

**San José State University  
Philosophy 160 section 03  
“Philosophy of Science”**

**Spring 2014**

**Contact Information**

<b>Instructor:</b>	Janet D. Stemwedel
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<b>Office Hours:</b>	Tuesdays and Thursdays 9:00-10:00, 1:30-2:30, or by appointment
<b>Class Days/Time:</b>	Tuesdays and Thursdays 12:00-1:15
<b>Classroom:</b>	Clark Hall 234
<b>Prerequisites:</b>	Completion of core GE requirements, upper division standing, successful completion of WST. 100W is a prerequisite or co-requisite for the course
<b>GE/SJSU Studies Category:</b>	R (Earth & Environment)

**Faculty Web Page and MYSJSU Messaging**

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my web page at [http://www.stemwedel.org/phil160\\_home](http://www.stemwedel.org/phil160_home) . You are responsible for regularly checking with the messaging system through MySJSU to learn any updates.

**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.

## **Course Goals and Learning Objectives**

### **GE Learning Outcomes (GELO)**

This course fulfills 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.

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/Readings**

### **Textbook (available at Spartan Book Store and from online book sellers)**

Peter Godfrey-Smith, *Theory and Reality: An Introduction to the Philosophy of Science*  
(PGS)  
ISBN 9780226300634

### **Philosophy 160 Course Reader (CR)**

Available online (via Canvas) or for purchase (print-on-demand)  
at Maple Press (481 E. San Carlos Street, 408-297-1001)

## Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on.

**Short essays.** For 4 of the reading assignments, you will be asked to write a short essay (2 typed, double-spaced pages, approximately 500 words) engaging with some issue or issues in the reading. (Specific instructions for the short essays will be posted on the course web site.) 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 short essays will be graded on the basis of content as well as grammar, clarity, conciseness, and coherence. Short essays are due in class on the dates listed in the program. **No late essays will be accepted**, but I will drop your lowest short essay grade before calculating your final grade. Taken together, the short essays 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 25% 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 20% of your course grade.

**Class participation:** Because dialogue and discussion are central to philosophy, you cannot pass a philosophy class without a passing grade in class participation. Class participation presupposes attendance. Generally, students who miss more than three weeks of class are unlikely to be able to earn sufficient class participation credit to receive a passing participation grade and will therefore fail the course.

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 Policy

Short essays:	25%
Research assignment:	20%
Midterm exam:	20%
Final exam:	25%
<u>Class participation:</u>	<u>10%</u>
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+ = 100-97%	A = 96-93%	A- = 92-90%
B+ = 89-87%	B = 86-83%	B- = 82-80%
C+ = 79-77%	C = 76-73%	C- = 72-70%
D+ = 69-67%	D = 66-63%	D- = 62-60%
F = 59-0% Unsatisfactory		

“A minimum aggregate GPA of 2.0 SJSU Studies (R, S, & V) shall be required of all students as a graduation requirement.” To see full text, review [University Policy S11-3](http://www.sjsu.edu/senate/docs/S11-3) at <http://www.sjsu.edu/senate/docs/S11-3.pdf>.

## Classroom Protocol

1. Treat class meetings as a serious commitment. When you are not in class, you miss material, and we miss your questions and comments.
2. Being in class means more than just being a warm body in a chair. Prepare for class by doing assigned readings, thinking hard about this reading, and making a list of questions you have about them or issues you hope to clarify in class. Bring your books with you to class. Participate in class by listening to the lecture, listening to your classmates, taking notes, asking questions, answering questions, participating fully in any class activities, and thinking.
3. Arrive and be ready to go by the official start time, and stay until the conclusion of the class meeting. Wandering in (or out) partway through disrupts the flow of the class. Budget extra time for parking if you need to!
4. If at all possible, don't schedule appointments (medical check-ups, job interviews, club meetings, etc.) during class time.
5. Turn OFF your cell phone during class time. Don't use your laptop for non-class-related purposes during our class meeting.
6. If you must miss class, it is YOUR responsibility to make up the material you missed. Ask a classmate if you may copy his/her notes.
7. If you miss class on a day when an assignment is due, it is still YOUR responsibility to make sure the assignment is turned in to me by class time.

## **University Policies**

### **Dropping and Adding**

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at [http://www.sjsu.edu/provost/services/academic\\_calendars/](http://www.sjsu.edu/provost/services/academic_calendars/). The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

### **Consent for Recording of Class and Public Sharing of Instructor Material**

[University Policy S12-7](http://www.sjsu.edu/senate/docs/S12-7.pdf), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course.

Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material. If you wish to record a class presentation, or specific material from the course, please discuss the specific request with me, and I will approve or deny your request at that time.

Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without specific and explicit instructor consent.

### **Academic integrity**

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.pdf> requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade (F) for the course and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

## **Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, 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](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at [http://www.sjsu.edu/president/docs/directives/PD\\_1997-03.pdf](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

## **Student Technology Resources**

Computer labs for student use are available in the [Academic Success Center](http://www.sjsu.edu/at/asc/) at <http://www.sjsu.edu/at/asc/> located on the 1st floor of Clark Hall and in the Associated Students Lab on the 2nd floor of the Student Union. Additional computer labs may be available in your department/college. Computers are also available in the Martin Luther King Library.

A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include DV and HD digital camcorders; digital still cameras; video, slide and overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones, projection screens and monitors.

## **SJSU Peer Connections**

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10<sup>th</sup> and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit [Peer Connections website](http://peerconnections.sjsu.edu) at <http://peerconnections.sjsu.edu> for more information.

## **SJSU Writing Center**

The SJSU Writing Center is located in Clark Hall, Suite 126. All Writing Specialists have gone through a rigorous hiring process, and they are well trained to assist all students at all levels within all disciplines to become better writers. In addition to one-on-one tutoring services, the Writing Center also offers workshops every semester on a variety of writing topics. To make an appointment or to refer to the numerous online resources offered through the Writing Center, visit the [Writing Center website](http://www.sjsu.edu/writingcenter) at <http://www.sjsu.edu/writingcenter>. For additional resources and updated information, follow the Writing Center on Twitter and become a fan of the SJSU Writing Center on



Facebook. (Note: You need to have a QR Reader to scan this code.)

## **SJSU Counseling Services**

The SJSU Counseling Services is located on the corner of 7<sup>th</sup> Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit [Counseling Services website](http://www.sjsu.edu/counseling) at <http://www.sjsu.edu/counseling>.

## PHIL 160, Philosophy of Science, Spring 2014 Course Schedule

*This schedule is subject to change with fair notice (i.e., by announcement in class and via MySJSU email messaging).*

### Course Schedule

Class	Date	Topics, Readings, Assignments, Deadlines
1	23 January.	FIRST CLASS; introductory remarks.
2	28 January.	<p><u>The Scientific Method:</u>  <b>To be discussed:</b> What makes science different from other human activities? What does science do? What does science achieve?</p> <p>PGS, Ch. 1 “Introduction” (1-18).            Stephen S. Carey, “Science,” from <i>A Beginner’s Guide to the Scientific Method</i> (1-7) <b>CR</b>            Carl Hempel, <i>Philosophy of Natural Science</i>, 2.1-2.2 (3-9) <b>CR</b></p>
3	30 January.	<p><u>Logical Empiricism:</u>  <b>To be discussed:</b> What roles do logic and empiricism play in science? How did the logical positivists and logical empiricists understand science?</p> <p>PGS, Ch. 2 “Logic Plus Empiricism” (19-38).</p>
4	4 February.	<p>Herbert Feigl, “Logical Empiricism” <b>CR</b>  <i>Recommended:</i> Peter Galison, “Aufbau/Bauhaus: Logical Positivism and Architectural Modernism” <b>CR</b></p>
5	6 February.	<p><u>Induction and Confirmation, Theory and Experiment:</u>  <b>To be discussed:</b> What can an experiment tell us about the world? How are scientific theories tested? Can I prove the sun will rise tomorrow?</p> <p>PGS, Ch. 3 “Induction and Confirmation” (39-56).            David Hume, <i>An Enquiry Concerning Human Understanding</i>, §IV <b>CR</b></p>
6	11 February.	<p>Hempel, <i>Philosophy of Natural Science</i>, 2.3 (10-18) <b>CR</b>            Hempel, <i>Philosophy of Natural Science</i>, 3.1-3.5 (19-32) <b>CR</b></p> <p style="text-align: center;"><i>Short essay #1 due.</i></p>



Class	Date	Topics, Readings, Assignments, Deadlines
7	13 February.	Pierre Duhem, "Physical Theory and Experiment" <b>CR</b>
8	18 February.	W.V. Quine, "Two Dogmas of Empiricism" <b>CR</b>
9	20 February.	<u>Popper and Falsification:</u> <b>To be discussed:</b> What is the distinguishing mark of scientific activity? How do we distinguish science from pseudo-science? Does the problem of induction make science impossible?  PGS, Ch. 4 "Popper: Conjecture and Refutation" (57-74).
10	25 February.	Karl Popper, "Science: Conjectures and Refutations" <b>CR</b> Popper, "The Problem of Induction" (426-432) <b>CR</b> <i>Recommended:</i> Carey, "Fallacies in the Name of Science" (107-126) <b>CR</b>
11	27 February.	<u>Kuhn and Scientific Theory Change:</u> <b>To be discussed:</b> 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?  PGS, Ch. 5 "Kuhn and Normal Science" (75-86). Thomas S. Kuhn, <i>The Structure of Scientific Revolutions</i> , Ch. II, "The Route to Normal Science" (10-22) <b>CR</b>  <b>Class will not meet. Do reading, watch streaming lecture, and participate in required discussion on Canvas.</b>
12	4 March.	Kuhn, SSR, Ch. III, "The Nature of Normal Science" (23-34) <b>CR</b> Kuhn, SSR, Ch. IV, "Normal Science as Puzzle-solving" (35-42) <b>CR</b> <i>Recommended:</i> Kuhn, SSR, "Postscript," §§1-3 (176-191) <b>CR</b> <i>Recommended:</i> Margaret Masterman, "The Nature of a Paradigm" <b>CR</b>  <i>Short essay #2 due.</i>
13	6 March.	PGS, Ch. 6 "Kuhn and Revolutions" (87-101). Kuhn, SSR, Ch. X, "Revolutions as Changes of World View" (111-135) <b>CR</b>

<b>Class</b>	<b>Date</b>	<b>Topics, Readings, Assignments, Deadlines</b>
14	11 March.	PGS, Ch. 7 “Lakatos, Laudan, Feyerabend, and Frameworks” (102-121).
15	13 March.	Catch up/review.
16	18 March.	<b>MIDTERM EXAM</b>
17	20 March.	<p><u>What Do Social Factors Have to Do with Science?</u></p> <p><b>To be discussed:</b> 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?</p> <p>PGS, Ch. 8 “The Challenge from Sociology of Science” (122-135).  <i>Recommended:</i> Barry Barnes and David Bloor, “Relativism, Rationalism, and the Sociology of Knowledge” <b>CR</b></p>
18	1 April.	<p>PGS, Ch. 9 “Feminism and Science Studies” (136-148).  The Biology and Gender Study Group, “The Importance of Feminist Critique for Contemporary Cell Biology” <b>CR</b>  Helen E. Longino “Values and Objectivity” <b>CR</b></p> <p style="text-align: center;"><i>Short essay #3 due.</i></p>
19	3 April.	RESEARCH DAY (Class will not meet)
20	8 April.	<p><u>Naturalism:</u></p> <p><b>To be discussed:</b> 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?</p> <p>PGS, Ch. 10 “Naturalistic Philosophy in Theory and Practice” (149-162).</p>
21	10 April.	PGS, Ch. 11 “Naturalism and the Social Structure of Science” (163-172).
22	15 April.	<p><u>Scientific Realism and Anti-Realism:</u></p> <p><b>To be discussed:</b> Must a good theory be a true theory? Should a theory make claims about entities we can’t observe? What counts as observation?</p> <p>PGS, Ch. 12 “Scientific Realism” (173-189).</p>

<b>Class</b>	<b>Date</b>	<b>Topics, Readings, Assignments, Deadlines</b>
23	17 April.	RESEARCH DAY (Class will not meet)
24	22 April.	Grover Maxwell, "The Ontological Status of Theoretical Entities" <b>CR</b>
25	24 April.	Bas C. Van Fraassen, "Arguments Concerning Scientific Realism" <b>CR</b>
26	29 April.	Ian Hacking, "Do We See Through a Microscope?" <b>CR</b> Charles Chihara and Carol Chihara, "A Biological Objection to Constructive Empiricism" <b>CR</b>  <i>Short essay #4 due.</i>
27	1 May.	WHOLE-CLASS DISCUSSION OF JOURNAL CLUB FINDINGS
28	6 May.	<u>Explanation:</u> <b>To be discussed:</b> Does science explain? What does a good scientific explanation look like?  PGS, Ch. 13 "Explanation" (190-201). Carey, "Proposing Explanations" (26-44) <b>CR</b>
29	8 May.	Carl G. Hempel and Paul Oppenheim, "Studies in the Logic of Explanation" <b>CR</b> Nancy Cartwright, "The Truth Doesn't Explain Much" <b>CR</b>
30	13 May.	WRAP-UP/REVIEW  <i>Journal Club Analysis and Annotated Bibliography due.</i>
Final Exam	20 May.	9:45 – 12:00 in Clark Hall 234