**PHIL 125. PHILOSOPHY OF SCIENCE**

**Spring 2024. Online Asynchronous**

**Instructor:**  Manuel Barrantes ([barrantes@csus.edu](mailto:barrantes@csus.edu); 540.246.8822)

**In-Person Office Hours:** Thursdays 11am-1pm (Mendocino Hall 3022)

**Online Office Hours:** Mondays & Fridays 1:15-1:45pm; Thursdays 11am-1pm; and by appointment.

(<https://csus.zoom.us/j/5268471798>)

**Credit hours:**  3WTU

**I. Course Description**

CATALOG DESCRIPTION: Study of the philosophical problems that arise in the sciences: the nature of scientific reasoning, the limits and styles of explanation, identifying pseudoscience, values in science, unity and diversity of the sciences, and science's impact on our world view.

The course is divided in three units, each of which addresses one conceptual aspect of the philosophy of science: Unit one, ‘Science, Pseudoscience & Science Skepticism’, focuses on the problem of differentiating science from pseudoscience, and the reasons to trust science. Unit two, ‘Scientific Inference’, is a historical and analytical study of the different patterns of inference used in scientific inquiry. Unit three, ‘Scientific Realism’, focuses on whether one should believe in the existence of the unobservable entities and processes posited by our best scientific theories. You do not need to have scientific or philosophical background to succeed in this course, but you are expected to be willing to understand and use scientific examples and philosophical arguments. All readings will be posted on canvas.

**II. Methodology**

Every unit has five modules. Each module consists of two or three readings (my lecture notes and one or two articles by another author), two video lectures, and three quizzes. To keep up with the course, every week you must complete at least one module. In addition, some weeks you must also contribute to a discussion and submit a test. Deadlines for quizzes, tests and discussions are specified in the schedule below. There will also be a ‘syllabus quiz’ (which you must take after reading the syllabus and watching the introductory video), and a ‘presentation discussion’ (where you must introduce yourself), both due on *1/30*. Office hours will be held during the times outlined above. You do not need an appointment to come to regular office hours, but you may have to wait if I am with another student. If you can’t make it to office hours, contact me and we will set up an appointment. Appointments should be scheduled a week in advance. Communication will be via Canvas announcements and Canvas email. You should expect a reply to your email within 48 hours for business days only (Mon-Fri 9AM-5PM). If you don’t hear a response from me within this time, only then should you send me another follow up email.

**III. Learning OUTCOMES**

*1. Philosophy:*

* You will learn the concepts necessary to understand some of the most important debates in current philosophy of science.
* You will learn to write philosophy papers.
* You will learn to evaluate philosophical arguments.

#### 2. General education: This course satisfies GE area B-5 (upper level scientific and mathematical literacy). The specific learning objectives of Area B-5 covered in this class are:

* Cite critical observations, underlying assumptions and limitations to explain and apply important ideas and models in one or more of the following: physical science, life science, mathematics, or computer science.
* Recognize evidence-based conclusions and form reasoned opinions about science-related matters of personal, public and ethical concern.

**IV. Course Requirements**

*Absolutely no makeups for discussions or quizzes. Late tests and papers will receive a 1/3 letter-grade penalty, unless you provide a documented justification.*

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| **%** | **Assignments** | **Description** |
| 30% | 46 quizzes | Short quizzes on the articles, lectures, and class notes. The quizzes consist of 10 multiple choice questions, most of them ‘true/false’. Once you open a quiz, you will have *7 minutes* to finish it. The lowest 6 grades will be dropped. |
| 10% | 7 discussions | In the first discussion you must briefly introduce yourself. In the next three discussions you must post a comment about one of the *articles* (not the class notes) from the corresponding unit and react to one of your classmates’ comments. Comment samples and guidelines will be posted on canvas. The lowest 2 grades will be dropped. |
| 40% | Tests 1 &2 | These tests cover units 1 & 2 respectively. Once you open the canvas link, you will have *60 minutes* to submit your test. More details will be posted on Canvas. |
| 20% | Test 3 (Paper) | You must write a paper on canvas. Once you open the canvas link, you will have 90 minutes to submit your paper. You will be given two topics to choose from (both from unit 3). You will then get some questions, whose answers correspond to the parts of a short paper. The paper, as a whole, will receive one letter-grade. More details will be posted on Canvas |

**V. COURSE GRADING SCALE (%)**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A | [94 -100] | B+ | [87 - 90[ | B- | [80 - 84[ | C | [74 - 77[ | D+ | [67 - 70[ | D- | [61 - 64[ |
| A- | [90 - 94[ | B | [84 - 87[ | C+ | [77 - 80[ | C- | [70 - 74[ | D | [64 - 67[ | F | [0 - 61[ |

**VI. SCHEDULE**

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| **Week** | **Topic** | **Readings\*** | **Assignments\*\*** |
|  | | | Syllabus quiz  Discussion 0  ***Deadline: 1/30*** |
| **UNIT 1. Science, Pseudoscience & Science Skepticism** | | | | |
| Module  1 | The Demarcation Problem  Popper’s falsifiability criterion | Karl Popper, Science as falsification | Quizzes 1-9  Discussion 1  ***Deadline: 2/9*** |
| Module  2 | Common misunderstandings  Laudan on Demarcation | Larry Laudan, Science at the bar |
| Module  3 | More problems with falsifiability  The Duhem-Quine thesis | Peter Godfrey-Smith, Popper, Conjecture and Refutation |
| Module  4 | Kuhn on Demarcation  Lakatos on Demarcation | Deborah Mayo, Ducks, Rabbits etc. | Quizzes 10-15  Discussion 2  Test 1  ***Deadline: 2/23*** |
| Module  5 | Thagard on Demarcation  Ladyman on Demarcation | Paul Thagard, Why astrology is a pseudoscience |
| **UNIT 2. Scientific Inference** | | | | |
| Module  6 | Deductive & Inductive arguments  Demonstrative reasoning | Siu-Fan Lee, What is Logic?  Ernan McMullin, Demonstration | Quizzes 16-24  Discussion 3  ***Deadline: 3/15*** |
| Module  7 | Inductive reasoning  Hume’s problem of induction | David Hume, Enquiry IV, II  Ernan McMullin, Induction |
| Module  8 | Cartwright on laws of nature  Popper on scientific inference | Nancy Cartwright, Do the laws of physics state the facts? |
| Module  9 | Retroductive reasoning  Descartes on retroduction | René Descartes, Principles IV, 201-207  Ernan McMullin, Retroduction | Quizzes 25-30  Discussion 4  Test 2  ***Deadline: 4/5*** |
| Module 10 | Descartes on realism  Contemporary debate | Bas van Fraassen, Response to McMullin |
| **UNIT 3. Scientific Realism** | | | | |
| Module 11 | Logical positivism  Overlap argument | Grover Maxwell, The ontological status of theoretical entities | Quizzes 31-39  Discussion 5  ***Deadline: 4/26*** |
| Module 12 | Constructive empiricism Underdetermination | Bas Van Fraassen, Arguments concerning scientific realism |
| Module 13 | No miracles argument  Pessimistic metainduction | Larry Laudan, A confutation of convergent realism |
| Module 14 | Entity realism  Structural realism | Ian Hacking, Entity realism | Quizzes 40-45  Discussion 6  Test 3  ***Deadline: 5/10*** |
| Module 15 | Global vs Local arguments  Antirealism vs Science skepticism | Leah Henderson, Global vs Local Arguments for scientific realism |

\* In addition, you must read my class notes.

\*\* All assignments are due 11:59pm of the day specified in the schedule, but you are encouraged to submit them before the deadline.

**VIII. course Policies and STUDENT RESOURCES**

* All work done in this course is subject to the CSUS academic honesty policy, which you may read at: [Academic Honesty Policy & Procedures.](https://sacramentostate.policystat.com/policy/11300038/latest) You can also check the [Library’s guide on Plagiarism](https://csus.libguides.com/plagiarism) and *my note on Canvas*.
* If you are experiencing serious distress, you can contact either [Student Health and Counseling Services](https://www.csus.edu/shcs/) or [Peer and Academic Resource Center](https://www.csus.edu/parc/).
* You can check out a laptop at the [CSUS University Library](https://www.csus.edu/information-resources-technology/teaching-learning/laptop-checkout.html).
* If you are experiencing any COVID- like symptoms (fever, cough, sore throat, muscle aches, loss of smell or taste, nausea, diarrhea, or headache) or have had exposure to someone who has tested positive for COVID, contact [Student Health & Counseling Services (SHCS)](https://www.csus.edu/student-life/health-counseling/) and notify me. More information can be found [here](https://www.csus.edu/return-to-campus/).
* If you believe that you require disability-related academic adjustments (including pregnancy-related disabilities), please contact [Services for Students with Disabilities (SSWD](https://www.csus.edu/student-affairs/centers-programs/services-students-disabilities/)) to discuss eligibility. A current accommodation letter from SSWD is required before any modifications. These adjustments are not retroactive.
* Sac State is committed to supporting students and fostering a campus environment free of sexual misconduct and gender-based discrimination. If a student chooses to disclose to a faculty or staff member an experience related to sexual misconduct which includes, but is not limited to rape, relationship violence, or stalking, all faculty and staff members are obligated to report this disclosure to the university’s Title IX Coordinator. Contact Sac State’s Title IX Coordinator, Skip Bishop, at 916.278.5770 or email at william.bishop@csus.edu. Upon receipt of the report, the Title IX Coordinator will contact you to inform you of your rights and options as a survivor and connect you with support resources, including resolution options for holding accountable the person who harmed you. Students who elect not to discuss their experience with the Title IX Coordinator can speak confidentially to the following confidential resources: Student Health & Counseling Services at The WELL 916.278.6461; [www.csus.edu/shcs](http://www.csus.edu/shcs). Campus Confidential Advocate – Laura Swartzen ([weave@csus.edu](mailto:weave@csus.edu)). On Campus Phone Number: 916.278.5850 (during business hours) WEAVE 24/7 Hotline: 916.920.2952.