference pages, the paper can be between 5-7 pages (1.5 lines or double spaced). You can choose between one of the following types of papers:

- 1) **EXPERIMENTAL STUDY.** This paper presents the results of an experimental study designed to test part of a theory or model related to problem solving or reasoning. The experiment is designed, performed, and analyzed by you. Ideally, your experiment addresses an important aspect of existing theory on problem solving and reasoning. The worst thing you can do is to exactly replicate an existing experiment. The paper will have to include the following sections:
 - a. Title page & abstract.
 - b. Introduction. What is the problem addressed in this paper? Discuss research that is related to this question.
 - c. Methods. Describe the methods used in the experiment in enough detail such that other researchers can attempt to replicate your results

- d. Results. Present a summary of your results with statistical analyses if necessary.
- e. Discussion. Interpret your results. How do your results contribute to the field of problem solving/ reasoning? What did and did not work in your experiment? What future research can be done?
- f. References. Include a list of references that were mentioned in the paper.

In order to get subjects for your experiment, you will have to be clever and persistent – you might want to ask the help of your fellow students/ friends/ family. The more subjects you can get, the better. However, sometimes valuable data can be collected with just a few subjects. This paper has to adhere to APA formatting rules.

2) **COMPUTER SIMULATION.** This paper presents the results of a computer simulation/algorithm that relates to a problem solving or reasoning task. Any type of programming language can be used for your simulations. When choosing this option, no human experimental data needs to be collected as in option 1). However, your simulation needs to be related to some aspect of human thinking in problem solving or reasoning situations. The paper will have to include the following sections:

- a. Title page & abstract.
- b. Introduction. What is the problem addressed in this paper? Discuss research related to this question.
- c. Methods. Describe your algorithm in enough detail such that other researchers can attempt to replicate your results. No source code needs to be included in the paper and the programming language itself does not (necessarily) need to be mentioned.
- d. Results. Present a summary of your results.
- e. Discussion. Interpret your results. How do your results contribute to the field of problem solving/ reasoning? What future research can be done?
- f. References. Include a list of references that were mentioned in the paper.

3) **CRITICAL REVIEW OF THEORY/MODEL.** This paper presents a critical review of a particular theory or model discussed. The theory or model does not have to have been presented in class (through a literature search, you might stumble on various interesting papers related to the material presented in class). When choosing this option, there is no need to collect experimental data or perform any computer simulation as in options 1) and 2). However, this does not make this assignment any easier because this type of paper requires a more in depth treatment of the relevant literature. The paper will need to include a title page, abstract, introduction, discussion, and reference section but besides that, the paper can be structured in any way as long as some logical exposition of the arguments is used.

The written assignment will be broken up into three phases. In phase 1, a brief outline needs to be written summarizing the plans for the paper. This outline will be approximately one page long and will be graded on a pass/fail basis. In phase 2, the first draft of the paper is due. In the first draft, all sections of the paper need to have been written and all analyses need to have been completed. A printed version of all written assignments (outline, draft, final version) need to be handed in – no emailed versions will be accepted. There will be no excuse for poor writing, grammatical errors and typographical errors. The references need to adhere to APA formatting.

More details of the written assignment will be given in class.