COURSE — PHIL 610: PHILOSOPHY & SCIENCE, SPRING 2018

INSTRUCTORS — J. Dmitri Gallow (✉: jdmitrigallow@pitt.edu)
Adam Marushak (✉: adshak@gmail.com)

LECTURE TIMES — Tuesdays and Thursdays, 14:00–14:50
Room 324, Cathedral of Learning

OFFICE HOURS — Dmitri's office hours are after class on Tuesdays and Thursdays, from 15:00 to 16:00, in room 1009H, Cathedral of Learning
Adam's office hours are on Wednesday and Thursday, from 13:00–14:00, in room 1219, Cathedral of Learning

COURSE GOALS — This course will offer an introduction to some central questions in the Philosophy of Science. For instance: what is the scientific methodology? What distinguishes it from psuedo-scientific methodologies? Should we believe that the scientific methodology will lead us toward truth? If so, why? How does evidence support or confirm a scientific theory? What can science teach us about the nature of reality, and how can it teach us this? In particular, does mature microphysics give us reason to believe that the entities posited by its theories really exist? Science seeks to discover causal relationships and laws of nature—what are causal relations? What are laws of nature? Much scientific theorizing involves ascribing probabilities to systems—what are probabilities? And, given the kind of things causes, laws, and probabilities are—how could science put us in a position to know about them?

EVAULATION — Final grades will be determined by 6 components:

Midterm	20%
Final	20%
Problem Sets	20%
Papers	20%
Quizzes	10%
Section	10%

MIDTERM AND FINAL: There will be an in-class midterm on February 27th, and a (non-cumulative) final on April 23rd (in our usual classroom, from 12:00–13:50). At the start of each lesson, I will provide an essay prompt on the material to be covered in that lesson. (That way, you know in advance what you really need to understand.) The essays on the midterm and final will be drawn (randomly—as in, using a random number generator) from these. The expectation is that you will prepare by writing out essays for each prompt, and come to class prepared to reproduce any of those essays.

PROBLEM SETS: Understanding philosophy of science requires a certain familiarity with some basic notions of deductive logic and probability theory. After these topics are covered, you will be given a problem set on each.

PAPERS: Over the course of the semester, there will be four days on which you are allowed to turn in papers (see SCHEDULE). The papers must be written on material covered since the last paper-turn-in day. Paper assignments come in two 'levels'.

EVALUATION (CON'T)

Level 1: A level 1 paper is a 400–600 word expository paper. With these papers, you will be asked to select one particular *argument* from the readings and explain that argument, in your own words. Carefully identify the premises and the conclusion, and try your best to make the argument valid.

Level 2: A level 2 paper is a 700–1000 word expository and *critical* paper. This is just like a level 1 paper, except that you will not only explain the argument from the reading, but additionally raise an *objection* to the argument you've presented. That is: you give some reason to think that one of the argument's premises are false, or some reason to think that the argument is invalid.

You must start at level 1. Each time you hand in a paper, you will receive one of four evaluations:

1. not much progress
2. good effort
3. almost
4. complete

When (but only when) you receive a "complete", you may progress to the second level. If you receive any other evaluation, you may try again at level 1 with your next paper. You have four chances to progress through both levels. Your final paper grade is determined by your final evaluation and your final level:

	Level 2	Level 1
Complete	A+	B
Almost	A	B-
Good Effort	A-	C+
Not Much Progress	B+	C

You are not required to hand in a paper at every paper hand in day. If you complete level 2 on the second paper hand in day, you are free to hand in nothing on the third and fourth paper hand in days.[a]

QUIZZES: At the start of most class days, there will be a short comprehension quiz on the reading for that day. These quizzes will both test that you've *done* the reading (by asking multiple-choice questions like "which of the following colors were discussed in the reading?"), and test that you've *understood* the reading (by asking questions like "Which of the following is Hume's objection to induction?"). In order to put you in a better position for these quizzes, the material appearing in the reading will be covered in class *before* you are asked to do the reading (see SCHEDULE). If you have an unexcused absence, you will not be allowed to make up a quiz you missed. (In order to complete these quizzes, you must either purchase a clicker from http://accounts.turningtechnologies.com, or else download the 'ResponseWare' app for your smart phones. You will also have to pay a small fee in order for your responses to be graded—apologies.)

SECTION: Finally, 10% of your grade will be determined by your recitation section leader in a manner of their choosing.

[a] This style of paper assignment was designed by Professor Dustin Locke. See http://www1.cmc.edu/pages/faculty/dlocke/docs/Locke_LevelsSystem.pdf.

SCHEDULE

Date	Questions and Readings
January 9th	What will the course be about? Syllabus
January 11th	What was Francis Bacon's scientific methodology of *induction*? Ladyman, *Introduction*
January 16th	Does science actually use Bacon's methodology? Should it? *Could* it? Ladyman, ch. 1
January 18th	*In*duction is contrasted with *de*duction. What is deduction? Hempel, ch. 2
January 23rd	Might induction lead us astray? Gallow, *Notes on Logic*
January 25th	What is it for one thing to cause another? Hume, *Sceptical Doubts concerning the Operations of the Understanding*, Part I Salmon, *An Encounter with David Hume*
January 30th	What makes something a law of nature? *no reading* **1st problem set due**
February 1st	What reason is there to think that induction will lead us to truth? Tooley, *The Nature of Laws*, §1 Carroll, *Laws of Nature*, §§1–4 (*optional*)
February 6th	Does science even need induction? Can science suffice with deduction alone? Hume, *Sceptical Doubts concerning the Operations of the Understanding*, Part II **1st paper turn in day**
February 8th	No class meeting today
February 13th	What would science look like, if it eschewed induction in the way Karl Popper thinks it should? Popper, *Conjectures and Refutations*
February 20th	Does scientific practice live up to Popper's recommendations? If not, do we think that it is Popper's recommendations or the practice of scientists which is more rational? Ladyman, chapter 3, §3.1–3.3 (*optional*)
February 22nd	What will be on the midterm? Putnam, *The "Corroboration" of Theories* Ladyman, chapter 3, §3.4–3.6 (*optional*) **2nd paper turn in day**
February 27th	**Midterm** *Midterm Review Sheet*

SCHEDULE (CON'T)

Date	Questions and Readings
March 1st	We often think that some body of evidence *verifies* or *confirms* a scientific theory. Can we give a general and formal theory of when evidence confirms a scientific theory? *no reading*
March 13th	If we can't have a purely formal theory of when evidence verifies or confirms a theory, can we at least say something about when evidence makes a theory more or less likely? Goodman, *The New Riddle of Induction*
March 15th	What do I need to know about the mathematical theory of probability in order to answer questions like these? Sober, *The Probabilistic Turn* Staley, *Reasoning with Probability*, p. 105–127 (*optional*)
March 20th	What do we *mean* when we say that something is more or less likely? Strevens, *Notes on Bayesian Confirmation Theory*, chapter 11 **3rd paper turn in day**
March 22nd	Are we justified in believing that electrons exist? Hájek, *Fifteen Arguments Against Finite Frequentism*
March 27th	Our physical theories might be wrong, and every previous physical theory that's ever been taken seriously *has* been wrong. Does this give us a reason to doubt that electrons exist? Ladyman, chapter 5 Staley, *Realism and Anti-Realism*, §§10.1–10.3 (*optional*) **2nd problem set due**
March 29th	What do we even *mean* when we say that electrons exist? Ladyman, chapter 6, up to p. 185 Staley, *Realism and Anti-Realism*, §§10.4–10.8 (*optional*)
April 3rd	If we're not justified in believing that electrons exist, what attitude should we take towards the physical theories that say they do? Godfrey-Smith, *Logic Plus Empiricism*
April 5th	Scientific theories provide us with explanations of various phenomena. What makes a scientific explanation good? Ladyman, chapter 6, §6.2
April 10th	Is there a relationship between the goodness of a scientific explanation and relations of cause and effect? Salmon, *Scientific Explanation*, §§1.1–1.9 (focus especially on §1.8)
April 12th	Are we even right to be thinking about scientific activity in terms of the verification of theories by evidence? Are scientists really just in the business of solving puzzles from *within* some particular scientific framework? Salmon, *Scientific Explanation*, §1.10 **4th paper turn in day**
April 17th	If scientists are just puzzle solvers, like Kuhn thinks, then how do old scientific theories get overturned for new ones? What happens during scientific revolutions? Godfrey-Smith, *Kuhn and Normal Science*

SCHEDULE (CON'T)

April 19th	What will be on the final? Godfrey-Smith, *Kuhn and Revolutions*
April 23rd	**Final** (in our usual classroom, **but at the unusual time of 12:00–13:50**) *Final Review Sheet*

ACADEMIC INTEGRITY

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

DISABILITY SERVICES

If you have a disability for which you are or may be requesting an accommodation, be sure to contact me within the first two weeks of the semester, as well as Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users. DRS will verify your disability and determine reasonable accommodations for this course.

LAPTOP POLICY

As a general rule, laptops and smart phones are not permitted during class. If you have some good reason for requiring a laptop or a cell phone during class, come speak to me about it in office hours.

RECORDING POLICY

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

SCHEDULE REVISION

As the course progresses, the course schedule may be revised. If it is, I will notify all enrolled students via email and post an updated syllabus to Courseworks.

STAPLE AND KADOOBIE POLICY

If you hand in work which consists of multiple pages, those pages should be stapled together. I reserve the right to refuse to accept any work which is not stapled together. In addition, any written work should be handed in free of kadoobies (google it). I reserve the right to refuse to accept any work which has not been rid of kadoobies.