# Teaching Dossier

Curtis Forbes

curtis.forbes@utoronto.ca
+1 (647) 688-8879 (Canada, preferred)
+63 (917) 142-8562 (Philippines)
www.curtisforbes.com

## Teaching Areas

GRADUATE AND UPPER-YEAR UNDERGRADUATE

- Philosophy of Science
  - Scientific Realism
  - Feminist Philosophy of Science
  - History of Philosophy of Science
  - Science, Values, and Society
  - Scientific Theory Change
  - Scientific Representation

INTRODUCTORY AND LOWER-YEAR UNDERGRADUATE

- General Philosophy
- History of Philosophy
- Epistemology
- History of Science (Ancient)
- History of Science (Modern)
- Critical Thinking
- Logic

## Table of Contents

## 1. Statement of Teaching Philosophy

I've run courses and tutorials in both history and philosophy, of sizes ranging from ten to over two hundred students. I've learned that I perform best when I set for myself two fundamental aims. First, *I aim to make my students genuinely interested* in the course material, designing my lectures to inspire their curiosity by expressing my own, and measuring my success through evidence of student engagement (e.g. class discussion, attendance in office hours, course evaluations, etc.). Second, *I aim to help students develop and practice their basic academic skills*: interpretation, critical analysis, and argumentation. Especially in lower-level courses I design and structure coursework to help students build these skills sequentially, one upon the other. I measure my success in this respect through the quality of their final assignments, hoping to see them applying these skills in concert to the subject matter of the course.

I'm always striving to be a more successful instructor, and continue to experiment with different styles of lecture and coursework. What follows is a summary of the principles and techniques I've found most effective for achieving my two fundamental aims to date.

### Basic Principles

#### Principle 1: Respect Comes First

Students often make amusing errors, but I'm shocked by how often my peers snicker or complain about their students' shortcomings, sometimes quite publicly or even directly to a student. As instructors, our job is to help our students improve, but we can't do that if we don't show them the respect and encouragement they deserve. I'm the only member of my family with a higher education, and I struggled to learn the skills needed to succeed in higher education, having only been able to because my earliest instructors were empathic and respectful in their correction of my work. I seek to emulate their approach with my own students, so whether they enter my class with a developed academic skillset or not, every one of my students has already earned my respect simply by pursuing higher education, and receives my genuine support and encouragement as a result.

#### Principle 2: Speak from Intellectual Experience, not Expertise or Authority

Junior instructors often feel they need to appear as authoritative experts, but I take a very humble approach. I'm a valuable resource my students are paying to access, but not because I have all the answers or know all the facts. My value is just that I've been studying the topics for longer; I have intellectual experience, not expertise or authority. Operating with humility helps me address my students as peers while we investigate fascinating topics and issues together, many of which I still find just as perplexing and vexing as they do. I constantly remind myself that I don't know all the answers, though I have some idea of how we might find them, together.

#### Principle 3: Value your Students as Peers

As an instructor, my first duty is to be valuable to my students, but I also recognize their value to me. Organizing voluminous bodies of literature and working through it with my students helps me better understand it myself. I learned more teaching Kuhn than I ever did studying him alone, for example, and seeing which aspects of the scientific realism debate most engaged my students helped me decide what to focus on in my dissertation. I even received a list of hadiths from a Muslim student she felt could help illustrate a point I made during a lecture on Islamic natural philosophy. I learn through teaching, and while I recognize that my first duty is to help my students learn, it keeps me motivated to remember that I will always learn something myself by doing so. My best students are the ones that actually keep me motivated to continue my own thinking about philosophical topics, for I sometimes worry that the questions I address in my courses and research are too complicated to answer, and that thinking about them is therefore a waste of time. My most eager students regularly quell my fatalist impulses by reminding me not only that it's important to keep asking these questions, but impossible to stop.

## Principles for Lecturing

Principle 4: Display Excitement, Wonder, and Confusion

Everyone learns best when they're excited about the material, and I've found the best way to get my students excited is to show them how excited I am myself, and how I remain genuinely confused and curious about many of the issues addressed in my courses and research. I find that displaying my puzzlement alongside my excitement increases student engagement dramatically. This can be as simple as introducing a topic by saying "I find it hard to imagine what it was like living in Ancient Athens …" or "there's a fascinating puzzle here …" rather than "what we know about Ancient Athens is …" or "the dominant position is …" The first formulation opens the door for student questions and input; the second closes that door.

Principle 5: Don't be Boring

Simply put, I love to learn because I find it entertaining, so I wholeheartedly embrace the idea of being "a sage on the stage." I try to write lectures that are both comedic and dramatic, and generally pepper them with memorable stories, trivia, anecdotes, analogies, props, and demonstrations. Whether it's telling a story about Tycho losing his nose in a duel over mathematics, tossing around a tennis ball to explain the difference between Aristotelean and Newtonian physics, or using student volunteers to illustrate how a Turing machine algorithmically adds 1+1, I find there are no better teaching aids than narrative and theatre. Rather than demanding my students' attention by banning cell phones or grading attendance, I prefer to present a spectacle they don't want to miss.

## Principles for Seminars

Principle 6: Make the Students do the Work

When teaching my first seminar I vastly over-prepared, and ended up directing the discussion far too much. Recently I tried a different strategy: every day I told students to pretend I hadn't done the readings, and had them explain everything to me. I'd ask for points of clarification, plead ignorance, and spend time going over the text with them to figure out what exactly the author was saying. This way we all worked to understand the material together, and by the end of class we all left with a far better grasp on it than we had when we arrived, including myself. Thus, I've learned, the best way to run a seminar is to make the students do the work.

## Principles for Assignments and Examinations

Principle 7: Develop Skills, not Knowledge

I try to evaluate my students in a way that helps develop and their interpretive, analytical, and argumentative skills, not test their knowledge *per se*. In the age of Wikipedia and smartphones we usually have access to whatever information we might need, whenever we need it. In that milieu, I see higher education as valuable when it provides people with the skills needed to better understand that information, rather than training them to regurgitate it on command.

To this end, I've found a common progression for written assignments quite effective: first, assign an expository (i.e. "non-critical") essay, where students simply *summarize* an author's main argument or key claims; next, assign a critical essay, where students aim to *assess* an author's main argument or key claims; finally, assign a position paper, where students *defend* a certain stance, or *argue* for a specific claim. By first learning to properly characterize (and thereby understand) other people's writing, then learning to evaluate it, I find students are subsequently better able to write strongly argued position papers that address central issues directly, and even anticipate potential objections.

In the future, I hope to experiment with this format a bit. In introductory courses, especially logic or critical thinking, I'd like to try having students analyze an argument between two public figures over some issue or current event, or even an argument they got into or witnessed online. I expect that having students develop their analytic skills using something they already care about would help them see the value in having those skills. I'd also like to try having students write position papers on both sides of a contentious issue for their final assignment (e.g. "is intelligent design a scientific theory?"). I expect building the best case for a position they disagree with would help students learn just how complex many topics are. Understanding why

someone might take any given position, and how they'd likely defend it, is an invaluable skill I think this kind of assignment might help students develop.

## 2. AI Use Strategy

My teaching philosophy acknowledges the presence of generative AI as an unavoidable and potentially enriching part of contemporary academic life. Rather than prohibit its use, I design assignments and class activities that guide students toward developing their own philosophical voice and analytic skill, using AI as a tool for discovery, critique, and refinement—not substitution.

This approach is grounded in the belief, following Plato, that "philosophy begins in wonder." Our task as educators is to cultivate that wonder—those moments of puzzlement and deep curiosity—so that students see philosophical inquiry not as a chore but as the pursuit of questions that genuinely matter to them. AI cannot experience that wonder for us, nor can it do our thinking in any meaningful sense; when it comes to creativity and insight, we generally only really get out of an AI chatbot what we ourselves bring to the conversation. LLMs can serve as incredibly useful interlocutors, like a TA at their fingertips, provided students have learned how to ask better questions and critically evaluate what they receive in return, all in the context of their own self-motivation.

To that end, my AI teaching strategy includes the following elements:

1) Reading Labs Instead of Traditional Tutorials

I supplement or replace conventional tutorials with reading labs—structured, collaborative sessions where students and TAs work through philosophical or historical texts together. These labs foster close reading, conceptual precision, and interpretive discipline. They also create a shared space for developing intellectual habits that resist over-reliance on AI-generated summaries or explanations.

2) AI-Supported Writing and Iterative Reflection

Some take-home assignments allow and even encourage the use of AI tools during the writing process, but always in tandem with pedagogical structures that foster independent thinking. Students submit exploratory drafts, reflect on how AI contributed to (or complicated) their process, and then produce revised, polished versions. The may also be given instructions to converse with an LLM using a specific prompt on a philosophical topic, then reflect on their interactions with the bot and what they learned during in-class handwritten reflections that help reinforce individual learning. In certain assignments—particularly those aimed at cultivating process awareness—students are required to document their workflow using the tools described below (see point 3), allowing them to demonstrate authentic engagement with the material and the writing process.

3) Writing Process Monitoring to Support Authentic Engagement

I incorporate writing-process tracking tools such as Grammarly Authorship, GPTZero's authorship tracker, and Google Docs version history into selected assignments. These tools allow students to record how their work evolved—keystrokes, edits, use of AI, etc.—and provide evidence that their writing was developed thoughtfully and independently. When used alongside iterative assignments and reflective components, these tools help students visualize and take pride in their own intellectual development, while reinforcing transparency and academic integrity.

4) Philosophy of AI and Philosophy with AI

Every course I teach includes structured engagement with the philosophical, epistemological, or ethical dimensions of AI. Early in the term, I ask students to identify major questions they hope to explore and to draft prompts they might pose to an AI about those questions. At the end of the term, students revisit those same questions and draft new, more refined prompts based on what they've learned. A final reflective assignment invites students to compare the two sets and assess their intellectual growth. This

exercise illustrates that our ability to use AI meaningfully is itself a function of understanding: the better we grasp a subject, the better the questions we can ask—and the more insightful the responses we can evaluate.

In sum, my AI strategy is designed not to bypass the intellectual labor of philosophy, but to make that labor more visible, more deliberate, and more rewarding with the help of modern tools such as LLM chatbots, not more devious, frustrating, and laborious by wishing away such tools. My experience in business has convinced me that AI is additive for our intellectual and practical goals, not subtractive, but only if used properly and carefully. This strategy will help students build habits of critical inquiry that endure beyond the classroom—even (and especially) in a world where machine assistance is already and will henceforth always be ever-present.

## 3. Teaching Experience

### Instructor

INSTITUTE FOR THE HISTORY AND PHILOSOPHY OF SCIENCE, UNIVERSITY OF TORONTO

- HPS210: Scientific Revolutions I, Fall 2016
- HPS302: Topics in Philosophy of Science: Scientific Realism, Winter 2015
- HPS211: Scientific Revolutions II, Winter 2013
- HPS350: Revolutions in Science, Winter 2012
- HPS211: Scientific Revolutions II, Winter 2011

### Teaching Assistant

INSTITUTE FOR THE HISTORY AND PHILOSOPHY OF SCIENCE, UNIVERSITY OF TORONTO

- HPS250: Introduction to Philosophy of Science
  Instructor: Boaz Miller, Winter 2008
- HPS211: Scientific Revolutions II
  Instructor: Andrew Munro, Winter 2009
- HPS210: Scientific Revolutions I
  Instructor: Ari Gross, Summer 2011
  Instructor: Jaipreet Virdi, Summer 2012
- HPS202: Technology in the Modern World
  Instructor: Gwyndaf Garbutt, Fall 2015
- HPS200: Science and Values
  Instructor: Paul Thompson, Fall 2015

DEPARTMENT OF PHILOSOPHY, UNIVERSITY OF TORONTO

- PHL232: Knowledge and Reality
  Instructor: Adam Murray, Fall 2016
- PHL245: Introduction to Formal Logic
  Instructor: Jackie Brunning, Fall 2015

DEPARTMENT OF PHILOSOPHY, UNIVERSITY OF VICTORIA

- Phil100: Introduction to Philosophy
  Instructor: Jeff Foss, Fall 2006-Spring 2007
- Phil201: Critical Thinking

Instructor: Audrey Yap, Fall 2007

- Phil203: Elementary Formal Logic
  Instructor: Audrey Yap, Spring 2008

## 4. Evidence of Teaching Effectiveness

### 4.1 Teaching Evaluation #1
### HPS211: Scientific Revolutions II
### (Winter 2011, as Instructor)

Note: This was my *first* course as an instructor, and out of 102 respondents I received a 6.6/7 average in response to question 11 which reads: "All things considered, performs effectively as a university teacher."

**Statements about the course:** Respond to the statements below, using the following 7-point scale. *SIDE 2*

| | very low | low | below average | average | above average | high | very high |
|---|---|---|---|---|---|---|---|
| 12. Compared to other courses at the same level (100,200,300,400), the work load is | 1 | 2 | 3 | ● | 5 | 6 | 7 |
| 13. Compared to other courses at the same level, the level of difficulty of the material is | 1 | 2 | 3 | ● | 5 | 6 | 7 |
| 14. The value of the required reading is | 1 | 2 | 3 | 4 | ● | 6 | 7 |
| 15. (If applicable) The value of the tutorials is | 1 | 2 | 3 | 4 | ● | 6 | 7 |
| 16. (If applicable) The value of the laboratories is | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. (If applicable) The value of the seminars is | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18. (If applicable) The value of the language conversation classes is | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19. The value of the overall learning experience is | 1 | 2 | 3 | 4 | 5 | ● | 7 |

20. Considering your experience with this course, and disregarding your need for it to meet program or degree requirements, would you still have taken this course? ● Yes ○ No

**Statements about yourself:**

21. Number of full course credits already earned (prior to this session):
1. 0-4½ ● 5-9½ 3. 10-14½ 4. 15-19½ 5. ≥20

22. Status of the course for you:
1. Program Requirement 2. Selected from a required list in a program ● Breadth Requirement 4. Optional

23. Your level of enthusiasm to take this course at the time of initial registration:
1. low 2. medium 3. high

24. Your expected grade in this course:
1. <50 2. 50-59 3. 60-69 4. 70-79 ● ≥80

**Additional statements or questions which may be supplied in class:**

| | | | |
|---|---|---|---|
| 25. 1 2 3 4 5 6 7 | 28. 1 2 3 4 5 6 7 | 31. 1 2 3 4 5 6 7 | 34. 1 2 3 4 5 6 7 |
| 26. 1 2 3 4 5 6 7 | 29. 1 2 3 4 5 6 7 | 32. 1 2 3 4 5 6 7 | 35. 1 2 3 4 5 6 7 |
| 27. 1 2 3 4 5 6 7 | 30. 1 2 3 4 5 6 7 | 33. 1 2 3 4 5 6 7 | 36. 1 2 3 4 5 6 7 |

**PART II: PLEASE ANSWER ONLY AFTER COMPLETING PART I.** Please use the space below to provide supplementary comments on the instructor(s) or course. For example, you may wish to give the reasons for your numerical evaluations or provide specific suggestions for improving the instruction in the course.

Curtis was an excellent lecturer who explained concepts clearly and with enthusiasm. He was highly encouraging to the students and was extremely approachable and helpful in answering questions. An excellent course overall!

*END OF SURVEY. THANK YOU FOR YOUR COOPERATION AND PARTICIPATION.*

Faculty of Arts & Science
University of Toronto
Survey Summary Results: SPR 11

Course: HPS 211H1S
Section: L0101
Instructor: C. FORBES

Enrolment: 318
Number of Forms Scanned: 102

STATEMENTS ABOUT THE INSTRUCTOR:

| Quest. | % Resp. to Scale Rating 1 | 2 | 3 | 4 | 5 | 6 | 7 | No. | Mean |
|---|---|---|---|---|---|---|---|---|---|
| 2. | 0 | 0 | 0 | 0 | 9 | 46 | 43 | 101 | 6.3 |
| 3. | 0 | 0 | 0 | 1 | 16 | 39 | 41 | 101 | 6.2 |
| 4. | 0 | 0 | 0 | 0 | 8 | 40 | 49 | 101 | 6.4 |
| 5. | 0 | 0 | 0 | 0 | 6 | 39 | 52 | 101 | 6.4 |
| 6. | 0 | 0 | 0 | 0 | 1 | 24 | 72 | 101 | 6.7 |
| 7. | 0 | 0 | 0 | 0 | 3 | 37 | 58 | 101 | 6.5 |
| 8. | 1 | 0 | 1 | 3 | 13 | 39 | 41 | 98 | 6.1 |
| 9. | 0 | 0 | 0 | 5 | 18 | 35 | 41 | 99 | 6.1 |
| 10. | 0 | 1 | 0 | 7 | 17 | 35 | 40 | 100 | 6.1 |
| 11. | 0 | 0 | 0 | 0 | 3 | 30 | 65 | 101 | 6.6 |

STATEMENTS ABOUT THE COURSE:

| Quest. | % Resp. to Scale Rating 1 | 2 | 3 | 4 | 5 | 6 | 7 | No. | Mean |
|---|---|---|---|---|---|---|---|---|---|
| 12. | 1 | 2 | 11 | 62 | 13 | 3 | 7 | 99 | 4.2 |
| 13. | 1 | 3 | 8 | 57 | 20 | 7 | 2 | 97 | 4.2 |
| 14. | 0 | 5 | 8 | 25 | 27 | 22 | 11 | 96 | 4.9 |
| 15. | 4 | 3 | 13 | 34 | 20 | 15 | 7 | 89 | 4.4 |
| 16. | 7 | 7 | 7 | 46 | 7 | 15 | 7 | 13 | 4.2 |
| 17. | 4 | 4 | 0 | 42 | 4 | 23 | 19 | 21 | 4.9 |
| 18. | 0 | 2 | 0 | 27 | 13 | 44 | 11 | 43 | 5.3 |
| 19. | 1 | 1 | 0 | 14 | 24 | 32 | 25 | 74 | 5.6 |
| 20. | Yes: 94% | | | No: 5% | | | | 88 | |

OTHER QUESTIONS:

| Quest. | % Resp. to Scale Rating 1 | 2 | 3 | 4 | 5 | 6 | 7 | No. | Mean |
|---|---|---|---|---|---|---|---|---|---|
| 25. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 26. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 27. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 28. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 29. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 30. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |

| Quest. | % Resp. to Scale Rating 1 | 2 | 3 | 4 | 5 | 6 | 7 | No. | Mean |
|---|---|---|---|---|---|---|---|---|---|
| 31. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 32. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 33. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 34. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 35. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| 36. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |

MEAN RATING ON QUESTION 11 (GLOBAL EVALUATION OF INSTRUCTOR) AS A FUNCTION OF STUDENT INFORMATION:

| | | No. | Mean Global Eval. |
|---|---|---|---|
| 21. | Number of full courses already completed: | | |
| | 0- 4.5 | 13 | 6.8 |
| | 5- 9.5 | 36 | 6.5 |
| | 10-14.5 | 20 | 6.8 |
| | 15-19.5 | 21 | 6.4 |
| | >=20 | 5 | 7.0 |
| 22. | Status of the course for the student: | | |
| | Program Requirement | 6 | 6.7 |
| | Selected from a required list in a program | 6 | 6.7 |
| | Breadth requirement | 41 | 6.6 |
| | Optional | 33 | 6.7 |
| 23. | Initial enthusiasm to take course: | | |
| | low | 8 | 6.5 |
| | medium | 49 | 6.5 |
| | high | 23 | 6.8 |
| 24. | Expected grade in course: | | |
| | <50 | 1 | 7.0 |
| | 50-59 | 0 | - |
| | 60-69 | 10 | 6.2 |
| | 70-79 | 46 | 6.6 |
| | 80-89 | 39 | 6.7 |
| | >=90 | 0 | - |

## 4.2 Teaching Evaluation #2
## HPS302: Topics in Philosophy of Science: Scientific Realism
## (Winter 2015, as Instructor)

Note: This third year seminar was based on my dissertation research. Unfortunately, it was interrupted for four weeks by a labour dispute between my union and the University, and from the comments it's readily apparent that several of the survey respondents really held that against me, personally. In spite of this I still performed well above average. I would be eager to teach a version of this course again, ideally at the graduate level. The syllabus for a graduate version can be found in section 4.1 on p.11-17.

### 7. Please comment on the overall quality of the instruction in this course.

| Comment |
|---|
| Lecturing was done well.<br>60% of evaluation is still occuring despite having no instruction for over a month, a bit ridiculous.<br>For those of us attending lecture with no philosophy background, this is somewhat of a tall order; especially as these assignments need to be done during the exam period. |
| At first I was going to really dig into him for going on strike and cancelling the course for four weeks. Honestly, though, he was a good lecturer and tried to create a pretty stimulating course. He also gave a fair marking scheme, all things considered. When he wasn't on strike he was more than helpful and responded to emails straight away. I didn't like how he put his strike politics into the last lecture, though. That prevents me from letting him off too easily and writing other reviews of him online. |
| I really enjoyed Curtis' instruction (until the strike began, of course). He was clear, the class was well structured and I found it extremely interesting. It's a shame that the course did not continue as scheduled. |
| Curtis was a great instructor and I would love the opportunity to learn from him again. The course was fantastic and so was the instruction. |
| Great instructor! |
| Curtis showed a massive amount of enthusiasm when teaching, the way that his lectures were set up made it possible for discussion. Some of the best classes were where instead of racing through the material and being told if you don't understand it, to come find the instructor; rather we would spend a good chunk on a lecture having a debate and discussion to make sure that we all understood it. |
| THE INSTRUCTOR WAS NOT HELPFUL AT ALL |
| The Instructor was absent during the strike |
| Curtis is a wonderful wonderful instructor who holds his students to a higher standard, which inspires us to live up to it and surpass it. He is helpful and insightful, and provides nuanced and intriguing arguments with sufficient background for the students to engage with the ideas at the level at which he presents them. |

### 8. Please comment on any assistance that was available to support your learning in this course.

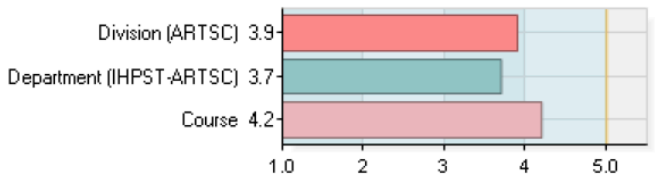
| Comment |
|---|
| The strike impeded any learning that could've happened. |
| THE INSTRUCTOR WENT ON STRIKE, HE DID NOT HELP WITH ASSIGNMENTS WHILE NOT ON STRIKE. THE ASSIGNMENTS INSTRUCTIONS WERE VAGUE AND HE MARKED HARD |

## Section 3. Comparative Data

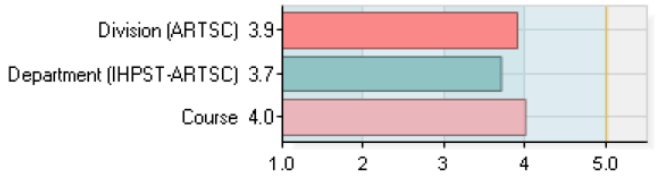
### Part A. Core Institutional Items

**Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal**

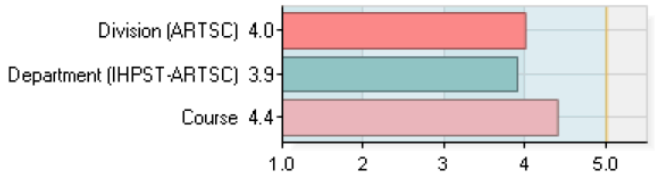
**Institutional Composite**



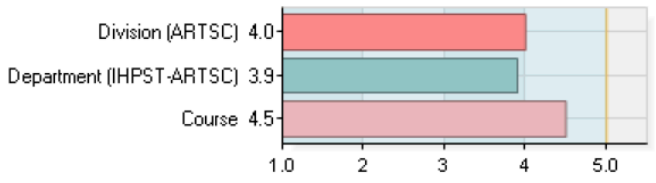

1. I found the course intellectually stimulating.



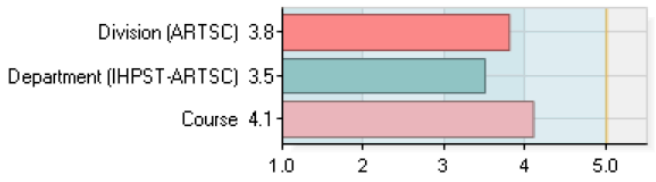

2. The course provided me with a deeper understanding of the subject matter.



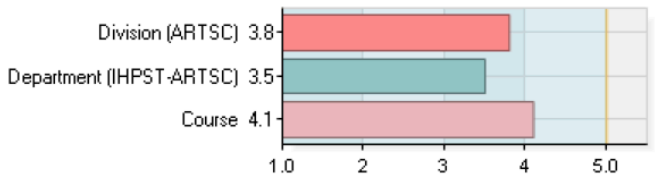

3. The instructor (Curtis Forbes) created an atmosphere that was conducive to my learning.




4. Course projects, assignments, tests, and/or exams improved my understanding of the course material.



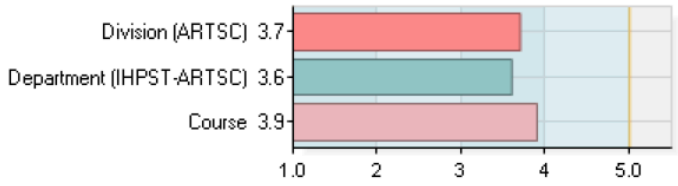

5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



## Section 3. Comparative Data (continued)

**Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent**

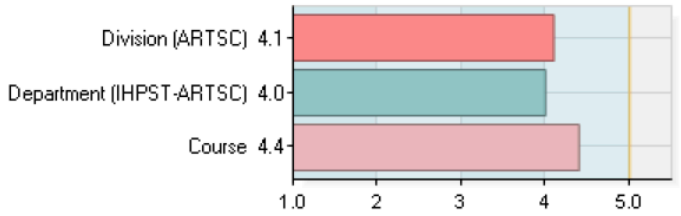
**6. Overall, the quality of my learning experience in this course was:**




### Part B. Divisional Items

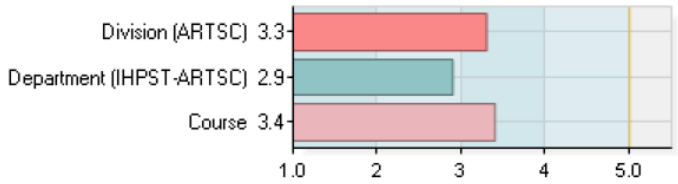
**Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal**

**9. The instructor generated enthusiasm for learning in the course.**



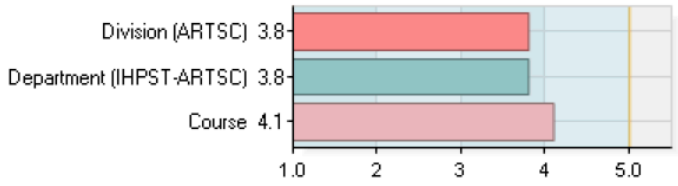

**Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy**

**10. Compared to other courses, the workload for this course was:**




**Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly**

**11. I would recommend this course to other students.**



## 5.1 Sample Syllabus #1 — Scientific Realism

# Advanced Topics in the Philosophy of Science
# SCIENTIFIC REALISM

**Instructor: Curtis Forbes**
**PhD Candidate - Institute for the History and Philosophy of Science and Technology**
Email: curtis.forbes@utoronto.ca
Office Hours: by appointment

### Course Description

This course is a detailed investigation of a favourite topic for philosophers of science: scientific realism. Scientific realism is the pervasive idea that our currently accepted scientific theories give an (at least) approximately true picture of reality. We will investigate the details, variations, and philosophical plausibility of this thesis by studying several arguments that have been proffered by its defenders and detractors. In the process we will touch on a variety of historical and philosophical questions including the nature of truth, the nature of knowledge, the methodology of science, the notion of "progress" in science, and the influence of social factors on scientific theorizing.

### Basic Course Structure

This course will be structured as a seminar. For each class (after the first) there will be two required readings, along with a list of recommended (optional) readings. At the beginning of each class two students will be selected *at random*, each giving a five (5) minute verbal summary of one of the articles for that day. After the presentations are over, students will discuss the issues raised in the readings, under guidance from the instructor.

Student evaluation will be based on:

1) In-Class Presentation (10%)
2) Non-Critical Reading Summary (5%)
3) Critical Reading Summary (15%)
4) For-and-Against Assignment (30%)
5) Final Essay (40%)

## Evaluation

All assignments in this course will be graded according to the guidelines given by the University of Toronto's Faculty of Arts and Science:

| Percentage | Letter Grade | Grade Point Value | Grade Definition | |
|---|---|---|---|---|
| 90-100 | A+ | 4.0 | Excellent | Strong evidence of original thinking; good organization; capacity to analyze and synthesize; superior grasp of subject matter with sound critical evaluations; evidence of extensive knowledge base. |
| 85-89 | A | 4.0 | | |
| 80-84 | A- | 3.7 | | |
| 77-79 | B+ | 3.3 | Good | Evidence of grasp of subject matter, some evidence of critical capacity and analytic ability; reasonable understanding of relevant issues; evidence of familiarity with literature |
| 73-76 | B | 3.0 | | |
| 70-72 | B- | 2.7 | | |
| 67-69 | C+ | 2.3 | Adequate | Student who is profiting from the university experience; understanding of the subject matter and ability to develop solutions to simple problems in the material. |
| 63-66 | C | 2.0 | | |
| 60-62 | C- | 1.7 | | |
| 57-59 | D+ | 1.3 | Marginal | Some evidence of familiarity with the subject matter and some evidence that critical and analytic skills have been developed. |
| 53-56 | D | 1.0 | | |
| 50-52 | D- | 0.7 | | |
| 0-49 | F | 0.0 | Inadequate | Little evidence of even superficial understanding of subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature. |

### Presentation – 10%

Each assigned reading will be introduced at the beginning of class through a verbal presentation by a *randomly selected* student. This will ensure that every student is prepared to contribute to subsequent class discussions. These presentations will not need to provide a perfect summary of the material in order for the student to get a perfect grade. The goal will be to demonstrate that one has read and thought about the article by summarizing its main argument and discussing some confusions or objections.

### Non-Critical Reading Summary - 5%

Students will be required to produce a one page (approximately 250 word) summary of an argument found in the readings. The goal will be to concisely reconstruct the specified argument without providing any critique or assessment of that argument.

### Critical Reading Summary - 10%

Students will be required to produce a two page (approximately 500 word) summary of one of the readings. The goal will be to concisely summarize the relevant article by outlining its main argument and to then evaluate this argument.

For-and-Against Assignment - 30%

Students will be required to write two four page essays (approx. 1000 words each). One essay will build the strongest case possible in favour of scientific realism. The other essay will build the strongest case possible against scientific realism. The essays do not need to address each other, but should attempt to capture the appeal of scientific realism and anti-realism, respectively.

Final Essay - 40%

Students will be required to write a final essay of eight to ten (8-10) pages in length (approximately 2000-2500 words) on a topic of their choosing related to the course material. Topics must be discussed with and approved by the instructor in person at least three weeks prior to the due date.

## Plagiarism Policy

**Ignorance of what counts as plagiarism is not an excuse. All instances of plagiarism will be taken directly to the appropriate university officials, without warning or notification**. Plagiarism often ends with severe academic sanctions, ranging from a zero on the assignment or examination to permanent expulsion from the University.

The university has a useful guide to avoiding plagiarism, available here:
http://www.writing.utoronto.ca/advice/using-sources

The University of Toronto's official plagiarism policy can be found online here:
http://www.governingcouncil.utoronto.ca/policies/behaveac.htm

This course will use Turnitin.com for the essay assignment. Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site

## Email policy

You are strongly encouraged to ask questions about the syllabus, exams, course material, or assignments during class time in case other students may have the same question. Most other conversations should take place in person rather than via email, so you should only use email for two reasons: to notify the instructor in advance that you will be absence, or to set up a one-on-one meeting if office hours conflict with your schedule. Be sure to include the course code and use the subject line "**Notification of Absence**" or "**Meeting Request**." Any request for a meeting must include at least two times when you would like to meet along with a brief (one or two sentence) description of the reason for the meeting. **Email sent for any other reason, or in any other format, will not be considered or acknowledged**. If you are having or have had a personal emergency, do not panic. Take care of it first, then either request a meeting or approach the instructor after class to find a resolution. Adhering to this email policy is not meant to make the instructor unavailable, but rather to help everyone get to know each other better by fostering a collegial learning atmosphere.

(inspired by Spring-Serenity Duvall's policy)

## Illness, Extensions, and Late Penalties

Should illness cause you to miss a deadline, contact the instructor as soon as possible. You may be required to provide an official University of Toronto medical certificate, found here: http://www.artsandscience.utoronto.ca/current/petitions/certificate.pdf

You are responsible for knowing and abiding by the regulations for missed term work, but please note you have only one week after a missed test or deadline to provide the instructor with a written request for an extension that includes supporting documentation.

Attempts to accommodate late assignments will be made if a student makes early arrangements with the instructor (at least 72 hours) prior to the deadline, or if an official student medical certificate is produced. In other cases, a late penalty of up to 10% per day will be assigned, including weekends.

## Readings Schedule

Note: All readings can be found either on the course website or elsewhere online

Week 1 - *Introduction*
**Required readings**: None
**Recommended readings**: None

Week 2 - *What is Scientific Realism and where does it come from?*
**Required readings**:
1) Section 1 of Chakravartty, Anjan, "Scientific Realism", The Stanford Encyclopedia of Philosophy (Spring 2014 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2014/entries/scientific-realism/>
2) Ladyman, "Understanding Philosophy of Science," Ch.5
**Recommended readings**:
1) Psillos, "The Present State of the Scientific Realism Debate"
2) McMullin, "A Case for Scientific Realism"

Week 3 - *Arguments For Scientific Realism: The "No Miracle" Argument (NMA)*
**Required readings**:
1) Section 2 of Chakravartty, Anjan, "Scientific Realism", The Stanford Encyclopedia of Philosophy (Spring 2014 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2014/entries/scientific-realism/>
2) Sankey, "Scientific Realism: An Elaboration and a Defense"
**Recommended readings**:
1) Lyons, "Explaining the Success of a Scientific Theory"
2) Psillos, "Thinking about the Ultimate Argument for Realism"

Week 4 - *Arguments Against Scientific Realism: The Pessimistic Induction (PI), the Underdetermination of Theories by Evidence (UTE), and the Base Rate Fallacy*
**Required readings**:
1) Section 3 of Chakravartty, Anjan, "Scientific Realism", The Stanford Encyclopedia of Philosophy (Spring 2014 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2014/entries/scientific-realism/>
2) Wray, "A Selectionist Explanation of the Success and Failures of Science"
**Recommended readings**:
1) Lauden, "A Confutation of Convergent Realism"
2) Ladyman, "Understanding Philosophy of Science," Ch. 6;
3) Magnus and Callender, 2004, "Realist Ennui and the Base Rate Fallacy"
4) Votsis, "The Prospective Stance in Realism"

Week 5 - *Varieties of Anti- Realism Part I: Constructive Empiricism*

**Required readings**:

1) van Fraassen, "The Scientific Image," Introduction and Ch.1
2) Foss, "On accepting Van Fraassen's Image of Science"

**Recommended readings**:

1) Maxwell, "The Ontological Status of Theoretical Entities"
2) Bourgeois, "On Rejecting Foss's Image of van Fraassen"
3) Foss, "On Saving the Phenomena and the Mice: A Reply to Bourgeois concerning van Fraassen's Image of Science"
4) van Fraassen, "The Scientific Image," Ch.2-4
5) Rosen, "What is Constructive Empiricism?"
6) van Fraassen, "Gideon Rosen on Constructive Empiricism"
7) Stanford Encyclopedia of Philosophy entry on "Constructive Empiricism"
8) Teller, "Wither Constructive Empiricism"
9) Ladyman, "What's Really Wrong with Constructive Empiricism: van Fraassen and the Metaphysics of Modality"

Week 6 - *Varieties of Realism Part I: Entity Realism and Structural Realism*

**Required readings**:

1) Worrall, "The Best of Both Worlds"
2) Hacking, "Representing and Intervening," Ch.1 and Ch.16

**Recommended readings**:

1) Ladyman, "What is Structural Realism?"
2) Hacking, "Extragalactic Reality: The Case of Gravitational Lensing"
3) Psillos, "Is Structural Realism Possible?"

Week 7 - *Varieties of Anti-Realism Part II: Pragmatism, Nominalism, Instrumentalism, and Social Constructivism*

**Required readings**:

1) Section 4 of Chakravartty, Anjan, "Scientific Realism", The Stanford Encyclopedia of Philosophy (Spring 2014 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2014/entries/scientific-realism/>
2) Kukla, "Social Constructivism and the Philosophy of Science", Ch.1-4

**Recommended readings**:

1) Rouse, "Vampires: Social Constructivism, Realism, and Other Philosophical Undead (Review Essay)"
2) Hacking, *The Social Construction of What?*, preface and Ch.1
3) Feyerabend, "How to Defend Society Against Science"

Week 8 - *Varieties of Realism Part II: Semirealism and Whig Realism*

**Required readings**:

1) Chakravartty, "Semirealism"
2) Solomon, "Social Empiricism," Ch.3

**Recommended readings**:

1) Giere, “Scientific Perspectivism”, Ch.1
2) Barad, “Meeting the Universe Halfway”, Introduction and Ch.1

Week 9 - *Arealism: The Natural Ontological Attitude*
**Required readings**:
1) Fine, “The Natural Ontological Attitude”
2) Hendry, “Are Realism and Instrumentalism Methodologically Indifferent?”
**Recommended readings**:
1) Psillos, “Agnostic Empiricism versus Scientific Realism: Belief in Truth Matters”
2) Hendry, “Realism and Progress: Why Scientists Should be Realists”

Week 10 - *Stance Realism and Stance Empiricism*
**ESSAY PROPOSAL DUE**
**Required readings**:
1) Chakravartty, “Stance Relativism: Empiricism versus Metaphysics”
2) Lipton, “Epistemic Options”
**Recommended readings**:
1) van Fraassen, *The Empirical Stance*, Ch.2
2) Chakravartty, *A Metaphysics for Scientific Realism*, preface, Ch.1
3) Chakravartty, “A Puzzle about Voluntarism about Epistemic Stances”
4) van Fraassen, “Laws and Symmetry”, Ch.6

Week 11 – *Meta-Epistemological Voluntarism*
**Required readings**:
1) Rowbottom and Bueno, “Stance and Rationality: A Perspective”
2) Boucher, “What is a Philosophical Stance? Paradigms, Policies and Perspectives”
**Recommended readings**:
1) Kukla, “Embodied Stances: Realism without Literalism”
2) Wylie, “Arguments for Scientific Realism: The Ascending Spiral”
3) Psillos, “Putting a Bridle on Irrationality: An Appraisal of van Fraassen’s New Epistemology”

Week 12 - *Scientific Realism in the History of Scientific Practice*
**Required readings**:
1) Lyons, “Epistemic Selectivity, Historical Threats, and the Non-Epistemic Tenets of Scientific Realism”
2) Wray, “The Methodological Defense of Scientific Realism Scrutinized”
**Recommended readings**:
1) Forbes, “A Pragmatic, Existentialist Approach to the Scientific Realism Debate”

**5.2 Sample Writing Assignment #1**

# TOPICS IN PHILOSOPHY OF SCIENCE: SCIENTIFIC REALISM

## NON-CRITICAL WRITING ASSIGNMENT

Please include your name, student number, and a word count for each answer.

In 500 words or less, complete one of these two options:

1) In the section titled "Realism and Common Sense" of his "Scientific Realism: An Elaboration and a Defense," Howard Sankey proffers an argument for scientific realism on the basis of common sense. What is this argument, and how does Sankey think it relates to the No Miracles Argument?

2) In section 3 of "A Selectionist Explanation for the Success and Failures of Science," K. Brad Wray argues that "van Fraassen's selectionist explanation is superior to the realists' explanation in two ways" (p. 85). What are these two ways, and why does Wray thinks they undercut the realist's No Miracles Argument?

## 5.3 Sample Take Home Test – Revolutions in Science

# Revolutions in Science: Take Home Test 2

**Complete three (3) options total:** one from section A, one from section B, and from either section A or B.

Be sure to use your own words as much as possible while still referencing relevant portions of text (i.e. try to paraphrase *with citations* rather than giving lengthy quotations). Feel free to use the recommended readings, in addition to the assigned readings, but please do not use external sources, including online resources or encyclopedias.

Each answer should be approximately 500 words in length (2 double spaced pages), give or take 50 words. Going significantly over this word count will incur a penalty.

**Section A**

1) Kuhn argues that the division of fact from theory, of discovery from invention, is "exceedingly artificial." Nevertheless, Chapters VI and VII of *Structure* are divided around this dichotomy. Explain why Kuhn views this division as somewhat artificial it terms of anomalies, crises, and paradigm shifts. If the relations between discovery and invention, and between fact and theory, are as Kuhn says they are, what are the consequences for the nature of observation (i.e. perception) and evidential assessment between competing paradigms? Be sure to discuss the psychological experiments that Kuhn discusses.
2) Kuhn argues that Newton's theory is not just a special case of Einstein's theory, i.e. that Newton's theory shouldn't be considered approximately true in a limited domain (e.g. amongst objects moving slowly relative to the speed of light). Explain the view that Kuhn is arguing against, including the arguments generally forwarded in its favor, and then explicate the two arguments he outlines in response, using the example of Newtonian vs. Einsteinian dynamics.
3) In Chapter XII of *Structure*, Kuhn lists three reasons competing paradigms are incommensurable, i.e. why proponents of these paradigms are "talking through each other" and "are always at least slightly at cross-purposes." Describe them each in detail, with at least one example for each. Given these difficulties, and the fact that transitions between competing paradigms must occur "all at once" like a Gestalt shift, how is it that people are persuaded to adopt a new paradigm, i.e. what sorts of arguments prove effective in inducing change of allegiance for individual scientists at different stages of extraordinary science?

**Section B**

1) Kuhn writes that, given his account of science, we may "have to relinquish the notion, explicit or implicit, that changes of paradigm carry scientists and those who learn from them closer and closer to the truth" (170). What arguments and analogies does Kuhn offer for relinquishing the notion of progress towards the truth? If science does not produce theories that, over time, converge on the truth, what does its produce, i.e. what notion of "scientific progress" might we consistently maintain for science, given Kuhn's account?
2) After writing *Structure*, Kuhn faced a lot of criticism from philosophers of science who claimed his account of theory choice made science out to be an irrational process, i.e. a matter of "mob psychology." Explain Kuhn's response to this accusation, i.e. the way in which paradigm and theory selection, on his account, can be seen as a rational choice that nevertheless differs between individual scientists. Be sure to discuss why is it possible for scientists to make conflicting yet equally rational assessments of theoretical preferability, and in what senses theory assessment is (and is not) "subjective."
3) In contrast to the early account of incommensurability suggested in *Structure*, Kuhn's account of incommensurability evolved in later years into a "taxonomical" account. This later account understood incommensurability as linguistic differences between different theoretical frameworks, rather than as different ways of practicing a particular discipline. Explain this later understanding of incommensurability and its consequences for comparing the content of different theories to one another. Be sure to discuss the differences between "interpretation" and "translation," and the nature of semantic holism.

## 5.4 Sample Entrance and Exit Survey – Scientific Realism

Please quickly indicate your agreement or disagreement with the following statements.

| Statement | Strongly Agree | Agree | No Idea | Disagree | Strongly Disagree | I Don't Care |
|---|---|---|---|---|---|---|
| **SCIENTISM** | | | | | | |
| Science is our best guide to the truth about reality. | [X] | [X] | [X] | [X] | [X] | [X] |
| Modern science discredits or disproves most pre-scientific (e.g. religious, spiritual, mystical, etc.) claims about the world. | [X] | [X] | [X] | [X] | [X] | [X] |
| People who do not accept the claims of modern science are, ipso facto, irrational. | [X] | [X] | [X] | [X] | [X] | [X] |
| While individual people are entitled to their beliefs, public policy should always and exclusively be based in scientific thinking. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific inquiry is a suitable (or even superior) substitute for many traditional intellectual endeavours such as theology, philosophy, and ethics. | [X] | [X] | [X] | [X] | [X] | [X] |
| Non-experts should learn to trust scientists. | [X] | [X] | [X] | [X] | [X] | [X] |
| **SCIENTIFIC REALISM** | | | | | | |
| Dinosaurs existed. | [X] | [X] | [X] | [X] | [X] | [X] |
| Electrons exist. | [X] | [X] | [X] | [X] | [X] | [X] |
| Higgs Bosons exist. | [X] | [X] | [X] | [X] | [X] | [X] |
| Black holes exist. | [X] | [X] | [X] | [X] | [X] | [X] |
| Ghosts exist. | [X] | [X] | [X] | [X] | [X] | [X] |
| Einstein's theory of General Relativity is true. | [X] | [X] | [X] | [X] | [X] | [X] |
| Quantum Mechanics is true. | [X] | [X] | [X] | [X] | [X] | [X] |
| Thermodynamics is true. | [X] | [X] | [X] | [X] | [X] | [X] |
| Freudian Psychoanalytics is true. | [X] | [X] | [X] | [X] | [X] | [X] |
| Marxist economics is true. | [X] | [X] | [X] | [X] | [X] | [X] |

| Statement | Strongly Agree | Agree | No Idea | Disagree | Strongly Disagree | I Don't Care |
|---|---|---|---|---|---|---|
| Mainstream economics is true. | [X] | [X] | [X] | [X] | [X] | [X] |
| The Big Bang explains the origin of the universe. | [X] | [X] | [X] | [X] | [X] | [X] |
| Evolutionary biology explains the origin of species. | [X] | [X] | [X] | [X] | [X] | [X] |
| Evolutionary biology explains the origin of life itself. | [X] | [X] | [X] | [X] | [X] | [X] |
| Phlogiston-based chemistry explains the qualitative similarity of all metals. | [X] | [X] | [X] | [X] | [X] | [X] |
| The caloric theory of heat explains the speed of sound in air. | [X] | [X] | [X] | [X] | [X] | [X] |
| **ANTI-REALISM** | | | | | | |
| Modern science is importantly and/or largely false. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific theories can still "work" (e.g. make accurate predictions or provide explanations) without being true. | [X] | [X] | [X] | [X] | [X] | [X] |
| Modern science suppresses or ignores alternative perspectives on the nature of reality that should not be so suppressed or ignored. | [X] | [X] | [X] | [X] | [X] | [X] |
| The idea that modern science is true helps perpetuate social injustice. | [X] | [X] | [X] | [X] | [X] | [X] |
| There are many different truths about reality, and they are all in some sense equally true, even though they do not all make sense together. | [X] | [X] | [X] | [X] | [X] | [X] |
| Truth and reality are subjective, i.e. what's true and real for one person may not be true and real for everyone. | [X] | [X] | [X] | [X] | [X] | [X] |
| Our current best scientific theories are no more secure or certain than any of the many failed theories of the past (e.g. phlogiston chemistry, caloric theory, Newtonian mechanics, etc.). | | | | | | |
| **THE AIM OF SCIENCE** | | | | | | |

| Statement | Strongly Agree | Agree | No Idea | Disagree | Strongly Disagree | I Don't Care |
|---|---|---|---|---|---|---|
| The ultimate aim of science is to create true theories. | [X] | [X] | [X] | [X] | [X] | [X] |
| The ultimate aim of science is to explain phenomena (e.g. gravitation, speciation, electrical attraction, etc). | [X] | [X] | [X] | [X] | [X] | [X] |
| The ultimate aim of science is to determine the ontological make-up of reality. | [X] | [X] | [X] | [X] | [X] | [X] |
| The ultimate aim of science is to discover the laws of nature governing reality. | [X] | [X] | [X] | [X] | [X] | [X] |
| The ultimate aim of science is to make accurate predictions. | [X] | [X] | [X] | [X] | [X] | [X] |
| The ultimate aim of science is to produce technology. | [X] | [X] | [X] | [X] | [X] | [X] |
| Science does not have a single identifiable aim. | [X] | [X] | [X] | [X] | [X] | [X] |
| **ACCEPTING SCIENTIFIC THEORIES** | | | | | | |
| Scientific theories are acceptable if and only if they are true. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific theories are acceptable if and only if they provide good explanations. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific theories are acceptable if and only if they make accurate predictions. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific theories are acceptable if and only if they generate new paths of research. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific theories are acceptable if and only if they accord with one's political beliefs. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific theories are acceptable for a diversity of reasons. | [X] | [X] | [X] | [X] | [X] | [X] |
| A good scientific theory is true with respect to both observables (trees, cannonballs, planets, etc.) and unobservables (electrons, quarks, microbes, genes). | [X] | [X] | [X] | [X] | [X] | [X] |
| A good scientific theory is true with respect to observables, but not necessarily with respect to unobservables. | [X] | [X] | [X] | [X] | [X] | [X] |

| Statement | Strongly Agree | Agree | No Idea | Disagree | Strongly Disagree | I Don't Care |
|---|---|---|---|---|---|---|
| **SCIENTIFIC METHOD** | | | | | | |
| There is one, unique, distinctly *scientific* method. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific inquiry, when conducted properly, generally leads to truth. | [X] | [X] | [X] | [X] | [X] | [X] |
| Science is an inherently rational enterprise. | [X] | [X] | [X] | [X] | [X] | [X] |
| Evidence and observation is the only viable arbiter for conflicts between scientific theories. | [X] | [X] | [X] | [X] | [X] | [X] |
| Metaphysical speculation should be avoided in the sciences. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific theories that were once widely accepted, but are now known to be strictly false, were accepted because people were biased, or did not employ proper scientific method. | [X] | [X] | [X] | [X] | [X] | [X] |
| After properly implementing the scientific method over several centuries, our current (scientific) understanding of reality is more true than previous understandings. | [X] | [X] | [X] | [X] | [X] | [X] |
| **SCIENCE AND PROGRESS** | | | | | | |
| As time goes on, science makes progress. | [X] | [X] | [X] | [X] | [X] | [X] |
| Scientific progress is mainly about producing better theories. | [X] | [X] | [X] | [X] | [X] | [X] |
| Science progresses mainly by accumulating truths and correcting error. | [X] | [X] | [X] | [X] | [X] | [X] |
| Science progresses in ways other than by accumulating truth and correcting error. | [X] | [X] | [X] | [X] | [X] | [X] |
| Science is a (generally) positive force in society. | [X] | [X] | [X] | [X] | [X] | [X] |
| **REVOLUTIONARY CHANGE** | | | | | | |
| Scientific inquiry sometimes goes through "revolutionary" periods where our picture of the world changes radically. | [X] | [X] | [X] | [X] | [X] | [X] |

| Statement | Strongly Agree | Agree | No Idea | Disagree | Strongly Disagree | I Don't Care |
|---|---|---|---|---|---|---|
| Scientific revolutions are sometimes necessary. | [X] | [X] | [X] | [X] | [X] | [X] |
| Political revolutions are sometimes necessary. | [X] | [X] | [X] | [X] | [X] | [X] |
| Science will likely undergo one or more revolutions in the future. | [X] | [X] | [X] | [X] | [X] | [X] |

# Topics in the Philosophy of Science
# REVOLUTIONS IN SCIENCE

**Instructor: Curtis Forbes**
**PhD Candidate - Institute for the History and Philosophy of Science and Technology**
Email: curtis.forbes@utoronto.ca
Office Hours: by appointment

## Course Description

This course is an investigation of how scientific theories change over time that pays special attention to Thomas Kuhn's idea of "revolutionary" change in science. The course will effectively be a Kuhn sandwich: we will begin with some introductory material, move on to a close reading of Kuhn's *The Structure of Scientific Revolutions*, and finish by addressing a few of the many questions raised by Kuhn's work: is political change a good metaphor or model for scientific change? Can we explain scientific change scientifically? Can studying the history of science negatively impact scientific practice? Should the existence of revolutionary change in the history of science undercut our faith in the truth of modern science? Throughout the course we'll be continually looking at whether theory change is "rational," whether science is "progressive" in any important sense, and whether science can be seen as converging on a "final" or "fundamental" theory of everything.

## Basic Course Structure

This course will be structured as a seminar. For each class (after the first) there will be two required readings, along with a list of recommended (optional) readings. At the beginning of each class two students will be selected *at random*, each giving a ten (10) minute verbal summary of one of the articles for that day. After the presentations are over, students will discuss the issues raised in the readings, under guidance from the instructor.

Student evaluation will be based on:

In-Class Presentation (10%)
Non-Critical Reading Summary (5% x 4 = 20%)
Critical Reading Summary (10%)
For-and-Against Assignment (20%)
Final Essay (40%)

## Evaluation

All assignments in this course will be graded according to the guidelines given by the University of Toronto's Faculty of Arts and Science:

### Presentation – 10%

| Percentage | Letter Grade | Grade Point Value | Grade Definition | |
|---|---|---|---|---|
| 90-100 | A+ | 4.0 | Excellent | Strong evidence of original thinking; good organization; capacity to analyze and synthesize; superior grasp of subject matter with sound critical evaluations; evidence of extensive knowledge base. |
| 85-89 | A | 4.0 | | |
| 80-84 | A- | 3.7 | | |
| 77-79 | B+ | 3.3 | Good | Evidence of grasp of subject matter, some evidence of critical capacity and analytic ability; reasonable understanding of relevant issues; evidence of familiarity with literature |
| 73-76 | B | 3.0 | | |
| 70-72 | B- | 2.7 | | |
| 67-69 | C+ | 2.3 | Adequate | Student who is profiting from the university experience; understanding of the subject matter and ability to develop solutions to simple problems in the material. |
| 63-66 | C | 2.0 | | |
| 60-62 | C- | 1.7 | | |
| 57-59 | D+ | 1.3 | Marginal | Some evidence of familiarity with the subject matter and some evidence that critical and analytic skills have been developed. |
| 53-56 | D | 1.0 | | |
| 50-52 | D- | 0.7 | | |
| 0-49 | F | 0.0 | Inadequate | Little evidence of even superficial understanding of subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature. |

Each assigned reading will be introduced at the beginning of class through a verbal presentation by a randomly selected student. This will ensure that every student is prepared to contribute to subsequent class discussions. These presentations will not need to provide a perfect summary of the material in order for the student to get a perfect grade. The goal will be to demonstrate that one has read and thought about the article by summarizing its main argument and discussing some confusions or objections.

### Non-Critical Reading Summary - 5%

Students will be required to produce four different one page (approximately 250 word) summaries of an argument found in the readings. The goal will be to concisely reconstruct the specified argument without providing any critique or assessment of that argument.

Critical Reading Summary - 10%

Students will be required to produce a two page (approximately 500 word) summary of one of the readings. The goal will be to concisely summarize the relevant article by outlining its main argument and to then evaluate this argument.

For-and-Against Assignment - 20%

Students will be required to write two four page essays (approx. 1000 words each). One essay will build the strongest case possible in favour of Kuhn's picture of scientific change. The other essay will build the strongest case possible against Kuhn's picture. The essays do not need to address each other, but should attempt to capture both the appeal of Kuhn's picture and its more disconcerting aspects, respectively.

Final Essay - 40%

Students will be required to write a final essay of eight to ten (8-10) pages in length (approximately 2000-2500 words) on a topic of their choosing related to the course material. Topics must be discussed with and approved by the instructor in person at least three weeks prior to the due date.

## Plagiarism Policy

**Ignorance of what counts as plagiarism is not an excuse. All instances of plagiarism will be taken directly to the appropriate university officials, without warning or notification**. Plagiarism often ends with severe academic sanctions, ranging from a zero on the assignment or examination to permanent expulsion from the University.

The university has a useful guide to avoiding plagiarism, available here:
http://www.writing.utoronto.ca/advice/using-sources

The University of Toronto's official plagiarism policy can be found online here:
http://www.governingcouncil.utoronto.ca/policies/behaveac.htm

This course will use Turnitin.com for the essay assignment. Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site

## Email policy

You are strongly encouraged to ask questions about the syllabus, exams, course material, or assignments during class time in case other students may have the same question. Most other conversations should take place in person rather than via email, so you should only use email for two reasons: to notify the instructor in advance that you will be absence, or to set up a one-on-one meeting if office hours conflict with your schedule. Be sure to include the course code and use the subject line "**Notification of Absence**" or "**Meeting Request**." Any request for a meeting must include at least two times when you would like to meet along with a brief (one or two sentence) description of the reason for the meeting. **Email sent for any other reason, or in any other format, will not be considered or acknowledged**. If you are having or have had a personal emergency, do not panic. Take care of it first, then either request a meeting or approach the instructor after class to find a resolution. Adhering to this email policy is not meant to make the instructor unavailable, but rather to help everyone get to know each other better by fostering a collegial learning atmosphere.

(inspired by Spring-Serenity Duvall's policy)

## Illness, Extensions, and Late Penalties

Should illness cause you to miss a deadline, contact the instructor as soon as possible. You may be required to provide an official University of Toronto medical certificate, found here: http://www.artsandscience.utoronto.ca/current/petitions/certificate.pdf

You are responsible for knowing and abiding by the regulations for missed term work, but please note you have only one week after a missed test or deadline to provide the instructor with a written request for an extension that includes supporting documentation.

Attempts to accommodate late assignments will be made if a student makes early arrangements with the instructor (at least 72 hours) prior to the deadline, or if an official student medical certificate is produced. In other cases, a late penalty of up to 10% per day will be assigned, including weekends.

## Readings Schedule

Note: aside from Kuhn's *Structure*, all readings can be found either on the course website or elsewhere online

Week 1 - The Problems with Scientific Revolutions
**Required readings**:
None
**Recommended readings**:
Lipton, "The Truth about Science"
2) Hacking, *Representing and Intervening*, Ch.1

Week 2 - Logical Empiricism and Falsificationism
**Required readings**:
Popper, "Science: Conjectures and Refutations"
**Recommended readings**:
Ayer, *Language, Truth, and Logic*

Week 3 - The Structure of Scientific Revolutions - Part I
**Required readings**:
Kuhn, *The Structure of Scientific Revolutions*, Preface, Ch. 1 and 2
**Recommended readings**:
Kuhn, "The Historical Structure of Scientific Discovery"

Week 4 - The Structure of Scientific Revolutions - Part II
**Required readings**:
Kuhn, *The Structure of Scientific Revolutions*, Ch. 3, 4, and 5
**Recommended readings**:
Lavoisier, *Elements of Chemistry*, preface

Week 5 - The Structure of Scientific Revolutions - Part III
**Required readings**:
Kuhn, *The Structure of Scientific Revolutions*, Ch. 6, 7, and 8
**Recommended readings**:
Einstein, "On the Electrodynamics of Moving Bodies"

Week 6 - The Structure of Scientific Revolutions - Part IV
**Required readings**:
Kuhn, *The Structure of Scientific Revolutions*, Ch. 9, 10, and 11
**Recommended readings**:
Heisenberg, *Physics and Philosophy*

Week 7 - The Structure of Scientific Revolutions - Part V
**Required readings**:
Kuhn, *The Structure of Scientific Revolutions*, Ch. 12, 13, postscript

**Recommended readings**:
Porter, "The scientific revolution: a spoke in the wheel?"

Week 8 - Kuhn, after Structure
**Required readings**:
Kuhn, "Commensurability, Comparability, Communicability"
Kuhn, "Objectivity, Value Judgment, and Theory Choice"
**Recommended readings**:
Leahey, "The Mythical Revolutions of American Psychology"

Week 9 - Social and Political Revolutions - A Model for Science?
**Required readings**:
Marx and Engels, *The Communist Manifesto*, selections
Zagorin, "Theories of Revolution in Contemporary Historiography"
**Recommended readings**:
Marcos, *Our Word is Our Weapon*

Week 10 - Sociology of Scientific Knowledge and Feminist Science Criticism
**Required readings**:
Bloor, *Knowledge and Social Imagery*, Ch.1
Harding, *Whose Science? Whose Knowledge?*, Ch.1
**Recommended readings**:
Lloyd, "Science and Anti-Science: Objectivity and its Real Enemies"
Feyerabend, "How to Defend Society Against Science"

Week 11 - Sociology of Scientific Knowledge in the History of Science
**Required readings**:
Brush, "Should the History of Science be Rated X?"
Shapin and Schaffer, *Leviathan and the Air-Pump*, selections
**Recommended readings**:
Shapin, "The Sociology of Scientific Knowledge"
Biagioli, *Galileo Courtier*

Week 12 - Theory Change and Scientific Realism
**Required readings**:
Larry Lauden, "A Confutation of Convergent Realism"
John Worrall, "The Best of Both Worlds"
**Recommended readings**:
Arthur Fine, "Science Made Up"
Bas van Fraassen, *The Scientific Image*, Ch.1 and 2