PHL 363: Scientific Method
Spring 2011

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Office Hours: 2:30pm-4:30pm Wednesdays, 408B Waggener Hall

Course Information:
This course explores a number of foundational issues in the philosophy of science and confirmation theory. The following topics will be explored.
(Topic 1) What **justifies** the so-called scientific method? Does it have a justification that privileges it over pure dogmatism, or is our choice of method arbitrary? We'll study David Hume's and Nelson Goodman's skeptical challenges to the science method.
(Topic 2) A closely related topic is this: exactly when does a certain batch of **evidence** serve to **confirm** a certain theory, and **how much** does it confirm it? We'll briefly survey some classical qualitative theories of confirmation, before turning to a more quantitative theory of confirmation: Bayesian Confirmation Theory. This part of the course will involve some technical probability theory.
(Topic 3) What is the role, in science, of giving **explanations**? What makes something a good explanation in science?
(Topic 4) Is what sense is physics the fundamental science, the one to which chemistry, biology, and possibly others **reduce**? Are there special sciences that are irreducible to physics, such as economics or psychology?

The course presupposes no specific background in science, philosophy or probability theory: we'll do everything from scratch. However, it will be a tough course, requiring hard work and dedication from students! (If you want to get a sense of the technical material that we will be studying in topic 2, have a look at chapters 1-9 of this online textbook we'll be using: http://www.nyu.edu/classes/strevens/BCT/BCT.pdf)

Readings:
Our main textbook will be Michael Strevens's *Notes on Bayesian Confirmation Theory* (link given above). Additional readings will be made available as PDFs on the course blackboard site, or else as links to websites. Make sure you have access to our blackboard site; email me if you do not.

Assignments and Grading:
Grading will be based on 4 exams, each worth 25%. Additionally, a pass/fail homework assignment will be distributed in week 6, and is due at the start of week 7: the assignment will not be hard, but a failing grade or failure to hand it in on time will result in the final course grade being diminished a

third of a letter. Additionally, class attendance affects the final grade as described below.

Class Participation and Attendance:
Class participation is *extremely welcome*. Ask questions. Never worry that your question sounds dumb, because (a) it won't affect your grade, and more importantly (b) it's almost certainly not a dumb question.

If your final grade from the papers is near a borderline, then multiple unexcused *absences* from lecture will put it below the borderline.

Disabilities:
"Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 471-6259."

Schedule: (as of Jan 14th -- we can revise this schedule over time as our particular class's needs and interests dictate)

Part 1: Problems Facing the Development of Confirmation Theory

Week 1, *Jan 19th, Jan 21st*
1. Introduction
Reading: Skyrms, *Choice and Chance*, Chapters 1 & 2

Week 2, *Jan 24th, Jan 26th, Jan 28th*
2. Hume's Problem of Induction
Reading: Hume, *Enquiry*, Section 4
Reading: Skyrms, *Choice and Chance*, Chapter 3

Week 3: *Jan 31st, Feb 2nd, Feb 4th*
3. The New Riddle of Induction
Reading: Goodman, *Fact, Fiction and Forecast*, Chapter 3
Reading: Skyrms, *Choice and Chance*, Chapter 4

Week 4: *Feb 7th, Feb 9th. Feb 11th*
4.   The Paradoxes of Confirmation Theory
Reading: Hempel, "Studies in the Theory of Confirmation (I)"

FEBRUARY 11th: 1st Exam (in class)

Part 2: Introducing Bayesian Confirmation Theory

Week 5: *Feb 14th, Feb 16th, Feb 18th*
5.   Introduction to the basics of probability theory
Reading: Skyrms, *Choice and Chance*, Chapter 6

Week 6: *Feb 21st, Feb 23rd, Feb 25th*
6.   More basic probability theory; the Dutch Book justifications
Reading: Strevens, *Notes on BCT*, Chapters 1 - 4

PASS/FAIL Homework assignment on basics of probability theory due by start of week 7

Week 7: *Feb 28th, March 2nd, March 4th*
7.   The Mechanics of Bayesian Confirmation Theory
Reading: Strevens, *Notes on BCT*, Chapters 5 - 6

MARCH 4th: 2nd Exam (in class)

Part 3: Applications of Bayesian Conformation Theory

Week 8: *March 7th, March 9th, March 11th*
8.   Bayesian Confirmation Theory Tackles the Puzzles of Confirmation Theory
Reading: Strevens, *Notes on BCT*, chapters 7 - 8

SPRING BREAK (*March 14th - 18th*)

Week 9: *March 21st, March 23rd, March 25th*
9.   The Subjectivity of Bayesianism
Reading: Strevens, *Notes on BCT*, chapter 9

Week 10: *March 28th, March 30th, April 1st*
10. Further Applications of Bayesianism
Reading: Strevens, *Notes on BCT*, chapters 10 - 11

APRIL 1st: 3rd Exam (in class; not an April Fool's joke)

<u>Part 4: Theories of Scientific Explanation</u>

Week 11: *April 4th, April 6th, April 8th*
11. The D-N Model of Explanation and the Unificatory Theory of Explanation
Reading: Hempel, "Two Basic Types of Scientific Explanation"
Reading: Kitcher, "Explanatory Unification"

Week 12: *April 11th, April 13th, April 15th*
12. Causal Theories of Explanation
Reading: Lewis, "Causal Explanation"
Reading: Strevens, "The Causal and Unification Accounts Unified Causally"

<u>Part 5: Intertheoretic Reduction in Science</u>

Week 13: *April 18th, April 20th, April 22nd*
13. For and Against Reduction in Science: Round 1
Reading: Putnam and Oppenheim, "The Unity of Science as Working Hypothesis"
Reading: Fodor, "Special Sciences"

Week 14: *April 25th, April 27th, April 29th*
14. For and Against Reduction: Round 2
Reading: Kim, "Multiple Realizability"
Reading : Fodor, "Special Sciences: Still Autonomous After All These Years"
Reading: Block, "Antireductionism Slaps Back"

Week 15: *May 2nd, May 4th, [May 6th: No Class]*
15. Review Period, and Buffer

MAY 16th: 4th and Final Exam (at 9am; location TBA)