Philosophy of Science

Sample Syllabus, suitable for 200-level undergraduate course with 12 students

Professor Information:
Email Address: Qiu.Lin@Duke.edu
Office Hours: Wed 3-5pm
Office Location: West Duke Rm 650

Class Information:
Class Time: Mon and Wed 1-2:15pm
Class Location: West Duke 202

Course Description:

This is a survey course covering three classic topics in the philosophy of science: laws of nature, theory change, and science and values. Questions to be addressed include: What are laws of nature? What is the status of laws in physical theorizing? Do laws tell us anything true about the physical world? Is science after truth? Do non-epistemic values play constitutive roles in scientific research, and if so, should they? How might philosophers of science help us better learn about, say, the tobacco industry's strategy? The aim of this course is to help students get a better insight into what science is, how it works, and what roles it plays in our society. We will be reading authors from the early modern period (e.g. Descartes, Newton, Du Châtelet, and Hume), as well as classics from the 20th century philosophy of science (e.g. Kuhn, Armstrong, Cartwright, and van Fraassen) near to some newer directions (e.g. feminist philosophy of science with Longino and applied-mathematically integrated philosophy of science with Weatherall & O'Connor).

Learning Goals:

- Students will gain familiarity with major concepts, views, and debate relating to self, moral development, impartialism, non-action, and truth acquisition.
- Students will critically and charitably engage with the primary texts.
- Students will gain improved proficiency in philosophical writing, defend arguments relating to course themes, and independently develop a paper project out of the course content.

Texts:

- Kuhn, Thomas. *The structure of scientific revolutions*. Princeton University Press, 2021.
- Du Châtelet, Emilie: *Foundations of Physics* (English translation by the Notre Dame Du Châtelet group available at https://www.kbrading.org/translations; many thanks to them for generously sharing it with all!)

All other texts will be made available via Sakai. The schedule below is subject to change. In the event of changes, I will send an email class-wide and update the syllabus on Sakai.

Course Requirements:

- **Participation (15%)**: Participation in class discussions will be judged on: 1) grasp of and depth of reflection on the assigned reading material; and 2) ability to listen and respond appropriately to other students' comments. Consistent and constructive participation will weigh in favor of the higher grade in the case of a borderline final grade based on your other work.

- **Writing (20%; 35%):** You are required to write a mid-term paper and a final paper for this course. The mid-term assignment will be a response paper of 1,000–1,200 words (double-spaced, 12 point, PDF format). I will provide 6–8 questions relating to the assigned readings for you to respond to. This paper should consist of three sections: exposition; argument; objection and response to objection. The final paper will be a 2,000–2,500-word project which you will develop independently based on the course materials. It is highly recommended that you discuss your ideas with me to determine which topic best suits your philosophical interests and strengths, and how to proceed with your project.

  • **Presentation and commentary (20%; 10%):** Before starting to write the final paper, each student is required to present their topic to the class, and to provide commentary on another class member's presentation. During their twenty-minute presentation, the presenter should talk through their project, using 5–6 slides that give the audience: i) an overview of the main topic and motivation for the talk; ii) discussion of the source text; iii) arguments; iv) objection; v) response to the objection; and vi) conclusion and afterthought. In 3–5 minutes, the commentator should aim to offer 2–3 constructive, actionable suggestions for how the presenter can further develop their ideas and strategize their writing plan.

Course Arrangements:

- **Rewrite and Resubmit:** I will leave extensive comments -- critical and constructive -- to the papers you hand in. The expectation is that you can make use of the returned comments to revise and polish the written work in order to strengthen it for a better grade. Good philosophy takes time, patience, and often numerous revisitings of one's ideas. Don't be discouraged if you don't get a perfect grade for the first attempt! All rewritten works will be held at the same grading standard as the first-timers.

- **Pre-class Mini-Talks:** We will start every class with a pre-class mini-talks by students on the assigned reading of the day. In five minutes, speakers should give one or two reasons as to why the assigned reading is worthy of attention for someone who has no prior investment in the topic. Each student needs to sign up for at least one, but preferably two, mini-talks.

- **Extended Office Hours:** In addition to the regular office hour, I will offer extended hours to help you wrestle with paper ideas two weeks before the deadlines. Exact scheduling will be given in class. You are also welcome to make an appointment with me should the announced schedule conflict with yours.

- **Best Talk Prize:** As a group, the students will choose the winner of Best Talk Prize via Sakai Poll. Please vote for the presenter that gives the most compelling and engaging presentation in your mind! The winner will receive a paper copy of Plato's *Republic* as a souvenir for her/his accomplishment .

Grading scale

A+: 95% and up
A: 93-95%
A-: 90-92%
B+: 87-89%
B: 83-86%
B-: 80-82%
C+: 77-79%
C: 73-76%
C-: 70-72%

Reading Schedule

Class 1	Introduction to the course: why philosophy of science?
Class 2	**The early days of physical science: laws and method** Descartes, *Principles of Philosophy*, Part II
Class 3	Descartes, *Principles of Philosophy*, Part VI, 199-207
Class 4	Newton, *Principia* Author's Preface to the reader (from the first edition) Axioms or laws of motion and the accompanying corollaries 1-6 and the scholium
Class 5	Newton, *Principia* Rules of Reasoning General Scholium
Class 6	Du Châtelet, *Foundations of Physics* Chapter 1: "Of the Principles of Our Knowledge"; Chapter 4: "Of Hypotheses"
Class 7	Hume, *An Enquiry Concerning Human Understanding* Chapter VI: "Sceptical Doubts Concerning the Operations of the Understanding"
Class 8	**Contemporary debates on laws of nature** Armstrong, *What is a Law of Nature?* Part I, Chapter 1 ("Introductory") and Chapter 2 ("Critique of the Regularity theory (1): The problem of accidental uniformities")
Class 9	Armstrong, *What is a Law of Nature* Part II, Chapter 6 ("Laws of nature as relations between universals")
Class 10	van Fraassen: *Laws and Symmetry* Part II: "Are There Laws of Nature?"
Class 11	Cartwright, "Do the Laws of Physics state the Facts"
Class 12	Case study: how about the "laws" in Newton's *Principia*? Smith, "Closing the Loop: Testing Newtonian Gravity, Then and Now" 10.1: "Introduction" 10.2.1: "Evidence in the *Principia*"

Class 13	10.2.2: “Newtonian Idealizations” 10.2.3: “Testing the Theory of Gravity”
Class 14	**Science, Objectivity, and Values** Kuhn, “The Structure of Scientific Revolutions” Chapters I-IV: the very idea of “normal science”
Class 15	Kuhn, “The Structure of Scientific Revolutions” Chapters V-VIII: paradigm, anomaly, and crisis
Class 16	Kuhn, “The Structure of Scientific Revolutions” Chapters XI-XI: scientific revolutions
Class 17	Kuhn, “The Structure of Scientific Revolutions” Chapter XII-finish: what philosophical lessons do we learn?
Class 18	Longino, “Values and Objectivity”
Class 19	Doublas, “Inductive risk and values in science”
Class 20	Michaels, *Doubt is Their Product* Chapter 1: “The Manufacture of Doubt”
Class 21	Oreskes & Conway, *Merchants of Doubt* Chapter 5: “What’s Bad Science? Who Decides? The Fight Over Secondhand Smoke”
Class 22	Weatherall & O’Connor: “How to Beat Science and Influence People: Policy Makers and Propaganda in Epistemic Networks”
Class 23	Spillover from previous classes...
Class 24	Student project presentations
Class 25	Student project presentations
Class 26	Student project presentations