

PHIL 2301: Introduction to the Philosophy of Science

Fall 2015

Carleton University

Department of Philosophy

Instructor: Dr. Kevin deLaplante

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Meeting Dates: Sep 02, 2015 - Dec 07, 2015

Days: Tue Thu

Time: 11:35am - 12:55pm

Office Hours: Tuesday 1:30pm - 2:30pm and by appointment

Office: 329B Paterson

Mailbox: 3A42 Paterson

cuLearn: All assignments, readings and other course materials will be available through cuLearn. Communication with the students will primarily be through email.

Prerequisite: a course in philosophy or second-year standing

Catalog Description:

Students in this course will be introduced to main questions, problems, and approaches that philosophers of science have raised about science, as analytical philosophy of science took its present shape (from roughly 1950 to present). Thus, while important historical figures may be discussed incidentally, readings will be drawn primarily from contemporary philosophy of science. Key concepts to be discussed include theory, inference, and explanation. Central philosophical questions will be about science, its aims, and methods, such as, 'How are theories evaluated?' 'How does science explain anything?' 'Does science aim for truth?' The goal of the course is to stimulate students' thinking about the chosen questions and provoke them to form views about them. The objective is not merely for them to understand how philosophers and others have answered these questions, but to understand and evaluate their arguments, recognizing their strengths and weaknesses, possibly trying to improve upon them. Students should be encouraged to formulate their own arguments and defend them, as far as they are able.

Organizing theme for this term:

This term, the organizing theme for the course will be to examine these traditional issues in the philosophy of science as they bear on the following question: "What does it mean to be scientifically literate in the 21st century?". A case will be made that science literacy for the modern world really amounts to *philosophy of science* literacy, and that traditional science education largely does not prepare students to think in an informed and critical way about science. The central goal of this course is for the students in this class to leave this course with the ability to critically engage discussions about the nature of science and its role in modern life.

Topics:

Below is a list of topic categories arranged in roughly the chronological order that I anticipate we'll address them. However, the list of topics is dynamic and can change as the class progresses.

1. Science Literacy: What It Is and Why It's Important
2. Why Genuine Science Literacy = History and Philosophy of Science Literacy
3. The Vocabulary of Science
 1. Debates in science that turn on the meanings of the words we're using
 2. Important concepts for understanding the nature of science
 1. empirical/empiricism
 2. empirical/observable claims vs. theoretical claims
 3. the observable/ unobservable distinction
 4. "phenomenological" vs. theoretical
 3. Epistemically-loaded and Epistemically-Neutral meanings of ...
 1. theory
 2. law
 3. hypothesis
 4. fact
4. The Logic of Scientific Reasoning
 1. Deductive vs. Inductive reasoning
 2. Hypothetical/conditional reasoning in science and in everyday life
 3. Valid and invalid conditional argument forms
 4. Hypothetico-Deductive reasoning (confirmation and falsification)
 5. The fundamentally comparative nature of hypothesis testing in science
5. Cognitive Biases and Scientific Reasoning
 1. "Science is what we do keep us from lying to ourselves."
 2. The nature of cognitive biases, with some important examples for science
 1. confirmation bias
 2. "patternicity"
 3. experimenter bias/subject bias
 3. Scientific protocols that neutralize or reduce the distorting effects of cognitive biases
 1. the randomized, controlled, double-blind study
 2. the so-called "hierarchy of evidence"
 3. the methodology of meta-studies
6. The Landscape of Science
 1. General features of scientific reasoning vs. domain-specific features of scientific reasoning
 2. Natural vs. Social science
 3. Social science: how is science different when we're trying to understand human behavior?
 4. Physical science vs. Life Science
 5. Case Study: Are there laws in biology?
 6. Case Study: Are there "causes" in physics?

Evaluation Components and Grading Scheme: Summary

Attendance:	5%
In-class Tests: 2 x 15% =	30%
Short Essay (1500-2000 words) (contemporary issues topic):	15%
Writing Assignments (in-class and take-home):	15%
In-Class Quizzes:	15%
Final Exam (cumulative):	<u>20%</u>
Total:	100%

Number to Letter Transfer

All final grades at Carleton are letter grades. I will be issuing numerical grades on course elements, and calculating a final grade out of 100. Here is the standard conversion used at Carleton.

A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	0-49

Evaluation Components: Discussion

Attendance:

Attendance and participation in this class is essential to its success. I take attendance with the first five minutes of class. Late arrivals are treated as absences, unless extenuating circumstances are noted (e.g. mobility issues).

You start out with 5 points (5%). Everyone is entitled to two "freebie" unexcused absences. For every unexcused absence after that, you lose one of these 5 points, until the 5 are gone.

Excused absences include those that would justify allowing a makeup for missing a final exam (documentable sickness, death in the family/compassionate grounds). They do not include absences that are inconsistent with the fair evaluation of others in the class (e.g. they do not include early travel plans, travel to weddings, job interviews, etc.).

In-class Tests:

There will be two in-class tests, at roughly the 1/3 and 2/3 date intervals (so, the first test in early October, the second around mid-November — exact dates tba). Each is worth 15%, for a total of 30%. Questions will be in a variety of formats, including true/false, multiple choice, "define/explain the following terms", and short answer/essay questions.

I will circulate a list of review questions prior to any test, and allow class time for discussion of these questions.

Make-up tests can be arranged if students are absent for an excusable reason, and offering the make-up is consistent with the fair evaluation of other students in the class.

Short Essay (1500-2000 words):

You will have a short essay assignment that will focus on a contemporary topic or issue that can be illuminated by viewing it through the lens of one or more of the methodological or philosophical concepts introduced in this class.

Example: Explain the logic of why current scientists are so convinced of the Big Bang theory, using the hypothetic-deductive framework introduced in class.

Example: Explain why, despite thousands of anecdotal stories that have persuaded many parents, medical researchers do not believe there is a causal link between vaccinations and autism rates.

Details of the assignment will be discussed in class, but it will require a three-stage process of initial topic selection and preliminary research for my approval and feedback

(due around mid-term); initial draft, submitted for feedback (due at some point in November); and final revised draft, due before the last day of class.

Writing Assignments (in-class and take-home):

I will periodically ask students to complete a short writing assignment, either individually or with a group, and either in-class or take-home. These will typically be graded on a complete/incomplete basis. Typically, these will not be subject to make-up if you are absent for them. If you are away due to an excused absence, such as a medical absence, you will not be penalized for missing an in-class writing assignment.

In-class Quizzes:

I will announce in-class quizzes in advance. These will typically be five questions of the true/false, fill-in-the-blank or multiple choice variety.

You will be required to bring an index card to class to complete these quizzes. You can purchase a package of index cards anywhere that sells stationary for around 2 dollars that will last you the whole term.

Questions will be displayed on the projector. You write answers on your card. We swap cards with a neighbour, take up the answers in class and your neighbor grades your card and returns it to you. I then collect the cards.

Questions and answers to quiz questions will be made available on cuLearn, and will be a useful aid for review before a test.

Final Exam (cumulative):

A final written exam is required, and will be held during finals week.

Department of Philosophy and Carleton University Policies (2015-16)

Assignments:

Unless specifically told otherwise by their instructors, students:

- must not use a plastic or cardboard cover or paper clips
- must staple the paper (there is a stapler on the essay box)
- must include the following:
 - student name
 - student number
 - course number and section
 - instructor's name
- No assignments will be accepted after the last day for handing in term work – see dates in next column.
- Assignments handed in through the essay box (just inside the glass doors, Paterson Hall, Floor 3A) must be dropped into the box by **4:15** on a regular business day in order to be date-stamped with that day's date. Assignments handed in after 4:15 or on a non-business day will be stamped as having been handed in on the next business day.
- Students are required to keep copies of their assignments. If your paper is lost at any point, you will be considered not to have submitted it if you cannot produce a copy immediately on request.

Deferrals for Term Work:

If you miss a final examination and/or fail to submit a final assignment by the due date because of circumstances beyond your control, you may apply for a deferral of examination/assignment. For deferred examinations, you must apply within 5 working days after the scheduled date of your exam. To apply for deferral of a final assignment, you must apply within 5 working days of the last scheduled day of classes. Visit the Registrar's Office for more information.

Plagiarism:

It is the responsibility of each student to understand the meaning of 'plagiarism' as defined in the Undergraduate or Graduate Calendars, and to avoid both committing plagiarism and aiding or abetting plagiarism by other students. (Undergraduate Calendar Academic Regulations, section 14.3, or <http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/acadregsuniv14/>)

Academic Accommodation:

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy obligation: write to your professor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: <http://www2.carleton.ca/equity/>

Religious obligation: write to your professor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: <http://www2.carleton.ca/equity/>

Academic Accommodations for Students with Disabilities: The **Paul Menton Centre** for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send your **Letter of Accommodation** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). After requesting accommodation from PMC, meet with your professor to ensure

accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (*if applicable*) at <http://www2.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/>

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://www2.carleton.ca/equity/>

Important Dates:

Sept. 2	Classes start.
Sept. 4	Classes follow a Monday schedule.
Sept. 7	Labour Day - University closed.
Sept. 18	Last day for registration and course changes in Fall and Fall/Winter courses.
Sept. 30	Last day for entire fee adjustment when withdrawing from Fall term or two-term courses.
Oct. 12	Thanksgiving Day – University closed.
Oct. 26-30	Fall Break – no classes.
Nov. 24	Last day for tests or examinations in courses below 4000-level before the Final Examination period.
Dec. 7	Last day of classes, Fall term. Last day for handing in term work and the last day that can be specified by a course instructor as a due date for Fall term courses.
Dec. 7	Last day to withdraw from Fall term courses (academic purposes only).
Dec. 8	No classes or examinations take place. Review classes may be held, but no new material may be introduced.
Dec. 9-21	Final examinations for Fall courses, mid-terms for Fall/Winter courses. Exams are normally held all seven days of the week.
Dec. 21	Take-home exams are due.
Jan. 6	Winter term classes begin.
Jan. 19	Last day for registration and course changes in Winter term classes.
Jan. 31	Last day for entire fee adjustment when withdrawing from winter courses or winter portion of two-term courses.
Feb. 15-19	Winter Break, no classes.
Mar. 24	Last day for tests or examinations in courses below 4000-level before the Final Examination period.
Mar. 25	Good Friday – University closed.
Apr. 8	Last day of Fall/Winter and Winter term classes. Last day for handing in term work and the last day that can be specified by a course instructor as a due date for term work for Fall/Winter and Winter term courses.
Apr. 8	Last day to withdraw from Fall/Winter and Winter term courses (academic purposes only).
Apr. 9-10	No classes or examinations take place. Review classes may be held, but no new material may be introduced.
Apr. 11-23	Final Examinations. Exams are normally held all seven days of the week.
Apr. 23	Take-home exams are due.

Addresses:

Department of Philosophy:	3A35 Paterson Hall www.carleton.ca/philosophy 520-2110
Registrar's Office:	300 Tory www.carleton.ca/registrar 520-3500
Student Academic Success Centre:	302 Tory www.carleton.ca/sasc 520-7850
Writing Tutorial Service:	4 th Floor, Library http://www1.carleton.ca/sasc/writing-tutorial-service/ 520-6632
MacOdrum Library	http://www.library.carleton.ca/ 520-2735