# Course Syllabus

Douglas Marshall
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Philosophy of Science

## 1 Logistics

Title: PHIL 251 - Evidence, Objectivity, and Realism in the Sciences

Meeting Times: Fall 2019, T TH 10:10 – 11:55 a.m.

Meeting Location: Leighton Hall Room 303

Instructor: Douglas Marshall (dmarshall@carleton.edu)

Instructor's Office: Leighton Hall 310

Office Hours: M 1:30 – 3:00 p.m.; TH 1:00 – 2:00 p.m.
(Please use the office hours scheduler in moodle to book time in office hours.)

Course Website:

`https://moodle.carleton.edu/course/view.php?id=30941`

## 2 Course Description

PHIL 251 is a course dealing with several central topics in the philosophy of science. The course is broken up into three parts, and during each part we will grapple with a different (though clearly related) set of questions.

**Part A. Science vs. Pseudoscience vs. Non-Science.** In virtue of what does a field, discipline, or enterprise count as a science? How can we differentiate the sciences from disciplines or enterprises that present themselves as sciences while falling short of being sciences ("pseudosciences"), or are just different sorts of enterprise altogether ("non-sciences")? In what principled way can we take a list of disciplines—say, astronomy, astrology, biology, phrenology, sociology, climate science, creation science, art criticism—and sort the list into sciences, pseudosciences, and non-sciences?

**Part B. Confirmation and Evidence in the Empirical Sciences.** What is the nature of scientific evidence? How can particular empirical data constitute evidence for general hypotheses, models, theories? To what extent is it possible to assess or quantify the strength with which empirical evidence supports a scientific hypothesis, model, or theory?

**Part C. Values and Objectivity in the Sciences.** In what sense can a scientific result or scientific evidence be objective? Does the content of various scientific theories—for example, biology and primatology—suffer from gender biases in a way that undermines these disciplines' claims to objectivity? If scientific facts are relative to a paradigm or research program, in what sense are scientific facts privileged over, *e.g.*, the current administration's "alternative facts"?

There are a number of other central topics in the philosophy of science that we could have covered, but either won't cover, or will at most cover very briefly. These include: the character of scientific explanations; what it is to be a law of nature; issues of metaphysical realism and instrumentalism in the sciences (e.g., do genes or Higgs-Bosons *really* exist?); whether there is a significance sense in which scientific theories are undetermined by all, or even all possible, empirical evidence (Duhem-Quine underdetermination).

## 3 Course Requirements

**1. Reading:** It is crucial to the functioning of this course that you read the required texts carefully. If readings are assigned for a given class meeting, you should be sure to do the readings before class meets. Reading philosophical texts is hard. You will not be prepared if you don't do the reading carefully and critically. I strongly recommend doing every reading for the class at least twice.

**2. Writing:** You will write three papers due over the course of the term. The first paper will be about 5 pages long (1,500 words approximately) and will defend a thesis concerning whether some field, discipline, or enterprise of interest to you is a science. You will have an opportunity to rewrite your first papers in light of feedback from me. The second paper will be about 4 pages long (1,200 words maximum) and will assess the strength of the current evidence for the claim that hurricanes are becoming more damaging over time.

The final paper will be about 8 pages long (2,400 words approximately) and can deal with any aspect of the course of interest to you—though your final paper should differ significantly from the other papers you hand in for the course.

**3. Take Home Exam:** There will be a take home exam covering the material of the first two-thirds of the course, with a focus on issues pertinent to confirmation and evidence in the empirical sciences. There will be no final exam.

**4. Class Participation:** Participation includes punctual attendance in class and contributions to class discussions. I will take attendance at each meeting. I encourage everyone to be part of our discussion, and I suggest you set a goal of participating actively (e.g., asking a question, describing your understanding) at least once or twice during each class meeting. If possible, you should avoid missing more than one week of class meetings. In cases where there may be good reasons for an extended absence, please work with the class deans on modifying course deadlines.

## 4 Tentative Schedule of Topics and Readings

The following weekly schedule is approximate and subject to change. Please see the course website for up-to-date weekly readings and assignments. The readings for a given week will always be posted by Friday evening of the previous week.

| WEEK | TOPICS | AUTHORS |
|---|---|---|
| 1 | Science vs. Pseudoscience<br>vs. Non-Science | K. Popper<br>T. Kuhn |
| 2 | Astronomy and Astrology | R. Westfall<br>P. Thagard |
| 3 | Creation Science;<br>Induction | M. Ruse, L. Laudan;<br>B. Russell |
| 4 | Falsificationism;<br>Inductive Confirmation | K. Popper;<br>C. Hempel |

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|---|---|---|
| 5 | Inductive Confirmation;<br>The New Riddle of Induction | C. Hempel<br>N. Goodman |
| 6 | Bayesianism;<br>Hurricanes | Peter Godfrey-Smith;<br>Various Authors |
| 7 | Normal Science<br>and Scientific Revolutions | T. Kuhn |
| 8 | Incommensurability<br>and Relativism | P. Feyerabend;<br>B. Barnes & D. Bloor |
| 9 | Gender Bias in<br>Biology and Primatology | K. Okruhlik, L. Lloyd;<br>H. Longino |
| 10 | Scientific Objectivity | H. Longino |

## 5 Grading

First Paper, 5 pages (1,500 words approximately): 20%
Second Paper, 4 pages (1,200 words maximum): 20%
Final Paper, 8 pages (2,400 words approximately): 30%
Take Home Exam: 20%
Participation: 10%

I will use the percentages above in computing a final raw score at the end of the semester for each student. Your final grade will be based on your raw score, but it will take improvement over the course of the semester into account.

*Extensions Policy:* Extensions on the papers must be requested before the date on which the paper is due. Papers that are late without an extension or beyond an extension will be discounted at the rate of one-third of a grade per day (A to A-, A- to B+, and so forth). Papers will not be accepted more than one week after the due date except under extraordinary circumstances. In such circumstances, arrangements should be made in consultation with the class deans.

*Once-per-term Automatic Extension:* Once in the term you may hand a paper in up to 24 hours late without any penalty to your grade. You do not need to notify me that you are using your once-per-term automatic extension

in order to use it. When I calculate final grades, I will simply ignore up to 24 hours of lateness for any one paper due in PHIL 251.

## 6 Technology and Course Texts

**As a general rule, I prohibit the use of mobile phones, tablets, laptops, etc., in the classroom.** Please either turn them off or silence them before you enter. In certain circumstances, I am willing to make exceptions to the general rule. Some students have technology accommodations through the disability services office–in that case, please have disability services send me a message. Other students with special circumstances may come talk to me about them.

**You must bring copies of our course texts to the classroom on the days that we are discussing those texts.** For each of our class meetings, you will need to print out the assigned readings, do the readings, and bring them to class.

## 7 The Writing Center

The Writing Center, located in 420 4th Libe, has peer writing consultants who can work with you during any stage of the writing process (brainstorming to final proofreading). Hours are listed here: `https://apps.carleton.edu/campus/asc/writingcenter/`. You can reserve specific times for conferences in 420 4th Libe by using their online appointment system: `https://writingcenter.carleton.edu/`. Walk-ins are welcome, though writers with appointments have priority.

If you are a second language writer and believe you might benefit from working individually with a writing consultant on a regular basis this term, e-mail Renata Fitzpatrick, Multilingual Writing Coordinator (rfitzpatri@carleton.edu), call her at x5998, or stop by her office in 420D 4th Libe. She can arrange once- or twice-a-week meetings between you and a specific writing consultant throughout the term.

## 8 Accommodations for Students with Disabilities

Carleton College is committed to providing equitable access to learning opportunities for all students. The Disability Services office (Henry House, 107 Union Street) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you

have, or think you may have, a disability (e.g., mental health, attentional, learning, autism spectrum disorders, chronic health, traumatic brain injury and concussions, vision, hearing, mobility, or speech impairments), please contact disability@carleton.edu or call Jan Foley, Student Accessibility Specialist (x4464) or Chris Dallager, Director of Disability Services (x5250) to arrange a confidential discussion regarding equitable access and reasonable accommodations.

## 9 Academic Integrity

All work submitted by you is assumed to be your own original work that has not been submitted elsewhere. Any words or ideas borrowed from other sources must be properly attributed. Any cases of suspected dishonesty will be forwarded to the Academic Standing Committee, as required by Carleton's policy on academic integrity. In confirmed cases of academic dishonesty, I will recommend a penalty ranging from a failing grade for the assignment to failure in the course. Carleton College may pursue further action.

For more information about academic integrity at Carleton and guidelines about how to avoid plagiarism in your work, please go to:
`https://apps.carleton.edu/campus/doc/integrity/`.

## 10 Course Objectives

**1. Learn how to articulate and defend a philosophical position concerning science in speech and in writing.**

**2. Engage with publications of scientific findings that are written for a general audience.**

**3. Get a feel for the tremendous breadth of the philosophy of science so that you can pursue it not just during the class but, if you are so inclined, after the class is over.**