

PHIL221 – Introduction to History and Philosophy of Science 2

Lectures: MW(F) 8:35am-9:25am

Location: CURRIE 408/9

Instructor: André Martin

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Office Hours: TBA

TAs: TBA

Course Description:

This course will serve as an introduction to the history and philosophy of science from the 18th century to the modern age. We will pursue such questions as: What makes scientific knowledge the apparent gold standard of knowledge? What are the methods of science, are they distinct, and are they distinctly modern? Can science make good on its apparent claim to provide privileged knowledge (or any at all) of the external world? The first two units of this course will be particularly historical: Unit 1 will start with a look at the direct roots of contemporary philosophy of science in early analytic empiricism and its challenges; Unit 2 will take a step back and consider some of the prior approaches of ancient to early modern science. In the second two units of this course, we will examine the varied methods of more contemporary science, in response to past and persisting challenges: e.g., the use of stand-in scientific models, experimental tools, abductive reasoning, and social, value-laden, systems of knowledge generation.

Course Materials:

All required readings will be made available through the course website.

Evaluation Methods:

- i. 4 short papers (1 per Unit, 600-800 words each). (30%)*
[1 paper will be fully evaluated (15%), the rest graded for completion (15%)]
- ii. Final paper proposal (~800 words). Pick a final paper topic and explain your thesis, outline the main argument, and briefly describe one objection which you will consider and your response. (15%)
- iii. Final paper (~2000 words). (40%)
- iv. Participation (in conferences and on MyCourses). (15%)

Although this course will be writing intensive, as one can see above, much of the writing will be relatively low stake. The purpose of this will be to give you a safety-net for ample practice in the basics of philosophical writing. Part of the participation grade will include sharing your short papers on the MyCourses discussion board and providing comments for each other. This is intended to provide a place for community thought and more pointed discourse (also in writing).

Schedule:

Unit 1: Early Analytic Philosophy of Science and its Challenges

Week 1: Logical Positivism

Rudolph Carnap, "The Elimination of Metaphysics"

Carnap, "Logical Foundations of the Unity of Science"

[Optional: Carnap, "The Methodological Status of Theoretical Concepts"

Grover Maxwell, "The Ontological Status of Theoretical Entities"]

Week 2: Falsification and Demarcation

Karl Popper, excerpts from, "Science: Conjectures and refutations"

[Optional: Kent Staley, "Falsificationism: science without induction?"]

Week 3: Underdetermination

Pierre Duhem, excerpts from *The Aim and Structure of Physical Theory*

[Optional: Kent Staley, "Underdetermination"]

Week 4: Incommensurability, Historiography, and Anti-Realism

Thomas Kuhn, excerpts from *The Structure of Scientific Revolutions*

[Optional: Laura Schroeter, "The Limits of Conceptual Analysis"

Kent Staley, "Kuhn: scientific revolutions as paradigm changes"]

Unit 2: Background in Ancient to Early Modern Science

Week 5: Aristotelian Science and its Legacy

Aristotle, excerpts from the *Physics*, *Metaphysics*, and more

Aquinas, "Is Theology a Science?" (ST I.1)

[Optional: James Lennox, "Aristotle's Biology" (SEP)

Avicenna (Ibn Sīnā), "A Verification of the True Account of the Soul" (The Soul, V.7)]

Week 6 & 7: Reason and Experiment in Early Modern Science

Émilie Du Châtelet, excerpts from the *Foundations of Physics*

David Hume, excerpts from *An Enquiry Concerning Human Understanding*

[Optional: Katherine Brading & Marius Stan, "How physics flew the philosophers' nest"

James Robert Brown, "Illustrations from the laboratory of the mind" (On Galileo and Newton)

Alexandre Koyré, "Galileo's Treatise 'De Motu Graviorum'"]

Unit 3: Scientific Method: Science and Society

Week 8: Feminist and Social Epistemology

Sandra Harding, "Borderland Epistemologies"

Helen Longino, excerpts from *Science as Social Knowledge*

[Optional: Kent Staley, "Values in Science"]

Week 9: Explanation in the Social Sciences

J.W.N. Watkins, "Historical explanation in the social sciences"

Steven Lukes, "Methodological individualism reconsidered"

[Optional: Edmund Husserl, "Motivation as the Fundamental Lawfulness of Spiritual Life"]

Unit 4: Scientific Method: Value-Free Tools?

Weeks 10: Models, Idealization, and Representation

Ronald Giere, “Models and Theories” from *Explaining Science: A Cognitive Approach*

Bas van Fraassen, excerpts from *The Scientific Image*

Agnes Bolinska, “Epistemic representation, informativeness and the aim of faithful representation”

[Optional: Callender & Cohen, “There is no special problem about scientific representation”]

Weeks 11 & 12: Experiment and Measurement

Harry Collins, “Detecting Gravitational Radiation: The Experimenter’s Regress”

Allan Franklin, “How to avoid the experimenters' regress”

Hasok Chang, excerpts from *Inventing Temperature*

[Optional: Eran Tal, “Measurement in Science” (SEP)]

Week 13: Abductive Reasoning

Kent Staley, “Explanation”

Gilbert Harman, “The Inference to the Best Explanation”

[Optional: Bas van Fraassen, “The Pragmatics of Explanation” from *The Scientific Image*]

Policy for Late Work: Late work will be penalized at a rate of 5% (flat) per day, unless granted an extension by the instructor.

Submitting Papers: Written work is to be, primarily, submitted on MyCourses, in **PDF** or **DOCX** format (not by email). Short papers are to be submitted both through the relevant Assignment box on MyCourses and posted on the Discussion Board (just copy + paste).

McGill Policies:

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/integrity for more information.)

Students have the right, without seeking permission, to submit work in French.

Under extraordinary circumstances, the above schedule/evaluation scheme is subject to change.