

Introduction to Inductive Logic

Summer, 2021

Instructor: Gerard Rothfus
Classroom: Online
Day/Time: Th; 1:30-3:00pm
Office Hours: W, Th; 3-4:00pm or by appointment (via zoom)
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Description

This course introduces students to the basics of inductive logic. As a necessary prelude, students will first review to the basics of deductive logic. We will then examine Hume's Problem of Induction as an argument for the limits of deductive reasoning, leading us to investigate probability theory as a model for how to reason inductively. Classical philosophical problems (e.g. the interpretation of probability and various probabilistic puzzles) will be explored along the way while students are equipped with tools they can use to improve their own probabilistic reasoning in everyday contexts. Franz Huber's "A Logical Introduction to Probability and Induction" will serve as the course's textbook

Learning Objectives

This course will equip students to:

- Represent and analyze arguments via formal logic.
- Apply Bayes' Rule and other principles of probability to assess the quality of inductive arguments.

Course Materials

The required textbook for this course is:

- *A Logical Introduction to Probability and Induction* by Franz Huber, 2019, OUP.

All other readings and exercises will be made available online via ILIAS. The schedule of course readings is given in the Course Outline below.

Course Structure

This course will be taught entirely online. Each week at lecture time, we will convene online to cover the material for the week. Periodically, I will also release short, pre-recorded videos to the ILIAS site (as well as YouTube), summarizing different ideas covered in the course. You may view these videos to help with homework problems or just to get a better grip on key ideas in the course.

I will also hold office hours over Zoom on Wednesdays and Thursdays at 3pm. You are encouraged to attend any of these office hours that you like! In these office hours, I will go over the past week's homework assignment. You are encouraged to come to these virtual office hours and ask any questions you may have about the course! Please feel free to reach out to me at any time!

Course Assignments

Homework will be due the day before class every other week (Wednesday at 11:59pm) and should be submitted via ILIAS. Students are encouraged to discuss homework problems with other students, though every student must write/type out their own homework. Your lowest homework grade will be dropped.

If you wish to write a term paper for the course, this is certainly possible, though it is not required as grading will be based solely on your homework performance. Feel free to reach out to me about this possibility!

Grade Scale

A: 90-100	B: 80-89	C: 70-79	D: 60-69	F: < 60
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Academic Integrity

Academic dishonesty will not be tolerated. Though collaboration among students is encouraged, any work a student turns in must ultimately be their own. Students who have any questions or uncertainty about this policy are responsible for meeting with the instructor to discuss the policy.

Disabilities

Please notify me in advance of the need for accommodation of a University verified disability. I will gladly provide the required accommodations. If you have any questions or concerns about disability accommodations, please don't hesitate to speak with me; I am happy to help out.

Course Outline

Week:	Topic:
April 15	<p>The Basics of Deductive Logic</p> <ul style="list-style-type: none"> • Propositional Logic, Predicate Logic, Set Theory <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 1, “Logic”. • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 2, “Set Theory”. <p>Homework One Due April 21, 11:59pm</p>
April 22	<p>The Problem of Induction</p> <ul style="list-style-type: none"> • Hume’s Traditional Problem of Induction <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 3, “Induction”. • <i>Choice and Chance: An Introduction to Inductive Logic</i> (4th edition) by Brian Skyrms, 2000: Chapter 3, “The Traditional Problem of Induction” . • “Induction, Explanation, and Natural Necessity” by John Foster, 1983, <i>Proceedings of the Aristotelian Society</i>.
April 29	<p>Deductive Approaches to Confirmation</p> <ul style="list-style-type: none"> • Rules of Deductive Confirmation, the Ravens Paradox, the Hypothetico-Deductive Method <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 4, “Deductive Approaches to Confirmation”. • “Hypothetico-Deductive Confirmation” by Jan Sprenger, 2011, <i>Philosophy Compass</i>. <p>Homework Two Due May 5, 11:59pm</p>

Week:	Topic:
May 6	<p>Probability Theory I</p> <ul style="list-style-type: none"> • The Probability Axioms, Basic Probability Rules, Conditional Probability <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 5, “Probability”.
May 13	<p>Probability Theory II</p> <ul style="list-style-type: none"> • Bayes’ Theorem, the Monty Hall Problem <p>Reading:</p> <ul style="list-style-type: none"> • “Introduction to Bayes’ Theorem” by Richard Swinburne, 2005, <i>Bayes’ Theorem</i>. <p>Homework Three Due May 19, 11:59pm</p>
May 20	<p>The Classical Interpretation of Probability</p> <ul style="list-style-type: none"> • The Principle of Indifference, Bertrand’s Paradox <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 6, “The Classical Interpretation of Probability”. • “Mushy Credences and Evidential Symmetry” by Roger White, 2009, <i>Oxford Studies in Epistemology</i>. • “Explanationist Aid for the Theory of Inductive Logic” by Michael Huemer, 2009, <i>British Journal for the Philosophy of Science</i>.
May 27	<p>The Logical Interpretation of Probability I</p> <ul style="list-style-type: none"> • Wittgenstein’s Inductive Logic <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 7, “The Logical Interpretation of Probability”, § 1. • <i>Lectures on Inductive Logic</i> by Jon Williamson, 2017: Chapter 1, “Classical Inductive Logic”. <p>Homework Four Due June 9, 11:59pm</p>

June 3	No Class (Break)
June 10	<p>The Logical Interpretation of Probability II</p> <ul style="list-style-type: none"> • Carnap’s Inductive Logic, the Grue Paradox <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 7, “The Logical Interpretation of Probability”, § 2-5. • <i>Lectures on Inductive Logic</i> by Jon Williamson, 2017: Chapter 4, “Carnap’s Programme”.
June 17	<p>The Subjective Interpretation of Probability I</p> <ul style="list-style-type: none"> • Justifying Probability as Degree of Belief, Dutch Books, Accuracy <p>Reading: Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 8, “The Subjective Interpretation of Probability”, § 1-3. • “Dutch-Book Arguments Depragmatized: Epistemic Consistency For Partial Believers” by David Christensen, 1996, <i>Journal of Philosophy</i>. • “Epistemic Utility Arguments for Probabilism” by Richard Pettigrew, 2019, <i>The Stanford Encyclopedia of Philosophy</i>. <p>Homework Five Due June 23, 11:59pm</p>
June 24	<p>The Subjective Interpretation of Probability II</p> <ul style="list-style-type: none"> • Bayesian Confirmation Theory, Updating Rules, Reflection <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 8, “The Subjective Interpretation of Probability”, § 4-5. • “Why Conditionalize?” by David Lewis, 1999, <i>Philosophy of Probability: Contemporary Readings</i>. • “Distorted Reflection” by Rachael Briggs, 2009, <i>Philosophical Review</i>.

Week:	Topic:
July 1	<p>The Chance Interpretation of Probability</p> <ul style="list-style-type: none"> • Probability in Physics, the Principal Principle <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 9, “The Chance Interpretation of Probability”. • “A Subjectivist’s Guide to Objective Chance” by David Lewis, 1981, <i>Studies in Inductive Logic and Probability, Volume II</i>. • “The Metaphysics of Chance” by Rachael Briggs, 2010, <i>Philosophy Compass</i>. <p>Homework Six Due July 7, 11:59pm</p>
July 8	<p>The Frequency Interpretation of Probability I</p> <ul style="list-style-type: none"> • The Straight Rule, Random Variables, Exchangeability, Laws of Large Numbers, Convergence Theorems <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 10, “The (Limiting) Relative Frequency Interpretation of Probability”, § 1-6. • <i>Notes on the Theory of Choice</i> by David Kreps, 1988: Chapter 11, “Independence, Exchangeability, and de Finetti’s Theorem”.
July 15	<p>The Frequency Interpretation of Probability II</p> <ul style="list-style-type: none"> • Descriptive and Inferential Statistics, the Central Limit Theorem <p>Reading:</p> <ul style="list-style-type: none"> • <i>A Logical Introduction to Probability and Induction</i> by Franz Huber: Chapter 10, “The (Limiting) Relative Frequency Interpretation of Probability”, § 7-9. • “Philosophy of Statistics” by Jan-Willem Romeijn, 2017, <i>The Stanford Encyclopedia of Philosophy</i>. <p>Homework Seven Due July 21, 11:59pm</p>
July 22	<p>Probability and Evidence</p> <ul style="list-style-type: none"> • Probability and Epistemology <p>Reading:</p> <ul style="list-style-type: none"> • “How Probabilities Reflect Evidence” by James Joyce, 2005, <i>Philosophical Perspectives</i>. • “The Structure of Epistemic Probabilities” by Nevin Climenhaga, 2020, <i>Philosophical Studies</i>.