

Principles of Scientific Reasoning

HPS 0611

Monday 6:00 – 8:30 pm
CL 327

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Office Hours: Wednesday 4:30 - 6:30 pm, and by appointment
Webpage: <http://courseweb.pitt.edu>
Texts: *Introduction to Logic and Critical Thinking*, by Merrilee H. Salmon,
plus readings posted on the course webpage.

Course Description

What makes science *science*? That is, what separates what we call the sciences from all the other forms of human inquiry? While part of the answer has to do with the *subject matter* of science, part of it also has to do with *methodologies* or the *styles of reasoning* that are employed in the sciences. In this course, we will explore various aspects of what is usually meant by “the scientific method”.

Our main focus will be on learning the logical and analytical skills necessary for understanding scientific reasoning, detecting fallacious arguments, formulating sound arguments, and designing basic experiments. These skills include analyzing definitions, analogies, samples, and hypotheses; identifying causal relationships; and elementary logic skills. We will use a wide variety of examples from the natural and social sciences, as well as everyday life.

In addition you will be introduced to several topics in the Philosophy of Science related to scientific method, including the observable vs. theoretical distinction, biases in experimentation, the theory of scientific apparatus, and social aspects of scientific practice.

Disabilities

If you have a disability that requires special testing accommodations or other classroom modifications, please notify both the instructor and Disability Resources and Services (<http://www.drs.pitt.edu>) no later than the 2nd week of term. To notify Disability Resources and Services, call 412-648-7890 (Voice or TTD) to schedule an appointment. The Office is located in 140 William Pitt Union.

Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity (<http://www.provost.pitt.edu/info/ai1.html>). Any work handed in for a grade must be the student's own original work, external sources must be cited appropriately, and the use of unauthorized aids during quizzes and exams is strictly prohibited. If you are unsure what constitutes original work or appropriate citation, ask the instructor. Any student suspected of violating these obligations will be required to participate in the procedural process, as outlined in the Policy on Academic Integrity. Sanctions may include: a failing grade for an assignment or test, a failing grade for the course, or suspension or dismissal from the university.

Requirements and Grading

15%	Homework / Participation
8%	4 Note-taking Exercises: 2% each
2%	Essay Draft
15%	Short Essay
30%	5 Quizzes: 6% each
30%	Final Exam

98 – 100% = A+	83 – 85% = B+	73 – 75% = C+	63 – 65% = D+
90 – 97% = A	78 – 82% = B	68 – 72% = C	52 – 62% = D
86 – 89% = A-	75 – 77% = B-	65 – 67% = C-	50 – 52% = D-

All **quizzes** will be held during the **first 15 minutes of class**. In weeks without a quiz, the first 15 minutes will be spent taking up the previous week's homework exercises together on the chalkboard (answers to even-numbered exercises are in the back of the book). Your **participation grade** will be based largely on your involvement in this homework review. It is therefore important to **come to class on time** (with homework done)!

In addition to learning Scientific Reasoning, you will learn some of the **study skills** required to do well in this course (and others). These skills include **taking effective notes**, and **writing well-argued essays**. For the first 4 weeks, you will be required to hand in for a grade the notes you've taken on the readings. Hopefully you will continue to take effective notes in later weeks too! You will be required to write one **short essay**. One week before the due date, you will be required to hand in an **essay draft**.

No late assignments will be accepted. Assignments are due at the **start** of class, or if you must be absent, by e-mail **prior** to the start of class. **No makeup quizzes** will be given, except in extreme circumstances. In order to make up a quiz, evidence of the extreme circumstance will be required (such as a doctor's note). You should contact the instructor no later than 24 hours after the missed quiz to be eligible for a makeup.

If you anticipate having trouble meeting any of these requirements, please contact the instructor before it becomes a problem!

Schedule

Date	Material Covered	Homework	
Aug 25	Chapter 1 – Introduction to Arguments (skip pp. 30-39)	Ch 1: read, take notes, all exercises.	
Sept 1	NO CLASS – Labor Day	Ch 2: read, take notes, try some exercises.	Ch 1 notes due
Sept 8	Ch 2 – Definitions, Use vs. Mention (skip § IV.3.ii – IV.3.iv, and § IV.4) Ch 3 – Deductive vs. Inductive Arguments, Fallacies	Ch 2: all exercises. Ch 3: take notes, all exercises.	Ch 2 notes due
Sept 15	Topic 1: Perception & Observation, Data & Theory	T 1: take notes. Study for quiz.	Ch 3 notes due
Sept 22	Ch 4 § I, II, IV – Inductive Arguments: Syllogism, Analogy, Generalization (skip pp. 152-166)	Ch 4: read, all exercises.	QUIZ 1 T 1 notes due
Sept 29	Ch 5 – Causal Arguments, Controlled Experiments, Causal Fallacies	Ch 5: read, all exercises.	
Oct 6	Topic 2: Experimental Bias, Correlation vs. Causation	T 2: read. Study for quiz.	Essay Topics Announced
Tuesday Oct 14	Ch 7 – Confirmation of Hypotheses, Hypothetico-Deductive Method (skip § VI)	Ch 7: read, all exercises. Write essay draft.	QUIZ 2
Oct 20	Topic 3 – The Theory of Scientific Apparatus	T 3: read. Write essay.	Essay draft due
Oct 27	Ch 8 § I - IV – Elementary Logic	Ch 8 § I-IV: read, all exercises. Study for quiz.	Essay DUE
Nov 3	Ch 8 § V - VIII – Logical Argument Forms, Symbolizing English	Ch 8 § V-VIII: read, all exercises.	QUIZ 3
Nov 10	Ch 8 § IX - XII – Truth, Validity, Tautologies (skip pp. 338-340)	Ch 8 § IX-XII: read, all exercises. Study for quiz.	
Nov 17	Ch 9 – Categorical Arguments, Venn Diagrams (skip § VI, and IX.2)	Ch 9: read, all exercises.	QUIZ 4
Nov 24	Topic 4 – Questioning Rationality, Science as Social Practice	T 4: read. Study for quiz.	
Dec 1	Ch 10 – Relational Arguments, Quantifiers Exam Review	Ch 10: read, all exercises. Study for Exam.	QUIZ 5
Dec 8	FINAL EXAM		