San José State University
Philosophy Department
Philosophy 160 Section 02
Philosophy of Science
Spring 2018

Course and Contact Information

Instructor:	Krupa Patel
Office Location:	Faculty Office Building 208
Email:	krupa.patel@sjsu.edu
Office Hours:	Tuesday and Thursday 12:30pm-1:30pm or by appointment
Class Days/Time:	Tuesday and Thursday 10:30am-11:45am
Classroom:	BBC 222
Prerequisites:	Completion of core GE requirements, upper division standing, successful completion of WST. 100W is a prerequisite or co-requisite for the course
GE/SJSU Studies Category:	R (Earth and Environment)

Course Format

The course will include lectures and discussions.

Course materials such as syllabus, additional reading assignments, handouts, writing assignments, assignment instructions, etc. can be found on the *Canvas Leaning Management System course login website at http://sjsu.instructure.com.*You are responsible for regularly checking with the messaging system through *MySJSU at http://my.sjsu.edu* (or other communication system as indicated by the instructor) to learn of 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 Outcomes

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 Chapter 8 and 9)

Writing: The reading response essays, research assignment, in-class writing and/or online discussions, and essay questions on the midterm and final exams will require more than 3000 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, research assignment, and exams.

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

3. "apply a scientific approach to answer questions about the earth and environment": This competency is one of the main themes of the course. Students will demonstrate their ability to apply a scientific approach in the research assignment.

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

Other Sources:

Additional course readings, (**CR**) will be available on Canvas.

Course Requirements and Assignments

"Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practice. Other course structures will have equivalent workload expectations as described in the syllabus."

For additional information please refer to:

Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

Reading Assignments:

Peter Godfrey-Smith, *Theory and Reality: An Introduction to the Philosophy of Science* (**PGS**) and additional course readings **(CR)**
There will be daily reading assignments. It is important that you critically engage with the readings. Please read carefully and thoroughly.

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 Canvas.) 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. The short essays will be worth 20 points each.

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 50 points and the final exam will count for 60 points.

Exam Dates are listed below:

Midterm Exam: Day: Tuesday, March 20, 2018
Time: 10:30am-11:45am

Final Exam: Day: Tuesday, May 22, 2018
Time: 9:45am-12:00pm

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 50 points.

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 25 points of your course grade.

Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.

Grading Policy:

Total points for Short Essay: 60 points
Total points for Midterm Exam: 50
Total points for Final Exam: 60
Total points for Research Assignment: 50
Total points for Participation: 25 points

TOTAL points possible: 245 points

All scores are numerical and I expect to assign letter grades on a standard percentile basis (i.e., 100-90 = high to low A; 89-80 = high to low B; and so on).

For upper division courses (R, S, V):
Passage of the Writing Skills Test (WST) or ENGL/LLD 100A with a C or better (C- not accepted), and completion of Core General Education are prerequisite to all SJSU Studies courses. Completion of, or co-registration in, 100W is strongly recommended. A minimum aggregate GPA of 2.0 in GE Areas R, S, & V shall be required of all students.

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. 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

"**University Policies:** Office of Graduate and Undergraduate Programs **maintains university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc.**"
You may find all syllabus related University Policies and resources information listed on GUP's Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

General Expectations, Rights and Responsibilities of the Student

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU's policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises. To learn important campus information, view University Policy S16-15 at http://www.sjsu.edu/senate/docs/S16-15.pdf and SJSU current semester's Policies and Procedures, at http://info.sjsu.edu/static/catalog/policies.html. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not address the issue, it is recommended that the student contact the Department Chair as the next step.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. The Late Drop 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 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, 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 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 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 is available at http://www.sjsu.edu/studentconduct/.

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 at 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 (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 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' free tutoring and mentoring is designed to assist students in the development of their full academic potential and to inspire them to become independent learners. Peer Connections tutors are trained to provide content-based tutoring in many lower division courses (some upper division) as well as writing and study skills assistance. Small group and individual tutoring are available. Peer Connections mentors are trained to provide support and resources in navigating the college experience. This support includes assistance in learning strategies and techniques on how to be a successful student. Peer Connections has a learning commons, desktop computers, and success workshops on a wide variety of topics. For more information on services, hours, locations, or a list of current workshops, please visit Peer Connections website 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 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.)

PHIL 160, Philosophy of Science, Spring 2018
Tentative Course Schedule

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

Class	Date	Topics, Readings, Assignments, Deadlines
1	Jan. 25	Introductory Remarks Read/Discuss Syllabus What is Philosophy of Science?
2	Jan. 30	The Scientific Method: **To be discussed:** What makes science different from other human activities? What does science do? What does science achieve? **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**

Class	Date	Topics, Readings, Assignments, Deadlines
3	Feb. 1	Logical Empiricism: **To be discussed:** What roles do logic and empiricism play in science? How did the logical positivists and logical empiricists understand science? **PGS**, Ch. 2 "Logic Plus Empiricism" (19-38).
4	Feb. 6	Herbert Feigl, "Logical Empiricism" **CR**
5	Feb. 8	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? **PGS**, Ch. 3 "Induction and Confirmation" (39-56). David Hume, *An Enquiry Concerning Human Understanding*, §IV **CR**
6	Feb. 13	Hempel, *Philosophy of Natural Science*, 2.3 (10-18) **CR** Hempel, *Philosophy of Natural Science*, 3.1-3.5 (19-32) **CR** ***Short essay #1 due.***
7	Feb. 15	Pierre Duhem, "Physical Theory and Experiment" **CR**
8	Feb. 20	W.V. Quine, "Two Dogmas of Empiricism" **CR**
9	Feb. 22	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? **PGS**, Ch. 4 "Popper: Conjecture and Refutation" (57-74).
10	Feb. 27	Karl Popper, "Science: Conjectures and Refutations" **CR** Popper, "The Problem of Induction" (426-432) **CR**
11	Mar. 1	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? **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**

Class	Date	Topics, Readings, Assignments, Deadlines
12	Mar. 6	Kuhn, SSR, Ch. III, "The Nature of Normal Science" (23-34) **CR** Kuhn, SSR, Ch. IV, "Normal Science as Puzzle-solving" (35-42) **CR** ***Short essay #2 due.***
13	Mar. 8	**PGS**, Ch. 6 "Kuhn and Revolutions" (87-101). Kuhn, SSR, Ch. X, "Revolutions as Changes of World View" (111-135) **CR**
14	Mar. 13	**PGS**, Ch. 7 "Lakatos, Laudan, Feyerabend, and Frameworks" (102-121).
15	Mar. 15	Catch up/review
16	Mar. 20	**MIDTERM EXAM**
17	Mar. 22	<u>What Do Social Factors Have to Do with Science?</u> **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? **PGS**, Ch. 8 "The Challenge from Sociology of Science" (122-135).
18	Apr. 3	**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** ***Short essay #3 due.***
19	Apr. 5	Research Assignment discussion/small-group activity
20	Apr. 10	<u>Naturalism</u>: **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? **PGS**, Ch. 10 "Naturalistic Philosophy in Theory and Practice" (149-162).
21	Apr. 12	**PGS**, Ch. 11 "Naturalism and the Social Structure of Science" (163-172).
22	Apr. 17	<u>Scientific Realism and Anti-Realism</u>:

Class	Date	Topics, Readings, Assignments, Deadlines
		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? **PGS**, Ch. 12 "Scientific Realism" (173-189).
23	Apr. 19	Research Assignment/Small Group Activity
24	Apr. 24	Grover Maxwell, "The Ontological Status of Theoretical Entities" **CR**
25	Apr. 26	Bas C. Van Fraassen, "Arguments Concerning Scientific Realism" **CR**
26	May 1	Ian Hacking, "Do We See Through a Microscope?" **CR** Charles Chihara and Carol Chihara, "A Biological Objection to Constructive Empiricism" **CR** ***Short essay #4 due.***
27	May 3	<u>Explanation</u>: **To be discussed:** Does science explain? What does a good scientific explanation look like? PGS, Ch. 13 "Explanation" (190-201). Carey, "Proposing Explanations" (26-44) **CR**
28	May 8	Carl G. Hempel and Paul Oppenheim, "Studies in the Logic of Explanation" **CR** Nancy Cartwright, "The Truth Doesn't Explain Much" **CR**
29	May 10	Review For Final Exam **Research Assignment Due**
Final Exam	May 22	Time: 9:45am-12:00pm BBC: 222