

PHIL 808K: Topics in Bayesian Epistemology

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Semester:	Fall 2026
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Course Website:	https://umd.instructure.com/courses/1411586
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Office Hours:	TBA
Class Times:	Thursdays, 2:00pm - 4:30pm
Class Location:	SKN 1116

Description

This course is about the formal models of knowledge and belief used in logic, philosophy, computer science, artificial intelligence, game theory, linguistics, and statistics. It is focused on four foundational questions:

1. How should an agent's uncertainty be represented, and how are the different representations related?
2. What, if anything, justifies representing an agent's uncertainty by a probability measure?
3. How should an agent change her beliefs in response to new evidence?
4. What is the relationship between an agent's graded beliefs, full beliefs, and the reasons that support them?

The final part of the course (time permitting) focuses on issues that arise in decision theory and in the move from a single agent to a group of agents.

Course work

If you are taking this seminar for credit, there are two main requirements in addition to regular attendance and completing the assigned readings:

1. **Questions:** Before each session, submit a question or comment about the readings for the week or the material discussed in the previous lecture. Your submission could include: A request for further explanation of mathematical concepts or notation, a question about the proof of a theorem we are discussing, or a philosophical question or comment related to the material from the previous or upcoming lecture. Questions or comments are due by midnight on the Wednesday prior to class, giving me time to review them before class.

2. **Project:** The primary requirement is a project, which can take several forms. Here are some options:

- Write a seminar paper exploring a philosophical topic related to the course material.
- Write a more technical paper, discussing a formal result about the course material or establishing a new result.
- Write an expository paper surveying a debate or a series of results in Bayesian epistemology.
- Implement and analyze an agent-based model connected to topics discussed during the semester.

I am open to other project ideas as well. Whatever you choose, we should finalize your project plan by the 10th or 11th week of the semester to ensure you have sufficient time to complete it before the semester ends or shortly thereafter.

Schedule and Readings

The following is a tentative schedule for the course (this may change based on the interests of the students or if we need to spend more time on a particular topic). Some of the readings contain a lot of mathematics (especially the logic papers). I will explain the proofs when it is useful, otherwise we will focus on understanding the philosophical implications of the mathematical results.

Part 1 Foundations: Representing uncertainty (9/3, 9/10)

- J. Halpern (2017). Chapter 2: Representing Uncertainty, in *Reasoning About Uncertainty*, The MIT Press.
- H. Lin (2022). Bayesian Epistemology, Stanford Encyclopedia of Philosophy, <https://plato.stanford.edu/entries/epistemology-bayesian/>
- D. Greco (2023). Chapter 3: Modeling with Possible Worlds, in *Idealization in Epistemology*, Oxford University Press.
- R. Stalnaker (2006). On Logics of Knowledge and Belief, *Philosophical Studies*, 128, pp. 169–199, <https://doi.org/10.1007/s11098-005-4062-y>.
- W. Holliday (2025). A partial-state space model of unawareness, *Journal of Mathematical Economics*, 116, 103081, <https://doi.org/10.1016/j.jmateco.2024.103081>

Part 2 Justifying probabilistic credences (9/17, 9/24, 10/1)

- K. Easwaran (2026). Chapter 2: Beliefs Guide Action, in *The Philosophical Foundations of Bayesianism: An Opinionated Introduction*, Routledge.
- S. Vineberg (2022). “Dutch Book Arguments”, The Stanford Encyclopedia of Philosophy (Fall 2022 Edition), <https://plato.stanford.edu/archives/fall2022/entries/dutch-book/>.

- R. Pettigrew (2026). The epistemology of accurate credences, manuscript, <https://philpapers.org/archive/PETTE0-44.pdf>.
- H. Leitgeb (2021). A Structural Justification of Probabilism: From Partition Invariance to Subjective Probability, *Philosophy of Science*, 88(2), pp. 341–365, <https://doi.org/10.1086/711570>.
- J.R.G. Williams (2012). Generalized Probabilism: Dutch Books and Accuracy Domination, *Journal of Philosophical Logic*, 41, pp. 811–840, <https://doi.org/10.1007/s10992-011-9192-4>.
- M. Caie (2013). Rational Probabilistic Incoherence, *The Philosophical Review*, 122(4), pp. 527–575, <https://doi.org/10.1215/00318108-2315288>
- S. Neth (2025). Better Foundations for Subjective Probability, *Australasian Journal of Philosophy*, 103(1), pp. 1–22, <https://doi.org/10.1080/00048402.2024.2329970>.
- C. Meacham and J. Weisberg (2011). Representation Theorems and the Foundations of Decision Theory, *Australasian Journal of Philosophy*, 89(4), pp. 641–663, <https://doi.org/10.1080/00048402.2010.510529>.

Part 3 Learning: How credences change (10/8, 10/15, 10/22)

- S. Huttegger (2017). *The Probabilistic Foundations of Rational Learning* (Chapters 2, 5, and 6), Cambridge University Press.
- S. Huttegger (2024). Superconditioning, *Philosophical Studies*, 181, pp. 811–833, <https://doi.org/10.1007/s11098-024-02117-7>
- K. Zollman and K. Dorst (2025). Reflection, introspection, and book, *Philosophy and Phenomenological Research*, 111, pp. 1136–1158, <https://doi.org/10.1111/phpr.70060>
- K. Easwaran and M. Nielsen (2025). Updating by Maximizing Expected Accuracy in Infinite Non-Partitional Settings, *Journal of Philosophical Logic*, 54, pp. 1095–1134, <https://doi.org/10.1007/s10992-025-09814-6>.
- B. Eva, T. Shear, and B. Fitelson (2022). Four Approaches to Supposition, *Ergo*, 8:26, <https://doi.org/10.3998/ergo.2227>
- K. Steele and H. Orri Stefánsson (2021). Belief Revision for Growing Awareness, *Mind*, 130(520), pp. 1207–1232, <https://doi.org/10.1093/mind/fzaa056>
- A. Mahtani (2021). Awareness growth and dispositional attitudes, *Synthese* 198, pp. 8981–8997, <https://doi.org/10.1007/s11229-020-02611-5>
- R. Pettigrew (2024). How Should your Beliefs Change When your Awareness Grows? *Episteme*, 21(3), pp. 733–757, <https://doi.org/10.1017/epi.2022.33>.
- G. Bonanno (2025). A Kripke-Lewis semantics for belief update and belief revision, *Artificial Intelligence*, 339, 104259, <https://doi.org/10.1016/j.artint.2024.104259>

Part 4 From credence to beliefs and reasons (10/29, 11/5, 11/12, 11/19)

- H. Leitgeb (2026). The Additive Logic of Epistemic Reasons: An Axiomatic Account, *Theoria* e70101, <https://doi.org/10.1111/theo.70101>.
- L. Hornischer and H. Leitgeb (2025). Explaining Neural Networks with Reasons, <https://arxiv.org/abs/2505.14424>.
- F. Dietrich and C. List. (2013). Reasons for (Prior) Belief in Bayesian Epistemology, *Synthese* 190(5), pp. 787–808, <https://doi.org/10.1007/s11229-012-0224-6>.
- A. Baltag, N. Bezhanishvili, A. Özgün, and S. Smets (2022). Justified belief, knowledge, and the topology of evidence, *Synthese*, 200(512), <https://doi.org/10.1007/s11229-022-03967-6>.
- H. Lin and K. Kelly (2012). Propositional Reasoning that Tracks Probabilistic Reasoning, *Journal of Philosophical Logic*, 41, pp. 957–981, <https://doi.org/10.1007/s10992-012-9237-3>.
- Selected readings from H. Leitgeb (2017), *The Stability of Belief: How Rational Belief Coheres with Probability*, Oxford University Press.
- K. Mierzewski (2025). Probabilistically stable revision and comparative probability: a representation theorem and applications, <https://arxiv.org/pdf/2509.02495>.
- L. Buchak (2014). Belief, credence, and norms. *Philosophical Studies*, 169, pp. 285–311, <https://doi.org/10.1007/s11098-013-0182-y>.
- J. Staffel (2016). Beliefs, buses and lotteries: Why rational belief can't be stably high credence, *Philosophical Studies*, 173, pp. 1721–1734, <https://doi.org/10.1007/s11098-015-0574-2>.
- F. Dietrich and C. List (2021). The relation between degrees of belief and binary beliefs: a general impossibility theorem, in *Lotteries, Knowledge, and Rational Belief. Essays on the Lottery Paradox*, ed. I. Douven, Cambridge University Press, pp. 223–254, <https://doi.org/10.1017/9781108379755.012>.
- J. Goodman and B. Salow (2025). Belief Revision Normalized, *Journal of Philosophical Logic*, 54, pp. 1–49, <https://doi.org/10.1007/s10992-024-09769-0>.

11/26: No Class Thanksgiving

Part 5 Applications and extensions (12/3, 12/10)

Readings for this part will be posted on the course website later in the semester. These meetings may be used as overflow for material from earlier parts of the course. Time permitting, we will discuss extensions of the course material, including recent work on evidential and causal decision theory and topics in interactive epistemology.