Inductive Logic, PHIL 3210, Fall 2016

Instructor

Professor Jonah Schupbach
jonahschupbach.com
jonah.n.schupbach@utah.edu

Office Hours

Mondays, 1-2pm
(and by appointment)
CTIHB 417

Class / LAB Meetings

M,W 11:50-12:40pm, BEH S 107
LAB: Fri 11:50-12:40, CTIHB 406
8/22/2016 - 12/16/2016

Course Description

While the mathematical framework behind probability and statistics is relatively set and uncontroversial, the proper application and interpretation of this framework is a matter of longstanding, heated debate. Philosophical controversy permeates the very concept of probability and divides contemporary statisticians. In this course, we will discuss the most influential interpretations of probability (both throughout history and today), and we will examine how these determine the uses that the probability calculus may legitimately have. Along the way, students will develop a firm understanding of elementary probability theory and basic statistical reasoning. While our focus will mostly be on the philosophical issues that lay at the foundations of probability theory, we will also pay attention to some of probability's common philosophical applications—e.g., regarding testimony, scientific confirmation, and the problem of induction.

Course Objectives

By the end of this course and successful completion of course requirements, the student will be able to:

- list and explain the importance of all of the axioms and basic rules of probability theory,
- calculate the probabilities of various events and determine the probability distributions for random variables,
- compare and contrast the most prominent interpretations of probability, and explain how each of these affect probability theory's range of legitimate applications,
- summarize longstanding philosophical issues to which the probability theory has been applied, and evaluate the probabilistic approaches to these issues.

Prerequisites

Although this course does not have any *official* prerequisites, it does presuppose a basic acquaintance with elementary symbolic logic and high school mathematics. Exams will include proofs and calculations as well as conceptual questions. Students who are unprepared to do this sort of work are urged to take some other course.

Course Materials

Method of Instruction

Classes. In the majority of class times, we will learn new material in a discussion-based lecture. I intend for these "lectures" to draw heavily upon student input and dialogue; ideally, these will look more like

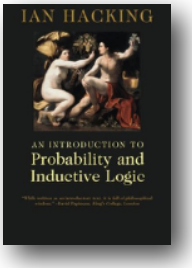
discussion sections than sit-and-listen lectures. Students will be expected to prepare well by doing the reading and homework carefully before classes and to participate throughout each class time.

Labs. Fridays are "lab days" devoted especially to answering student questions, reviewing or catching up on important concepts from the readings and lectures, and going over issues with the homework material (see below). These will be held at the normal class time, in CTIHB room 406.

Open Learning Initiative / Homework. Although we will be using the first few weeks of our course to go quickly through the basic mathematics of probability theory, students will be required to work more slowly and deeply through this material and to do a number of related homework assignments. For these purposes, we will be using Carnegie Mellon University's OLI course on "Probability and Statistics".

Readings / CANVAS Discussion Board. To keep up with this course and to get the most out of our class times, you must do the assigned reading slowly and carefully. Starting in week 2, students will be required to post reflections on aspects of our assigned readings to the CANVAS discussion board.

Learning Resources



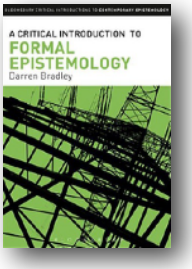
Ian Hacking, *An Introduction to Probability and Inductive Logic* (Cambridge University Press, 2001).

- This is our primary, required textbook for the course.
- Available at the University Campus Store.
- Online: [Cambridge] [Amazon]

Carnegie Mellon University, Open Learning Initiative (OLI).

- Students must enroll with our class through the OLI in order to get credit for their work [Key: PHIL3210F16].
- Enrollment cost is $25 for the term.

Darren Bradley, *A Critical Introduction to Formal Epistemology* (Bloomsbury Academic, 2015).



- This is our secondary textbook for the course. From time to time, I'll add optional, supplemental readings from this book to our weekly schedule. It is *not* a required purchase.
- Online: [Bloomsbury] [Amazon]

CANVAS <utah.instructure.com>

- I will use this resource throughout the term to keep you updated on your grades, for course communication, and for our course calendar. Class handouts and some assigned readings will be posted here as well.

Course Requirements

Attendance / Participation

(10% of final grade)

Attendance (physical and mental) is required for Monday and Wednesday classes, but *not* for Friday labs. By not coming to Monday / Wednesday classes, students will be hurting their own final course grades in ways that stretch beyond the direct 10% hit. I will typically take attendance at the very beginning of class time, so be sure to show up on time. If you arrive after I take attendance, you will be marked late and only receive 80% attendance credit for the day.

Discussion Board / Reading

(15% of final grade)

To encourage students to do their reading assignments carefully and thoughtfully, students will be required to post reflections on aspects of our assigned readings to the CANVAS discussion board. These weekly assignments will begin in week 2 and they must be posted by Wednesday, 9am of each week. As a rule of thumb, students should post at least around 100 words. Grading will be based on the amount of thought that students put into their posts and the extent to which their posts reveal that they have done the reading well. Here are some possible prompts to guide your response: (1) What did you take to be the author's strongest or weakest point and why? (2) How do the main points made in this reading relate to issues we have discussed previously; what new questions does it provoke for this issue? (3) Reply to someone else's response. You might take issue with a point that person makes or provide your own reason for agreeing with that person's response.

OLI Checkpoints / Homework

(25% of final grade)

The OLI component of this course (see above) includes several "checkpoint" assignments for you to complete and submit for grading online. See the course schedule below or the OLI syllabus for assignments and due dates. OLI checkpoints must be completed and submitted by Saturday, 5pm on those weeks that they are due. I will not accept any late homework, and I will not drop any scores at the end of the semester, so make sure that you finish all of your assignments and get them submitted on time. Your overall homework grade at the end of the term will be calculated as a straight average of all of your individual assignment grades throughout the term.

Exams

(20% for midterm / 30% for final = 50% of final grade)

Students will take a midterm and final exam. The final will be cumulative. The exams will cover students' knowledge of the probability theory as well as the philosophical ideas and arguments treated in the course—those covered in the readings and especially in class times. Check the schedule for exam / review session dates. Note that I do not allow students to make up missed exams. Some exceptions might be made in cases where students have a valid reason excusing them and evidence of that reason (e.g., sickness and a doctor's note).

GRADING

Final grades will follow a standard 10-point scale: 98-100 A+, 92-98 A, 90-92 A-, 88-90 B+, 82-88 B, 80-82 B-, etc.

POLICIES, ETC.

Missing and Late Assignments

Students will not be allowed to make up exams or turn in late homework assignments without a valid reason excusing them and evidence of that reason (e.g., sickness and a doctor's note). If you're going to be absent from class when HW is due, you need to turn it in to me before class or have a friend turn it in for you at the beginning of that class time.

Electronic Devices

Please silence your electronic devices during class. This includes your phones, tablets, computers, etc. Also, please refrain from texting, surfing the web, social networking, etc. during class time. Phones should not be used at all during class; tablets and computers should only be used for relevant readings / note-taking

Humanities Academic Misconduct Policy

Academic misconduct includes cheating, plagiarizing, research misconduct, misrepresenting one's work, and inappropriately collaborating. Definitions can be found in the Student Code.

If you are suspected of academic misconduct, the process proceeds according to the rules found in the Student Code, University Policy 6-400(V). According to that policy, after meeting with you, the instructor must determine whether academic misconduct has, in fact, occurred.

- If s/he determines that no academic misconduct has occurred, s/he will document that you are not responsible for any academic misconduct.
- If s/he determines academic misconduct has occurred and this is the first instance in which you have been alleged to have committed academic misconduct, s/he will take into account whether the act was intentional or a result of negligence in determining the appropriate sanction, which can be up to failing the course. The sanction will be noted in the resolution of the case and your right of appeal is as specified in Policy 6-400(V).
- If s/he determines academic misconduct has occurred, and you have previously been sanctioned for an act of academic misconduct, and the prior instance of misconduct resulted in a sanction less than failing the course, the department will follow the process to fail you for the course. If the prior sanction was failure of the course, your new act of misconduct will result in failure of the course and the department will also follow the process to seek your dismissal from the program and the University.

ADA Statement

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 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

Addressing Sexual Misconduct.

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 581-8365, or the Office of the Dean of Students, 270 Olpin Union Building, 581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 581-7776. To report to the police, contact the Department of Public Safety, 585-2677(COPS).

General Education Statement

This course contributes to the University of Utah's Quantitative Reasoning requirement. For such courses, academic units must identify three essential learning outcomes (ELOs) that are relevant to university general education objectives. The ELOs for this course are: Inquiry and Analysis, Quantitative Literacy, and Foundations and Skills for Lifelong Learning.

Course Schedule

*Our course schedule is roughly organized into three sections: 1. the mathematics of probability theory, 2. the philosophical foundations of probability and statistics, and 3. philosophical applications of the probability theory. The pace of our course will be determined in part by my evaluation of student progress. Thus, the schedule below should be thought of as tentative and subject to change throughout the term. (Students will be notified of any changes through CANVAS.) Below, in the right column, I list your assigned reading for the week, then optional, supplementary material, then any homework, review sessions, or exams. All readings marked '**' are available on our CANVAS page—under "Files" → "Readings"*

Week 1 (Aug 22-26) Course Introduction, Logic Refresher, From Logic to Probability Theory, Basic Notation **** Remember optional Friday LABs will be held at then normal class time, in CTIHB, room 406 ****	Hacking, chs. 1-2 OLI, pp. 86-93 (Module 5) - McGrew, "From Truth Tables to Joint Probability Distribution"** Enroll in our OLI course (instructions on CANVAS)
Week 2 (Aug 29 - Sept 2) The Mathematics of Probability Theory, σ-Algebras, Events and Propositions, Kolmogorov's Axioms	Hacking, chs. 3-4 OLI, pp. 94-99 - Hájek, SEP: "Interpretations of Probability," section 1 - Kolmogorov, "Foundations of the Theory of Probability"** - Lyon, "K's Axiomatization and its Discontents"** OLI checkpoint 6.1 (all checkpoints must be completed by 5pm on the Saturday of the assigned week) Post to online discussion board (all posts must be completed by 9am on Wednesday for each week)
Week 3 (Sept 5-9) Theorems and Basic Rules, Conditional Probability NO CLASS on 9/5 — Labor Day	Hacking, chs. 5-6 OLI, pp. 100-106 - Earman and Salmon, "The Confirmation of Scientific Hypotheses," pp. 66-74 Post to online discussion board

Week 4 (Sept 12-16) Bayes's Theorem, Bayes's Rule, Introduction to Interpreting Probabilities	Hacking, ch. 7 OLI, pp. 107-111 - Earman and Salmon, "The Confirmation of Scientific Hypotheses," pp. 74-77 OLI checkpoint 6.2 Post to online discussion board
Week 5 (Sept 19-23) Interpretations of Probability, Physical versus Epistemic Interpretations	Hacking, chs. 11-12 OLI, pp. 112-117 - Hájek, SEP: "Interpretations of Probability," (through section 3.1) - Bulmer, Principles of Statistics, chs. 1-2** OLI checkpoint 7.1 Post to online discussion board
Week 6 (Sept 26-30) Credences and Probabilities, Dutch Book Argument 1	Hacking, chs. 13-14 OLI, pp. 118-123 - Bradley, ch. 1-2 - Vineberg, SEP: "Dutch Book Arguments" OLI checkpoint 7.2 Post to online discussion board
Week 7 (Oct 3-7) Dutch Book Argument 2, Probabilism versus Personalism	Hacking, ch. 15 OLI, pp. 124-132 - Bradley, ch. 3 - Earman and Salmon, "The Confirmation of Scientific Hypotheses," pp. 81-84 Post to online discussion board
Week 8 (Oct 10-14) NO CLASSES all week — Fall Break	--
Week 9 (Oct 17-21) TEST WEEK	REVIEW SESSION: Monday MIDTERM EXAM: Wednesday
Week 10 (Oct 24-28) The Subjective-Objective Spectrum, Regularity, Principle of Conditionalization	OLI, pp. 133-137 - Bradley, chs. 4-5 OLI checkpoint 8.1

Week 11 (Oct 31 - Nov 4) Principle of Indifference, Principal Principle, Reflection NO LAB on 11/4	Eagle, Philosophy of Probability, pp. 284-295** OLI, pp. 138-140 - Bradley, chs. 9-10 - Earman and Salmon, "The Confirmation of Scientific Hypotheses," pp. 85-89 - Briggs, "Distorted Reflection"** OLI checkpoint 8.2 Post to online discussion board
Week 12 (Nov 7-11) Frequencies and Probabilities, Stability	Hacking, ch. 16-17 OLI, pp. 141-144 - Earman and Salmon, "The Confirmation of Scientific Hypotheses," pp. 77-81 - Hájek, "15 Arguments Against Finite Frequentism"** OLI checkpoint 8.3 Post to online discussion board
Week 13 (Nov 14-18) Significance Testing and Induction, Power, Confidence and Induction	Hacking, ch. 18 OLI, pp. 145-150 - Hacking, ch. 19 - Hájek, "15 Arguments Against Hyp'l Frequentism"** Post to online discussion board
Week 14 (Nov 21-25) The Problem of Induction NO CLASS on 11/23 NO LAB on 11/25 — Thanksgiving Break	Hacking, ch. 20 OLI, pp. 151-155 - Bradley, ch. 6 - Hume, *An Enquiry Concerning Human Understanding* section IV, parts 1-2** - Vickers, SEP: "The Problem of Induction" Post to online discussion board
Week 15 (Nov 28 - Dec 2) Probability and the Problem of Induction	Hacking, chs. 21-22 OLI, pp. 156-159 - Bradley, ch. 7 - Earman and Salmon, "The Confirmation of Scientific Hypotheses," pp. 55-66 - McGrew, "Direct Inference and the Prob of Ind"** OLI checkpoint 8.4 Post to online discussion board
Week 16 (Dec 5-9) TEST WEEK	REVIEW SESSION: Monday CUMULATIVE FINAL EXAM: Wednesday