

Introduction to History and Philosophy of Science 2

This course outline was revised on February 1st to account for schedule changes. Please discard previous versions of the course outline.

General Information

Course #	PHIL 221
Term	Winter
Year	2018
Course pre-requisite(s)	None
Course co-requisite(s)	None
Course schedule	MWF 2:35-3:25pm
Number of credits	3
Course location	Stewart Biology Building (STBIO) S3-3

Instructor Information

Name	Eran Tal
E-mail	eran.tal@mcgill.ca
Office hours for students	Tuesdays 1:30-3:30pm (except on: March 27 th and April 3 rd)
Office location	Leacock 933

TA Information

Name	Andre Martin	Yasmin Haddad
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Office hours	TBA	TBA

Course Overview

Is there such a thing as a distinctly 'scientific method'? Can evidence by itself decide between competing theories? How can scientists establish the existence of entities that cannot be observed directly, such as atoms and genes? Can computer simulations replace laboratory experiments? Should ethical and social values be allowed to influence the course of scientific research? This course will explore these and related questions by examining historical and contemporary examples of scientific inquiry from the physical, biological and social sciences.

Learning Outcomes

After taking this course, students will:

- Be familiar with key philosophical problems and positions concerning science and with historical cases exemplifying these problems and positions
- Be able to identify key theses and argument structures in a philosophical text
- Be able to differentiate between philosophical positions and compare their claims and assumptions
- Be able to express their own philosophical thesis in writing and argue for it in a clear and concise manner
- Be able to critically evaluate philosophical arguments, both others' and their own, and to improve their writing in response to constructive feedback

Instructional Method

Reading and discussion are important components of this course. Students are required to prepare for lectures by reading the week's mandatory text as listed below. Lectures will provide additional background that locates the readings in a wider context. Conferences will be held weekly starting Week 3 and will be focused on class discussion and on preparing students to write the essays.

Required Course Materials

All required readings have been scanned and are available for download from myCourses. Students are responsible for reading these texts and coming prepared to lectures and conferences. Note that the 'course week' starts on Monday, hence **the week's reading must be completed before the corresponding Monday lecture**. The only exception is Week 1, when the required reading must be completed before the Wednesday lecture. See the schedule below for a list of required readings.

Lecture and conference attendance are mandatory, and material covered in lectures and conferences forms part of the required content of this course. **Lectures and conferences will present materials that go beyond the week's reading, as well as important guidelines for writing the essays.** Missing a lecture or a conference is not an admissible reason for underperformance at a course assignment. Slides from lectures will be made available on myCourses after each lecture.

Optional Course Materials

In addition to the weekly required readings, optional readings will be assigned from the following two textbooks. While these are not mandatory, they provide clarification and background on the week's required reading, and are therefore useful resources for writing the essays.

- Barker, G. and Kitcher, P., 2014. *Philosophy of science: A new introduction*. Oxford University Press. [B&K]
- Staley, K.W., 2014. *An Introduction to the Philosophy of Science*. Cambridge University Press. [STA]

Both books are available at the McGill Bookstore (3544 Ave du Parc, open weekdays 9-5) and on the library course reserves.

Additional optional readings not from these textbooks are available for download from myCourses.

Course Content

This course covers topics in the philosophy of science, using episodes from the history of science as examples. Each week is dedicated to a different problem or topic.

The course is divided into three parts. The first part covers some of the most well-known debates in philosophy of science from the 18th century to the present day. The second part focuses on philosophical problems that concern particular methods of science, such as modeling, measurement and simulation. The third part is dedicated to the intersection of science, society and human values.

Part 1: Foundational debates

Wk	Dates	Description	Assignments and/or Readings Due
1	Mon Jan 8 th Wed Jan 10 th Fri Jan 12 th	Introduction; Hume on induction	Hume, D. Selections from <i>An Enquiry Concerning Human Understanding</i> (1748). Optional: <ul style="list-style-type: none"> • B&K Chapter 1: "Science and Philosophy" • STA Chapter 1: "Some problems of induction"
2	Mon Jan 15 th Wed Jan 17 th Fri Jan 19 th	Duhem on underdetermination	Duhem, P. 1914. excerpts from <i>The Aim and Structure of Physical Theory</i> , in: Curd & Cover (eds.) <i>Philosophy of Science: The Central Issues</i> , W.W. Norton, 1998, pp. 257-79. Optional: <ul style="list-style-type: none"> • STA Chapter 3: "Underdetermination"
3	Mon Jan 22 nd Wed Jan 24 th Fri Jan 26 th	Logical positivism	Conferences start Friday January 26th Carnap, R., (1938), "Logical Foundations of the Unity of Science", reprinted in Boyd, R., Gasper, P. & Trout, J. D. (eds.) (1991). <i>The Philosophy of Science</i> . MIT Press, pp. 393-404. Optional: <ul style="list-style-type: none"> • STA Chapter 4: "Logical empiricism and scientific theories"
4	Mon Jan 29 th Wed Jan 31 st Fri Feb 2 nd	Popper on demarcation	Popper, Karl R. 1957. Excerpts from "Science: Conjectures and refutations" in <i>Conjectures and refutations: The growth of scientific knowledge</i> (3rd Ed.) London: Routledge, 2002. Pp. 42-86. Optional: <ul style="list-style-type: none"> • STA Chapter 2: "Falsificationism: science without induction?" • B&K Chapter 2: "The Analytic Project", Section:

			“Demarcating Science”, pp. 12-24
5	Mon Feb 5 th Wed Feb 7 th Fri Feb 9 th	Kuhn on scientific revolutions	<p>In addition to scheduled lectures, there will be two make-up lectures this week:</p> <ol style="list-style-type: none"> 1. Tuesday, February 6 at 11:35-12:55 AM in EDUC 129 (note the different room) 2. Thursday, February 8 at 09:05-09:55 AM in STBIO S3/3 <p>Kuhn, T. 1962. excerpts from <i>The Structure of Scientific Revolutions</i>, 2nd ed., 1970. University of Chicago Press.</p> <p>Optional:</p> <ul style="list-style-type: none"> • STA Chapter 5: “Kuhn: scientific revolutions as paradigm changes” • B&K Chapter 4: “Science, History, and Society”
6	Mon Feb 12 th Wed Feb 14 th Fri Feb 16 th	Realism and empiricism	<p>First short essay due on Wednesday, February 14th 11:59pm</p> <p>Van Fraassen, B., 1980. excerpts from <i>The Scientific Image</i>, Clarendon Press.</p> <p>Optional:</p> <ul style="list-style-type: none"> • STA Chapter 10: “Realism and anti-realism”

Part 2: The methods of science

Wk	Dates	Description	Assignments and/or Readings Due
7	Mon Feb 19 th Wed Feb 21 st Fri Feb 23 rd	Models and representation	<p>Giere, R. 1988. <i>Explaining Science: A Cognitive Approach</i>, Chicago University Press. Ch 3: “Models and Theories”, pp. 62-91.</p> <p>Optional:</p> <ul style="list-style-type: none"> • Weisberg, M. 2013. <i>Simulation and Similarity: Using Models to Understand the World</i>. Oxford University Press. Ch. 3: “The Anatomy of Models”, pp. 24-45.
8	Mon Feb 26 th Wed Feb 28 th Fri Mar 2 nd	Experimentation	<p>Collins, H. 1985. <i>Changing Order: Replication and Induction in Scientific Practice</i>, London: Sage Publications. Chapter 4: “Detecting Gravitational Radiation: The Experimenter’s Regress”, pp. 79-112.</p> <p>Optional:</p> <ul style="list-style-type: none"> • Franklin, A. 1994. How to avoid the experimenters’ regress. <i>Studies in History and Philosophy of Science</i> 25(3), pp. 463-491.

	Study break – no classes or office hours		
9	Mon Mar 12 th Wed Mar 14 th Fri Mar 16 th	Measurement	<p>Second short essay due on Wednesday, March 14th 11:59pm</p> <p>Bridgman, P.W. 1927. Excerpts from: <i>The Logic of Modern Physics</i>, New York: MacMillan.</p> <p>Optional:</p> <ul style="list-style-type: none"> Chang, H. 2009. "Operationalism", <i>The Stanford Encyclopedia of Philosophy</i>, Edward N. Zalta (ed.) (freely available online).
10	Mon Mar 19 th Wed Mar 21 st Fri Mar 23 rd	Computer simulation	<p>Parker, W. 2009. Does matter really matter? Computer simulations, experiments, and materiality. <i>Synthese</i> 169, pp. 483-496.</p> <p>Optional:</p> <ul style="list-style-type: none"> Winsberg, E. 2010. <i>Science in the Age of Computer Simulation</i>, University of Chicago Press. Chapter 4: "A Tale of Two Methods", pp. 49-71.

Part 3: Science and society

Wk	Dates	Description	Assignments and/or Readings Due
11	Mon Mar 26 th Wed Mar 28 th (No conferences on Good Friday, March 30 th)	Social construction	<p>Hacking, I. 1999. <i>The Social Construction of What?</i> Harvard University Press. Chapter 4: "Madness: biological or constructed?"</p> <p>Optional:</p> <ul style="list-style-type: none"> Bird, A. and Tobin, E. (2017) "Natural Kinds", <i>The Stanford Encyclopedia of Philosophy</i>, Edward N. Zalta (ed.). Freely available online. <p>Notes:</p> <ul style="list-style-type: none"> - Prof. Tal will not hold office hours on Tuesday, March 27th - On March 28th there will be a guest lecture by Prof. Ian Gold on the philosophy of the sciences of the mind
12	(No lecture on Easter Monday, April 2 nd) Wed Apr 4 th Fri Apr 6 th	Values in science	<p>Longino, H. 1990. <i>Science as Social Knowledge</i>. Ch 4. "Values and Objectivity", pp. 62-82.</p> <p>Optional:</p> <ul style="list-style-type: none"> STA Chapter 12: "Values in Science" B&K Chapter 6: "Science, Values and Politics"

			Prof. Tal will not hold office hours on Tuesday, April 3 rd . Alternative office hours will be announced in class.
13	Mon Apr 9 th Wed Apr 11 th Fri Apr 13 th	Gender and Science	Okruhlik, K. 1994. Gender and the Biological Sciences. <i>Canadian Journal of Philosophy</i> , supplementary volume 20, pp. 21-42. Optional: • B&K Chapter 5: “Critical Voices”
	(No lecture on Monday April 16 th)		Long essay due on Monday, April 16th 11:59pm

Evaluation

The final mark is composed of the following:

Name of Assignment	Due Date	% of final grade
First short essay (800-1000 words)	Wednesday, February 14th 11:59pm	25%
Second short essay (800-1000 words)	Wednesday, March 14th 11:59pm	25%
Long essay (2000-2500 words)	Monday, April 16th 11:59pm	40%
In-class assignments (during tutorial conferences)	Every Friday starting January 26 th	10%

Essays: two short essays (800-1000 words) and one long essay (2000-2500 words) are to be submitted on MyCourses by the above due dates. Essay topics and detailed instructions for writing the essays will be given 2 weeks prior to each due date.

In-class assignments: during each of the 10 conferences, there will be some in-class activity designed by the TA. Only students who attend their conference will get credit for this activity: 1% each, for a total of 10% points. Students who have a medical (or similarly serious) reason for missing their conference will be able to get credit for the activity by submitting equivalent work to their TA.

Submitting work: essays are to be submitted online through MyCourses – **not by email**. Submit file in **PDF or DOCX** format only. In other words: if you are using a word-processor other than Microsoft Word, please use the ‘save as’ or ‘export’ function to save your work as a PDF before uploading it. We may not be able to read files submitted in other formats and you would get no credit for that work.

Policy for Late Work: Extensions to deadlines set will be granted only in **exceptional** circumstances, usually only for medical reasons and with a medical note or other, similar emergencies, appropriately documented. Essays will be penalized at the rate of 5 percentage points per day overdue. For example, an essay submitted three days late and graded 80 will have a final mark of 65. Essays submitted more than seven days late will receive a mark of 0. In-class assignments cannot be submitted late (with the exception of medical reasons as stated above).

Email: before emailing your TA or instructor, check the syllabus and the announcements on myCourses to see if you can find the answer to your query there. Requests to explain course material cannot be handled by email – please bring up your question at conference or attend our office hours. In all matters pertaining to the

grading of your assignments, please contact your TA and meet them during their office hours. Requests for regrading will only be considered after the student has discussed the issue with the TA who graded their assignment. We endeavor to respond to emails within two business days (i.e. not on weekends).

Use of electronic devices: Mobile computing and communications devices are permitted in class **only for note taking and for consulting online resources**, and only insofar as their use does not disrupt the teaching and learning process. Mobile computing and communications devices must be switched to silent mode and may not be used for voice communication at any time during class. Users of such devices must respect the right of fellow students and the instructor not to be distracted. No audio or video recording of any kind is allowed in class without the explicit permission of the instructor or TA. These rules apply both to lectures and conferences.

McGill Policy Statements

Language of Submission:

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue).

Academic Integrity:

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information).

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site www.mcgill.ca/students/srr/honest/).

Plagiarism:

"Plagiarism" means the representation of another's work, published or unpublished, as one's own or assisting another in representing another's work, published or unpublished, as his or her own.

- (a) No student shall represent another person's work, published or unpublished, as his or her own in any academic writing, such as an essay, thesis, research report, project or assignment submitted in a course or a program of study, or represent as his or her own the work of another, whether the material so represented constitutes a part or the entirety of the work submitted.
- (b) No student shall contribute any work to another student with the knowledge that the latter may submit the work in part or whole as his or her own. Receipt of payment or other forms of compensation for work contributed shall be cause for presumption that the student had such knowledge.

Additional Statements

- The [University Student Assessment Policy](#) exists to ensure fair and equitable academic assessment for all students and to protect students from excessive workloads. All students are encouraged to review this

Policy, which addresses multiple aspects and methods of student assessment, e.g. the timing of evaluation due dates and weighting of final examinations.

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- As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the [Office for Students with Disabilities](#), 514-398-6009.
- [End-of-course evaluations](#) are one of the ways that McGill works towards maintaining and improving the quality of courses and the student's learning experience. You will be notified by e-mail when the evaluations are available. Please note that a minimum number of responses must be received for results to be available to students.
- Additional policies governing academic issues which affect students can be found in the McGill Charter of Students' Rights (see the [Handbook on Student Rights and Responsibilities](#)).
- McGill has policies on sustainability, paper use and other initiatives to promote a culture of sustainability at McGill. (See the [Office of Sustainability](#).)