Philosophy of Probability & Inductive Logic

PHIL 3210
Course # 12408
Fall 2010
Tuesday/Thursday
10:45-12:05
OSH 104

Instructor: Matt Haber
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Office Hours: Monday 9:00-11:00
(or by appointment)
http://www.hum.utah.edu/~mhaber/PHIL3210.html

Course Description

The philosophy of probability concerns the nature and application of probability; it is not primarily about the numbers and formulas, but the ideas behind those things. What does an assignment of probability mean? To what kinds of things may probabilities be assigned? Are probabilities discovered, or calculated, or both? How does probability relate to inductive logic: are they identical, or is it a mistake to conflate the two? Ian Hacking has described probability as ‘Janus-faced’, namely that it has two distinct yet related senses. What does Hacking mean? The philosophy of probability touches on these questions and more.

In this class we (1) explore the relationship between inductive logic and probability; (2) evaluate competing interpretations of probability; and (3) develop basic formal skills in probability logic and calculus. Together these will help us develop a solid conceptual understanding both of the nature of probability and its applications, while at the same time serve as a useful lens by which to view more general philosophical problems.

Course Layout

We will be (roughly) alternating on a weekly basis between formal and conceptual treatments of probability. A more detailed description of this can be found below, in “Course Topics,” or on the course website (Please note: the url is case-sensitive): http://www.hum.utah.edu/~mhaber/PHIL3210.html

Class will consist of both lectures and small group discussions. You are expected to attend all classes. If you fail to attend class and miss an assignment, it is your responsibility to get this assignment.

For the formal material, we will be using Ian Hacking’s An Introduction to Probability and Inductive Logic as well as online Probability Modules through Carnegie Mellon’s Open Learning Initiative. You will be assigned exercises from these, and can expect exams to contain questions similar in style and difficulty. Additionally, I will develop a treatment of probability as an extension of formal logic, and introduce algebraic and axiomatic
proofs of central concepts in probability. This will include material drawn from other
texts and supplemental homework assignments, which you should also use as study
guides for exams.

For the conceptual and historical material, we will be using primary literature,
supplemented by Maria Galavotti’s *A Philosophical Introduction to Probability*. These weeks
will begin with small group discussions, which will include the reading and discussion of
keyword proposals. At the beginning of the semester, each student will sign up for two
weeks in which they will bring keyword proposals to class.

I will use the course website to post reading, writing, and other assignments. Some of
my lectures may use power point; when possible, I will post note slides of these power
point lectures on the course website prior to giving the lecture.

**Texts**

We will be using two textbooks for this course, along with other posted readings.

- Ian Hacking’s *An Introduction to Probability and Inductive Logic*.
- Hacking’s text will comprise much of the primary reading for the formal sections of this course, and you
  will be assigned exercises from many of the chapters as homework. Some of your exam questions will be
  modeled on these exercises.

- Maria Galavotti’s *A Philosophical Introduction to Probability*.
- Galavotti’s text is less formalized than Hacking’s, but
  offers a more extensive treatment of the competing interpretations of probability. This text will be a very
  useful secondary source of this material, serving as a complement to the assigned primary literature that will
  be made available electronically.
- Relevant class lectures will follow the Galavotti text, which is based on her lecture notes for a similar course
  as ours.

In addition to these textbooks, we are going to be working through three modules on
probability using Carnegie Mellon’s *Open Learning Initiative*. You must register for our
course on the OLI website (*http://oli.web.cmu.edu*), and pay the $25 registration fee.
Instructions for how to register may be found on the course website:
*http://www.hum.utah.edu/~mhaber/PHIL3210.html*
Course Topics

This course will cover both formal and conceptual/historical material, roughly alternating between the two on a weekly basis:

Weeks 1 & 2: Introduction to Basic Concepts & Problems
- The Problem of Probability; Basic Logical and Probability Terms and Tools; Elementary Rules of Probability; Calculating Probabilities.

Week 3: The Problem of Induction
- Hume's Skepticism; Inductive Logic; Probability & Induction.

Week 4: The Axioms of Probability and Conditional Probability
- Axioms of Probability; Calculating Conditional Probability; Probability Tree Calculations.

Week 5: The Classical Interpretation
- Laplace; The Principle of Insufficient Reason; Determinism; Problems & Limitations Of The Classical Interpretation.

Week 6: Bayes' Rule
- Calculating Conditional Probabilities Using Bayes' Rule.

Week 7: The Logical Interpretation
- Keynes' and Carnap's Logical Interpretation; Ramsey's Criticism.

Week 8: Review of Formal Material
- Exam #1

Week 9: The Subjective Interpretation of Probability
- Ramsey-De Finetti; Probability As Degrees of Belief

Week 10: Modeling Logical & Probability Space (I)
- Kolmogorov's Axioms; Intro to the Probability Calculus; Algebraic Proofs.

Week 11: The Frequency Interpretation
- von Mises' Probability AsLimiting Frequency; Difficulties And Limitations Of The Frequency Interpretation.

Week 12: Modeling Logical & Probability Space (II)
- Conclusion of Probability Calculus; Axiomatic Proofs.

Week 13: The Propensity Interpretation
- Popper's Propensity Interpretation; Difficulties and Limitations of the Propensity View.

Week 14: Dutch Book Arguments
- Dutch Book Proofs.

Week 15: Review & Second Formal Exam

Final Exam Week: Final Exam/Final Essay
Course Requirements and Grading

All written material must be submitted via turnitin.com to receive credit, even when brought to class. Missing or late assignments may carry additional penalties on your overall grade calculation (e.g., 1/3 grade reduction, such as ‘B+’ to ‘B’) to reflect the importance of the interactive nature of some of these assignments.

Keyword Proposals 15%

Each student must write a keyword proposal for two of the conceptual/historical topics listed above. Your goal should not be to try and cover lots of ground, rather to succinctly propose, explain and defend three keywords that capture important points in that week’s reading. Your keywords might provide a nice overview, or illuminate a subtle, but central, point of the text. No introduction is needed, just make your case for each keyword.

Keyword proposals must be brought to class, where they will be read aloud and discussed in small groups. On the first occasion they will be read aloud by you, on the second by someone else in your group. The goal of these assignments is to practice succinctly and effectively articulating a position, and defending or modifying that position in face of criticism. Doing philosophy is not merely about reading, writing, and listening (though those are important!) but also in actively engaging in intellectual discourse.

In addition to reading your keyword proposal in small groups, be prepared to discuss, explain and defend your keywords in front of the entire class. I may read selected passages aloud in class, followed by direct questioning and discussion with the author of those passages. This will provide you with feedback on how to improve your writing and argumentation, and will also facilitate understanding of the material.

Your group will have to come to a consensus on three keywords. These may be from the list of those proposed by whoever presented that week, or new keywords that come up in discussion. Your group will then propose these keywords to me, along with proposals from other groups. A class discussion will follow, with arguments for and against each keyword. At the end of class I will select three keywords from among those proposed.

Keyword assignments are pass/partial/fail, with an opportunity to earn extra credit. You will receive full credit simply by completing it on time, and participating in the relevant small group discussion. Furthermore, you will earn one extra credit point if I select a keyword proposed by your group, and a second extra credit point if you proposed that keyword.

Keyword proposals should be around 3 (or fewer) pages long, and no late assignments will be accepted. These should be tightly argued, focused proposals.
PeerMark 5%

In the four conceptual/historical weeks in which you do not have a keyword proposal to write, you must complete the PeerMark assignment on the keyword proposals written by your group members. This assignment must be completed on turnitin.com, and consists of answering six short questions about your peers’ proposal. I anticipate it will take no longer than 10-15 minutes.

Homework 5%

In weeks covering formal material, you will be assigned problem sets. These will be due at the beginning of class on Tuesday of those weeks. You will be responsible for checking your own work. I will simply be checking that you did the homework, assigning full, partial or no credit depending on how much of the homework assignment was completed. If you have a question about particular problems, I am happy to discuss them in class. However, unless prompted I am unlikely to go over any assigned problems—so ask!

Formal Exams 40%

There will two exams covering the formal material in this course. The second of these will be administered on the last regular day of class.

Final Exam 35%

The final exam will have several components, including a formal section and essay questions. The final exam study guide will be posted on the first day of class. This will give you plenty of time to work on your answers, and to use the study guide to help you understand class material.

(Course assignments are subject to revision in response to class progress)

(Grading criteria is specified in my ‘Grading Rubric’ document, available on the course website.)
**Online Components**

*Carnegie Mellon Open Learning Initiative* ([http://oli.web.cmu.edu](http://oli.web.cmu.edu))

A component of the formal part of this course will be conducted using Carnegie Mellon’s *Open Learning Initiative* probability modules. You must complete the “Checkpoints” and homework in the first three modules (I have included two extra modules for those who wish to delve deeper into the material). To do this, you must enroll in the course and pay the $25 registration fee.

Course key: dice2011


All papers must be turned in electronically through turnitin.com. Except by prior arrangement, I will not accept hard copies of any papers, nor will I accept any papers emailed directly to me! You will need to register with the course turnitin.com page. Here is the information you will need to do this:

- class id: 4180797
- class password: dice2011

**PHIL 3210 Course Website** ([http://www.hum.utah.edu/~mhaber/PHIL3210.html](http://www.hum.utah.edu/~mhaber/PHIL3210.html))

This site contains a weekly topic & reading list. You may download course readings and homework assignments as they become available.

**Course Etiquette**

*E-mail correspondence* – I am very happy to correspond with you via e-mail, and this is the best way to contact me. I hardly ever check my voicemail, and rarely return student phone calls. Emails, on the other hand, will typically get a response within 24 hours (and often much quicker), and I check it often during the semester. However, I do ask that you follow some minimal guidelines:

1. Please indicate which class you are writing to me about. I teach more than one course and it does neither of us any good if my reply is simply, “Which class are you writing me about?”
2. Please use a proper greeting. This may be formal (e.g., “Dear Prof. Haber”) or informal (“Hi Matt”). You may address me in whatever way you feel comfortable (so long as it is respectful!). If you are unsure how to address me, you may simply use, “Dear Prof. Haber”.
3. Please sign your e-mail. All too often I get unsigned e-mails from students with inscrutable e-mail addresses. Please identify yourself to me.
4. Please send emails to and from an official University of Utah address. You may use my department address: mhaber[at]philosophy.utah.edu. If you send emails from a non-University email system, I cannot guarantee that I will receive it or respond to it, e.g., I have had problems with student email addresses getting caught in my spam filter. Ultimately, it is your responsibility to provide me with an email address that we can use for correspondence.

These guidelines may be relaxed in obvious cases (e.g., in a string of e-mail replies, if you have confirmed your non-University email works). I will use similar guidelines in writing you. As stated above, I am happy to answer student e-mails, and tend to respond promptly (within a day). If I receive e-mails that fail meet the guidelines above, I reserve the right to not respond.
**In-Class Expectations:**

1. Show up on time; do not leave until class is over. Arriving to class late or leaving early is very distracting and disruptive, both to me and to other students. If you must leave class early, please select a seat such that you can leave in an unobtrusive manner;
2. Turn off your cell phone ringers. If a cell phone rings during class, I reserve the right to answer your phone for you;
3. No text-messaging, IMing, web-surfing, newspaper reading or other related activities during class. If you feel these kinds of activities are more meaningful than paying attention in class, then by all means do it – just not in the classroom. My feelings won’t be hurt if you choose not to attend class;
4. Be respectful of others. We are going to have in-class discussions over controversial foundational philosophical issues. You may feel strongly about this, and disagree with your fellow students (or me!). Disagreement is fine, *ad hominem* attacks are not.

**Administrative and Campus Policies**

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

I have zero tolerance for plagiarism and cheating. Students are responsible for knowing and understanding the University’s policy on academic misconduct. More information may be found in the Student Code, available at [http://www.admin.utah.edu/ppmanual/8/8-10.html#SECTION%20V](http://www.admin.utah.edu/ppmanual/8/8-10.html#SECTION%20V). According to the Code of Student Rights and Responsibilities, "Plagiarism includes, but is not limited to, representing as one’s own, without attribution, any other person’s words, phrasing, ideas, sequence of ideas, information or any other mode or content of expression. It does not include honest error." You are welcome to cite sources in your work, but you must do so explicitly and clearly. Please contact me if you have any questions on how to appropriately credit and mark the work of others.