

# COGS 303

## RESEARCH METHODS IN COGNITIVE SYSTEMS

### Classes

**Tuesday and Thursday, 2:00PM-3:20PM;** Swing Space 109

Website: <http://www.cogsys.ubc.ca/303/>

Wiki: <http://wiki.ubc.ca/Cogs303>

### Instructor

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Meetings: By appointment.

### Teaching Assistant

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Meetings: By appointment

*We really want to hear from you - please contact us about anything!*

### Purpose

**The goal of this course is to teach you how to do effective analysis and research in the areas of Cognitive Systems.** It covers the skills and principles common to all forms of investigative analysis and research, and connects these to the contents of specialized courses (e.g. statistics), ideas about the discovery of knowledge (e.g., philosophy of science), and knowledge about human cognition. It also includes development of meta-skills such as critical thinking and effective communication, which are important not only in scientific research and analytic investigation of various kinds, but also in many aspects of everyday life.

### Structure of Classes

*This course is primarily about teaching you skills. As such, it emphasizes “hands-on” practice, both in the assignments and in the classroom exercises.*

General format of most classes: (times are approximate)

1. Context for the material – why it’s important (10 min)
2. Brief quiz on the readings (5 min)
3. Group analyses of material (30-40 min). Material submitted by students will be the basis for analysis. Composition of the groups (4-5 people per group): will change every section; selections will be announced in advance.
4. Exercise / discussion to help integrate the material (10-40 min).
5. Overview of assignment for next day’s class (5 min).
6. Real-world segment (remaining time). Various aspects of life in the “real world” of science: how to write, give presentations, find a suitable grad school, get a good job in research, etc. The contents of this segment will not be tested on the exams—the real test will be life itself.

**Please note:** You are responsible for reading assigned material **BEFORE** class. **This material is the basis of the analyses and discussions. It is important that you read it.**

Brief notes of each day's overview will be made available on the course website before class. *If the site becomes unavailable in the last few days before an exam, that exam will be unaffected: it will be assumed that you will have already obtained the notes long before the exam was held.*

## Readings

- Beveridge, WIB** (1957). *The Art of Scientific Investigation* (3<sup>rd</sup> ed.). Caldwell, NJ: Blackburn.  
- HTML: <http://www.archive.org/details/artofscientifici00beve>
- Browne MN, and Keeley SM.** (2014). *Asking the Right Questions* (11<sup>th</sup> ed). Prentice. [B&K].  
- UBC Bookstore (10th edition is also okay.)
- Heuer RJ, Jr.** (1999). *Psychology of Intelligence Analysis*.  
- HTML: <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/psychology-of-intelligence-analysis/index.html>
- COGS 303 Course Materials** (2014-2015).  
- UBC Bookstore.

## Evaluation

- a. Quizzes (15%).** A brief question about the readings covered that day; these will be asked at the beginning of most classes. Students will have 5-6 minutes to answer. Questions are straightforward; answers should be brief. **The mark for each quiz will be 0, 1/2, or 1.**
- b. Submitted Material (25%).** This is the basis for group work; it will be submitted by the midnight preceding most classes. One of two types of material will be requested; it will be collected from half the students (cohort A or cohort B) at any time:
- i. Essays (15%).** These will be  $\leq 400$  words each. Each student will hand in 4 of these over the term. A subset will be randomly selected each time for analysis.  
**Each essay will be marked (by the groups) out of 12, based on both content and style.**
  - ii. Target essays (10%).** Essays describing studies that illustrate the point of the day. These will be  $\leq 400$  words. Each student will do 2 of these, **including a presentation for each.**  
**Each target essay will be 12, 8, 4, or 0 out of 12, based on both content and style.**
- c. Analyses [groups] (15%).** Groups of 4-5 students will analyze submitted material (essays or target articles) according to the criteria discussed. *These analyses themselves will be marked.* **Only those students present during an analysis will get the mark for that analysis.**
- d. Debates [teams] (10%).** Four sessions will be held, during which teams of students will debate particular issues concerning research in Cognitive Systems. Detailed information about the form of the debates is available on the course website.
- e. Critique of research papers (10%).** Each student will find two papers on a topic from a research area of Cognitive Systems (Computer Science, Psychology, or Linguistics) and write an essay comparing the strengths and weaknesses of each.
- f. Mid-term exam (10%).** This will cover the contents of the readings and the notes posted online (whether or not they were discussed in class). Among other things, it will test the general skills developed up to that point—e.g., spotting assumptions, logical reasoning. *If you do better on the final exam than on the midterm, the mark of the final will be used for this.*
- g. Final exam (15%).** This will cover the contents of the readings and the notes posted online (whether or not they were discussed in class). It will definitely test the general skills developed.

*Remember: **Don't Panic!** If the average mark is too low, grades will be scaled so that the final distribution of grades is similar to that of other third-year courses.*

## Notes on Marks

1. **Debate teams.** You will be assigned to a team for the debates. Your mark will be based upon both your team's performance on the debates and your individual participation in the team. **Each team will submit a report regarding the division of labour** (e.g., that two members each did 90% of their share, and the third 120%). Details available on the course website.
2. **Analysis groups.** All members of a group will be given the same mark. However,
  - **members can be fired from a group at any time** (if majority agrees). Anyone fired will form their own group, and be expected to do the work of a regular group.
  - **if you are not present for an analysis, you won't get the mark for it.**
3. **Essays:** Late essays will not be accepted. They are needed for analysis during class.
4. **Critiques:** A critique will have its mark reduced to 85% of its current value for every 24-hour period (or part thereof) that it is late. This reduction is compounded for each day it is late. Critiques will not be accepted after the date of the final exam.
5. **Makeup exams:** THERE WILL BE **NO** MAKEUP EXAMS IN THIS COURSE. Only medical reasons (these include psychological and psychiatric ones) will be accepted for missing an exam. Should such an emergency arise before the exam, **you must contact the instructor for the course as soon as possible.** If you show up after an exam and inform us that you were sick, you will receive no credit unless you have official documentation. Students will NOT ordinarily be excused for work-, travel-, childcare- or sports-related activities.

Plagiarism and other forms of academic misconduct (e.g., cheating on exams) will not be tolerated.  
\*\*\* UBC policies on these (<http://www.library.ubc.ca/home/plagiarism/>) will be enforced. \*\*\*

## Three quick tips for doing well in this course

1. **Attend class.** If you must miss a class, talk to a classmate – get their lecture notes.
2. **Do the readings ahead of time, and read 'actively'** – pay attention to what you're reading, ask yourself what point(s) the author(s) is trying to make, why this matters, and so on. Read it critically. Try to apply it to the material you'll be submitting.
3. If you're having any trouble with the course, **please speak to the instructor or the TA** right away.

## Schedule of Classes & Readings

Any changes to this will be announced. It is recommended that readings be read in the order shown.

Date	Essay	Topic	Readings
<b>0. BASICS</b>			
Sep 08		(Imagine UBC)	
Sep 10		Intro to the course; mindsets	Dweck; B&K, ch. 1
<b>I. EVALUATING AN ARGUMENT</b>			
Sep 15	1-A	Belief versus knowledge	Burton; B&K, ch 2
Sep 17	1-B	Structure of arguments	B&K, ch 4; Booth et al
Sep 22	-	Meanings of terms	B&K, ch 5; Niederman & Boyum; Freedman
Sep 24	<b>T1-B</b>	<b>Presentations I - Definitions</b>	
Sep 29	2-A	Assumptions	B&K, ch. 6; Heuer, ch. 6
Oct 01	2-B	Reasoning	Taleb; B&K, ch 7
Oct 06	-	Evidence; Recap	B&K, ch. 8, pp. 106-116
Oct 08	<b>T1-A</b>	<b>Presentations II - Assumptions</b>	
<b>II. FINDING AN EXPLANATION</b>			
Oct 13	3-A	Observation and mindset	Heuer, ch. 2; Beveridge, ch. 8
Oct 15	3-B	The role of hypothesis	Heuer, ch. 4; Beveridge, ch 4
Oct 20	-	Intuition	Claxton; Beveridge, ch. 6
Oct 22		<b>Debates I - Mindsets and hypotheses</b>	
Oct 27	4-A	Imagination; Visualization	Beveridge, ch. 5; Brown
Oct 29	4-B	The role of chance	Gilovich; Abelson, pp. 1-11
Nov 3	-	Selecting among possibilities; Recap	Cadsby; Heuer, ch. 8
Nov 5		<b>Debates II - Visualization and chance</b>	
Nov 10		<b>MIDTERM EXAM</b>	
<b>III. SYSTEMATIZATION</b>			
Nov 12	-	Experiment design	Cohen
Nov 17		<b>Debates III - Classification</b>	Yoon; Mayr; Kruskal & Wish
Nov 19		<b>Debates IV - Hierarchies; Networks</b>	Simon; Barabási, pp. 55-64
Nov 26	T2-B	<b>Presentations III - Power laws</b>	Barabási, pp. 65-73, 79-92
Nov 28	T2-A	<b>Presentations IV - Research questions</b>	Meltzoff, pp. 13-30; Abelson, pp. 11-14
Dec 01		Theories & Paradigms; Recap	Beveridge, pp. 106-115; Kuhn
Dec 03	Critique	<b>Presentations; Big Picture</b>	