San José State University
Philosophy 160
"Philosophy of Science"
Fall 2010

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http://www.stemwedel.org
Office Hours: Tuesday 9:00-10:00 AM,
Thursday 9:00-10:00 AM,
or by appointment.

Course website: http://www.stemwedel.org/phil160_home.html

Course Description:
This course will explore what science is, what it does, and how it works. We will examine: the features of its methodology which distinguish science from pseudo-science; how theoretical considerations and experiments interact to shape the scientific picture of the world; how scientific theories evolve and how theories from different scientific disciplines are related; and whether science does or should purport to give us a literally true picture of the world. We will consider not only what is peculiar to the culture of science, but also how this scientific culture fits into the culture of the larger society.

Prerequisites: Completion of core GE requirements, upper division standing, completion of WST, successful completion of, or co-registration in, a 100W course.

Course requirements:

Reading responses. For 5 of the reading assignments, you will be asked to write a short essay (1 typed, double-spaced page, approximately 400 words) engaging with some issue or issues in the reading. (Specific instructions for the reading response assignments will be distributed in class.) The goal of these assignments is to help you read in an active, engaged way, and to encourage you to develop your own view about these issues. Your reading responses will be graded on the basis of content as well as grammar, clarity, conciseness, and coherence. Reading responses are due in class on the dates listed in the program. **No late reading responses will be accepted**, but I will drop your lowest reading response grade before calculating your final grade. Taken together, the reading responses will count for 25% of your course grade.

Exams. There will be a midterm and a final exam for this course. The exams are intended to evaluate your grasp of material from assigned readings, lecture, and class discussions. Each exam will include shorter objective items (e.g., definitions of key terms) and longer essays that will require that you reflect critically on the course material. More details on the format and content of these exams will be distributed later in the term. The midterm exam will count for 20% of the course grade and the final exam will count for 30% of the course grade.

Research assignment. There will be an assignment that requires you to find articles from the popular and scholarly scientific literature, analyze these articles, develop an annotated bibliography, and write a discussion of the different patterns of communication in popular and

scholarly scientific articles. (Specific instructions for this research assignment will be distributed in class.) The research assignment (the final write-up plus the preliminary stages of the assignment) will count for 15% of your course grade.

Class participation. Dialogue and discussion will play an important role in our project of analyzing and assessing the central issues of the course raised in reading assignments and lectures. Therefore, I expect that you will come to class with your books, having done the readings and thought about the issues they raise *before* our class meetings, and ready to participate in general discussion, in-class writing exercises, and periodic small group exercises. Your class participation will count for 10% of your course grade.

Grading:

Reading responses:	25%
Midterm exam:	20%
Final exam:	30%
Research assignment:	15%
Class participation:	10%
Total:	100%

Your marks on assignments will be converted to percentages (e.g., 15/20 = 75%) and used to compute letter grades as follows:

A+	98-100%	B+	87-89%	C+	77-79%	D+	67-69%
A	93-97%	B	83-86%	C	73-76%	D	60-66%
A-	90-92%	B-	80-82%	C-	70-72%	F	0-59%

Academic Honesty. I expect you to be familiar with university policies on plagiarism, cheating, and other forms of academic dishonesty. As well, I expect you to understand the difference between proper attribution of the words and ideas of others and plagiarism. If you do not understand the difference, please make an appointment with me to discuss proper attribution as soon as possible. **Plagiarism or cheating will result in a failing grade in this course, and offenders may be subject to further administrative sanctions.**

Official academic integrity statement from the Office of Judicial Affairs:
"Your own commitment to learning, as evidenced by your enrollment at San Jose State University, and the University's Integrity Policy, require you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Judicial Affairs. The policy on academic integrity can be found at:
http://www.sjsu.edu/senate/S07-2.pdf"

If you need course adaptations or accommodations because of a disability, or if you have emergency medical information to share with me, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours.

Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the DRC to establish a record of their disability.

AREA R GOALS AND CONTENT:

This course fulfils Area R of upper division GE. The goals of this course are for students to cultivate knowledge of the scientific study of the physical universe and its life forms and to understand and appreciate the interrelationship of science and human beings to each other.

Diversity: This course considers a diverse range of perspectives on philosophy of science, including feminist philosophy of science. (This is covered in Unit 6)

Writing: The reading response essays, research assignment (including online discussions), and essay questions on the midterm and final exams will require a total of more than 5000 words of writing.

STUDENT LEARNING OBJECTIVES FOR AREA R:

In this course, students are expected to acquire certain upper-level General Education competencies. In particular, they should be able to:

1. "demonstrate an understanding of the methods and limits of scientific investigation": This is the topic of the entire course, and students will demonstrate their understanding of various aspects of the methods and limits of scientific investigation in their writing assignments and exams.

2. "distinguish science from pseudo-science": We touch on this theme throughout the course, but especially in our discussion of Popper in Unit 4. Students will have the opportunity to demonstrate this particular competency in the "Science or Pseudo-Science?" in-class activity and on midterm and final exams.

3. "apply a scientific approach to answer questions about the earth and environment": This competency is one of the main themes of the course, especially in Unit 3. Students will demonstrate their ability to apply a scientific approach in each of the in-class group tasks over the course of the semester.

Required Texts:
Peter Godfrey-Smith, *Theory and Reality: an Introduction to the Philosophy of Science* (PGS)

Philosophy 160 Course Reader (CR) — *available for purchase at Maple Press*

PROGRAM:

*Reading assignments are **due** on the dates for which they are listed.*

Th-Aug. 26 FIRST CLASS; introductory remarks.

1. The Scientific Method:
To be discussed: What makes science different from other human activities? What does science do? What does science achieve?

Tu-Aug. 31 PGS, Ch. 1 "Introduction" (1-18).
Stephen S. Carey, "Science," from *A Beginner's Guide to the Scientific Method* (1-7) **CR**
Carl Hempel, *Philosophy of Natural Science*, 2.1-2.2 (3-9) **CR**

2. Logical Empiricism:
To be discussed: What roles do logic and empiricism play in science? How did the logical positivists and logical empiricists understand science?

Th-Sep. 2 PGS, Ch. 2 "Logic Plus Empiricism" (19-38).

Tu-Sep. 7 Herbert Feigl, "Logical Empiricism" **CR**
Recommended: Peter Galison, "Aufbau/Bauhaus: Logical Positivism and Architectural Modernism" **CR**

3. Induction and Confirmation, Theory and Experiment:
To be discussed: What can an experiment tell us about the world? How are scientific theories tested? Can I prove the sun will rise tomorrow?

Th-Sep. 9 PGS, Ch. 3 "Induction and Confirmation" (39-56).
David Hume, *An Enquiry Concerning Human Understanding*, §IV **CR**

Tu-Sep. 14 Hempel, *Philosophy of Natural Science*, 2.3 (10-18) **CR**
Hempel, *Philosophy of Natural Science*, 3.1-3.5 (19-32) **CR**

Reading response #1 due.

Th-Sep. 16 Pierre Duhem, "Physical Theory and Experiment" **CR**

Tu-Sep. 21 W.V. Quine, "Two Dogmas of Empiricism" **CR**

4. Popper and Falsification:
To be discussed: What is the distinguishing mark of scientific activity? How do we distinguish science from pseudo-science? Does the problem of induction make science impossible?

Th-Sep. 23 PGS, Ch. 4 "Popper: Conjecture and Refutation" (57-74).

Tu-Sep. 28 Karl Popper, "Science: Conjectures and Refutations" **CR**
Popper, "The Problem of Induction" (426-432) **CR**
Recommended: Carey, "Fallacies in the Name of Science" (107-126) **CR**

Reading response #2 due.

5. Kuhn and Scientific Theory Change:
To be discussed: What role does theory play in the everyday practice of science? How do scientists choose between competing scientific theories? Are observations objective? Is theory choice rational?

Th-Sep. 30 PGS, Ch. 5 "Kuhn and Normal Science" (75-86).
Thomas S. Kuhn, *The Structure of Scientific Revolutions*, Ch. II, "The Route to Normal Science" (10-22) **CR**

Tu-Oct. 5 Kuhn, SSR, Ch. III, "The Nature of Normal Science" (23-34) **CR**
Kuhn, SSR, Ch. IV, "Normal Science as Puzzle-solving" (35-42) **CR**
Recommended: Kuhn, SSR, "Postscript," §§1-3 (176-191) **CR**
Recommended: Margaret Masterman, "The Nature of a Paradigm" **CR**

Reading response #3 due.

Th-Oct. 7 PGS, Ch. 6 "Kuhn and Revolutions" (87-101).
Kuhn, SSR, Ch. X, "Revolutions as Changes of World View" (111-135) **CR**

Tu-Oct. 12 PGS, Ch. 7 "Lakatos, Laudan, Feyerabend, and Frameworks" (102-121).

Th-Oct. 14 Catch up/review.

Tu-Oct. 19 **MIDTERM EXAM**

6. What Do Social Factors Have to Do with Science?
To be discussed: How does the nature of the scientific community affect the scientific knowledge it produces? Are scientific facts discovered or created? How can we achieve objective knowledge of the world?

Th-Oct. 21 PGS, Ch. 8 "The Challenge from Sociology of Science" (122-135).
Recommended: Barry Barnes and David Bloor, "Relativism, Rationalism, and the Sociology of Knowledge" **CR**

Tu-Oct. 26 PGS, Ch. 9 "Feminism and Science Studies" (136-148).
The Biology and Gender Study Group, "The Importance of Feminist Critique for Contemporary Cell Biology" **CR**
Helen E. Longino "Values and Objectivity" **CR**

Reading response #4 due.

7. Naturalism:
To be discussed: What connection should philosophical theories have to scientific theories? What can science tell us about our philosophical accounts of science? What kind of connection to the world can science give us?

Th-Oct. 28 PGS, Ch. 10 "Naturalistic Philosophy in Theory and Practice" (149-162).

Tu-Nov. 2 PGS, Ch. 11 "Naturalism and the Social Structure of Science" (163-172).

Th-Nov. 4 RESEARCH DAY (Class will not meet, *but* you can use the classroom to meet with your Journal Club group.)

8. Scientific Realism and Anti-Realism:
To be discussed: Must a good theory be a true theory? Should a theory make claims about entities we can't observe? What counts as observation?

Tu-Nov. 9 PGS, Ch. 12 "Scientific Realism" (173-189).

Th-Nov. 11 VETERANS DAY (Class will not meet.)

Tu-Nov. 16 Grover Maxwell, "The Ontological Status of Theoretical Entities" **CR**

Th-Nov. 18 Bas C. Van Fraassen, "Arguments Concerning Scientific Realism" **CR**

Reading response #5 due.

Tu-Nov. 23 Ian Hacking, "Do We See Through a Microscope?" **CR**
Charles Chihara and Carol Chihara, "A Biological Objection to Constructive Empiricism" **CR**

Th-Nov. 25 THANKSGIVING (Class will not meet.)

Tu-Nov. 30 WHOLE-CLASS DISCUSSION OF JOURNAL CLUB FINDINGS

9. Explanation:
To be discussed: Does science explain? What does a good scientific explanation look like?

Th-Dec. 2 PGS, Ch. 13 "Explanation" (190-201).
Carey, "Proposing Explanations" (26-44) **CR**

Tu-Dec. 7 Carl G. Hempel and Paul Oppenheim, "Studies in the Logic of Explanation" **CR**
Nancy Cartwright, "The Truth Doesn't Explain Much" **CR**

Th-Dec. 9 WRAP-UP/REVIEW

Journal Club Analysis and Annotated Bibliography due.

FINAL EXAM:
Phil 160 sec 01 (10:30 class): Friday, Dec. 17, 9:45 AM-12:00 noon
Phil 160 sec 02 (1:30 class): Monday, Dec. 13, 12:15-2:30 PM

JOURNAL CLUB TIMELINE:

Log in to Desire2Learn by Sep. 20.

Check in with your Journal Club group by Sep. 27.

Locate articles and post to your group by Oct. 18.

Begin discussing articles in online discussion by Oct. 25.

Start organizing findings by Nov. 1.

Discuss preliminary analysis in class on Tues. Nov. 30.

Final analysis and annotated bibliography due by class time Thurs. Dec. 9.