**Phil 225: Introduction to Philosophy of Science**

Spring 2024



Instructor: David Sorensen

Email: david.sorensen@rutgers.edu

Meeting time: MW 2:00pm-3:20pm
Meeting place: Ruth Adam Building, Room 208 (Douglass)

Office Hours: TBA

Office Location: 106 Somerset St (next to Barnes and Noble), Room 540

Science is widely thought to be a way to acquire knowledge about the natural world. However, many issues about the nature of science, including claims of scientific knowledge, are subject to debate by not only philosophers of science but practicing scientists too. Below is a list of questions that will be raised:

What is science and how exactly does it work?

Is there a scientific method shared across all sciences?

What distinguishes science from *pseudo*science?

Does science inform us about *reality* or only of our experiences?

Should we believe in the existence of entities posited by current scientific theories (e.g. electrons, black holes, or a common ancestor to all life?

Or do sociological, historical, and/or skeptical considerations undermine our justification in current scientific theories?

Should we always side with scientific authorities? Should we ever?

In cases where scientists disagree about an issue, who should we trust? What should we believe with respect to controversial scientific issues?

**Course Requirements**

**1.** Course readings:

**(a)** Two **Required** Textbooks:

1) *Theory and Reality,* **Third Edition**Peter Godfrey Smith

2) *The Knowledge Machine,* Michael Strevens

**(b)** Supplementary readings available on Canvas (go to “pages” and then “readings and homework”, or visit the “Files” section)

 **1)** You are expected to read the assigned articles and chapters **before** the class session the readings are scheduled for. However, I recommend doing the readings both before and after the class session, as the material may at times be difficult, or unclear the first time reading it. After lecture and in-class discussions, the material should be much easier to understand. But it’s important to know in advance that not everything will be covered in lecture. There will be quiz questions based on supplementary readings, videos, podcasts, etc. If they are not covered in lecture and you do not understand them, please send me an email or schedule an appointment with me during office hours.

**(c)** Powerpoints will be made available on Canvas (typically) the day before class. I recommend skimming the slides before class and carefully reviewing them before exams.

**2.** Course evaluation:

**(a)** Exam: There will one cumulative exam at the end of the semester. A study guide with topics and a sample question (which will appear on the exam) will be made available 2 weeks before each exam.

**(b)** Bi-weekly Canvas quizzes (based on the required readings), ranging from 5-10 questions (MC, MA, T/F, Matching)

**(c)** Conference Presentation: You will be required to sign up for and present a 10–15-minute presentation using PowerPoint or some other presentation software. Think of it as a short lecture or conference talk. There will be a five-minute period afterwards for Q&A for you to engage with your peers and instructor. You’ll be graded on a rubric with five dimensions: clarity, focus, organization informativeness, and understanding.

**End of the Semester Conference Sessions**

**Day 1:** Physics: Quantum Theory, Inflationary Cosmology, General Relativity, the Standard Model

**Day 2:** Biology: Evolution, Abiogenesis, Paleontology, Neuroscience

**Day 3:** Science or Pseudoscience?: Friedman’s Ufology, Hancock’s Alternative Archaeology, Sheldrake’s Morphic Resonance Theory, the Aquatic Ape Hypothesis

**Day 4:** Science or Pseudoscience? : Alternative Covid Cures, Acupuncture, Homeopathy, RFK Jr. on Vaccines

**Grade breakdown:**

* Bi-weekly Canvas Quizzes: 40 points (10 points each, lowest dropped)
* Low-Stakes Writing/Discussion Posts: 10 points (1 point each, lowest three dropped)
* Conference Presentation: 20 points
* (Final) Cumulative Exam: 30 points

**Grading Scale:**A 90-100

B+ 87-89

B 83-86

B- 80-82

C+ 77-79

C 73-76

C- 70-72

D+ 67-69

D 65-66

F Below 65

**Expectations of students:**

Students are expected to carefully read the syllabus, regularly attend class, do the readings, keep notes, and complete all course assignments. Students should also regularly check your email (every day), and log onto Canvas to check for course updates or revised deadlines. If any problems arise, you should contact me ASAP.

**How to do well in the course:**

1. **Take the readings seriously:** There will be lots of readings assigned in this course, some of which will be quite difficult. It is best to complete all the readings *before* attending the lecture for which they are assigned. Reading philosophy can be difficult, requiring much more time and focus than readings in other fields and genres. As a philosopher, you are also not just aiming to understand what the author is saying, but whether their claims are true. Thus, a special kind of *active* reading is required to get the most out of the assigned readings. I’ve provided a Canvas module with some tips and articles on active reading (in general) and also how to read philosophical papers.
2. **Be prepared with questions and comments**
3. **Regularly check Canvas** (at least once every 48 hours) for course updates, assignments, and newly added powerpoints
4. **Attend office hours:** If questions remain after class, or some questions were not adequately addressed, office hours allow students to have continued and more focused conversations about the course content. You do not even have to come to office hours prepared with a list of questions or comments about the course. I am happy to talk with you about any topics of interest in philosophy or science.

**Detailed schedule of topics/readings (tentative)**

**R: Required Supplementary Readings**

**P: Podcast**

**V: Video**

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| Date | **Topic** | **Readings/Homework** |
| January 17 (Wednesday) | Course Introduction  | Syllabus |
| January 22 (Monday) | The Scientific Revolution: A Brief Sketch  | T&R: Chapter 1 |
| January 24 (Wednesday) | The Empiricist Tradition | T&R: Chapter 2: sections 1-3 |
| January 29 (Monday) | The Empiricist Tradition: Part 2 | T&R: 2.4 and 2.5 |
| January 31 (Wednesday) | The Problem of Induction | T&R: Chapter 3: Section 3.1Reading: Hume  |
| February 5 (Monday) | The Hypothetico-Deductive Model of Science  | T&R: Chapter 3: Section 3.2 |
| February 7 (Wednesday) | The Ravens Problem  | T&R: Chapter 3: Section 3.3 |
| February 12 (Monday) | The New Riddle of Induction | T&R: Chapter 3: Section 3.4 |
| February 14 (Wednesday) | Popper: Conjecture and Refutation  | T&R: Chapter 4 |
| February 19 (Monday) | Kuhn’s Revolution  | T&R: Chapter 5: Sections 1-4TKM, Chapter 1 |
| February 21 (Wednesday) | The Great Method Debate  | TKM, Chapter 2 |
| February 26 (Monday) | The Great Method Debate | TKM, Chapter 3 |
| February 28 (Wednesday) | How Science Works | TKM, Chapter 4 and 5 |
| March 4 (Monday) | How Science Works | TKM, Chapter 6 |
| March 6 (Wednesday) | How Science Works | TKM, Chapter 7 |
| March 11 (Monday) | SPRING BREAK |  |
| March 13  | SPRING BREAK |  |
| March 18 (Monday) | Theories and Frameworks  | T&R, Chapter 6: sections 1-3 |
| March 20 (Wednesday) | Pseudoscience and the Demarcation Problem  | TBA |
| March 25 (Monday) | Epistemological Anarchism and Feyerabend | T&R, Chapter 6: sections 4 and 5 |
| March 27 (Wednesday) | The Challenge from Sociology | T&R: Chapter 7 |
| April 1 (Monday) | The Challenge from Politics | T&R: Chapter 8 |
| April 3 (Wednesday) | Scientific Realism  | Chapter 10 sections 1-3 |
| April 8 (Monday) | Arguments for Anti-Realism | Chapter 10, sections 4-6 |
| April 10 (Wednesday) | Arguments for Realism  |  |
| April 15 (Monday) | Natural Kinds and Race | Chapter 10, section 7 |
| April 17 (Wednesday) | Philosophy of Science Conference: Day 1Physics | Quantum Theory | Robert Sac Relativity | Tyler YanagiCosmology | Chris BartosSpacetime | Natalia Kalinowska |
| April 22(Monday) | Philosophy of Science Conference: Day 2Biology | Evolution | Gabriel JunodAbiogenesis | Karan TipnisNeuroscience | Jason Hong |
| April 24(Wednesday)  | Philosophy of Science Conference: Day 3Science or Pseudoscience | The AA Hypothesis | Sanchali Dighe |
| April 29(Monday) | Philosophy of Science Conference: Day 4Science or Pseudoscience | Alternative Covid | Christina WilliamsAcupuncture | Giang Huy DuongAyurvedic Medicine | Radha PathakRFK Jr on Vaccines | Tio Pinheiro |
| Final Exam  | TBA |  |

**COVID-related policies:**

***In the event that the college closes temporarily or permanently due to COVID or some other emergency, we will shift to a remote synchronous format. The lectures will take place during the same time as the in-person sessions. Additionally, exams will be taken remotely rather than in person.***

**Unexplained absences and missing assignments:**

Under most circumstances, if you do not report to me, in advance, that you will be absent or unable to submit an assignment on time, then you will not receive full credit. Assignments and problem sets that are not complete by May 4th will receive zeros.

**Rutgers Academic Integrity Policy**: *Principles of academic integrity require that every Rutgers University student:*

* *properly acknowledge and cite all use of the ideas, results, or words of others*
* *properly acknowledge all contributors to a given piece of work*
* *make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of unsanctioned materials or unsanctioned collaboration*
* *obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions*
* *treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress*
* *uphold the canons of the ethical or professional code of the profession for which he or she is preparing.*

*Adherence to these principles is necessary in order to insure that:*

* *everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments*
* *all student work is fairly evaluated and no student has an inappropriate advantage over others*
* *the academic and ethical development of all students is fostered*
* *the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.*

*Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.*

**Disability services:** The Office of Disability Services works with students with a documented disability to determine the eligibility of reasonable accommodations, facilitates and coordinates those accommodations when applicable, and lastly engages with the Rutgers community at large to provide and connect students to appropriate resources (e-mail: https://ods.rutgers.edu/, phone: (848) 445-6800). Students with disabilities requesting accommodations must follow the procedures outlined at https://ods.rutgers.edu/students/applying-for-services. Please give your letter of accommodation to me as soon as possible, and we will coordinate the accommodations privately.