Division of Humanities
Course Syllabus
Spring 2026

Course Title:	Philosophy of Science
Course Code:	HUMA1921
Credits:	3 credits
Prerequisites:	None
Course Instructor:	Yafeng Shan
Email:	hmyfshan@ust.hk
Office Hours:	10 am – 12 pm, Wednesdays
Teaching Assistant:	Qinyi Wang (qwangdi@connect.ust.hk)

Course Description:

This is an introductory course in the philosophy of science. It will cover some classical works of the 20th century philosophy of science, including Logical Empiricism (e.g. Carnap, Hempel, and Nagel), Popper's Falsificationism, Kuhn's *Structures of Scientific Revolutions*, Lakatos' research programme, and Feyerabend's 'anything goes'. It will also examine some fundamental concepts in science. What is scientific explanation? What counts as scientific evidence? What is scientific understanding? Moreover, it will assess some central debates in the philosophy of science such as the scientific realism/anti-realism debate and the recent debate over scientific progress.

Course Intended Learning Outcomes (ILOs):

	Course ILOs
1	Understand evaluate the key philosophical accounts of many core topics in the philosophy of science, including epistemology of science and metaphysics of science.
2	Write philosophically cohesive essays, where philosophical theories are explained and arguments for them critically evaluated.
3	Discuss philosophical arguments systematically and present these to their peers.

Course Outline:

Week		**Topics**

1	4 Feb	Philosophy and Science
2	11 Feb	Logical Empiricism (1)
3	25 Feb	Logical Empiricism (2)
4	4 Mar	Popper
5	11 Mar	Kuhn
6	18 Mar	Lakatos and Feyerabend
7	25 Mar	Scientific Confirmation
8	1 Apr	Scientific Explanation
9	15 Apr	Scientific Understanding
10	22 Apr	Scientific Realism
11	29 Apr	Underdetermination
12	6 May	Scientific Progress

Assessments:

Assessment tasks		Contribution to Overall Course grade (%)	Due dates
Summative essay 1	1,000 words essay	20%	1 April 2026
Summative essay 2	1,500 words essays	80%	20 May 2026

Late submissions will be penalised. 10% deduction applies per delayed day. Missing submissions will lose all the grades.

Readings:

Week 1

Topic: Philosophy and Science

Required Reading

Gillies, D. (1993). Some Historical Background: Inductivism, Russell and the Cambridge School, the Vienna Circle and Popper. In *Philosophy of Science in the Twentieth Century: Four Central Themes* (pp. 1–25). Oxford: Oxford University Press.

Further Reading

Gillies, D. (1993). Is Metaphysics Meaningless? Wittgenstein, the Vienna Circle, and Popper's Critique. In *Philosophy of Science in the Twentieth Century: Four Central Themes* (pp. 153–188). Oxford: Blackwell Publishers.

Week 2

Topic: Logical Empiricism (1)

Required Reading

Carnap, R. (1959). The Elimination of Metaphysics Through Logical Analysis of Language. In A. J. Ayer (Ed.), A. Pap (Trans.), *Logical Positivism* (pp. 60 –81). New York: The Free Press.

Further Reading

Gillies, D. (1993). Is Metaphysics Meaningless? Wittgenstein, the Vienna Circle, and Popper's Critique. In *Philosophy of Science in the Twentieth Century: Four Central Themes* (pp. 153–188). Oxford: Blackwell Publishers.

Richardson, A. W. (2007). That sort of every image of Logical Positivism - Thomas Kuhn and the decline of Logical Empiricist Philosophy of Science. In A. Richardson and T. Uebel, (Eds.), *The Cambridge Companion to Logical Empiricism* (pp. 346-370). Cambridge: Cambridge University Press.

Week 3

Topic: Logical Empiricism (2)

Required Reading

Oppenheim, P., & Putnam, H. (1958). Unity of Science as a Working Hypothesis. *Minnesota Studies in the Philosophy of Science*, *2*, 3–36

Further Reading

Benton, Ted, and Ian Craib. 2011. *Philosophy of Social Science*. 2nd ed. Basingstoke: Palgrave Macmillan. (pp.76-93.)

Nagel, E. (1974). Issues in the Logic of Reductive Explanations. In *Teleology Revisited and Other Essays in the Philosophy and History of Science* (pp. 95–113). New York: Columbia University Press.

Taylor, Charles. 1971. "Interpretation and the Sciences of Man." *The Review of Metaphysics* 25 (1): 3–51.

Weber, Max. 1947. The *Theory of Social and Economic Organization*. Translated by A. M. Henderson and Talcott Parsons. New York: The Free Press. (pp.87-157.)

Winch, Peter. 1958. *The Idea of a Social Science and Its Relation to Philosophy*. London: Routledge & Kegan Paul Ltd.

Week 4

Topic: Popper

Required Reading

Popper, K. (1963). Science: Conjectures and Refutations. In *Conjectures and Refutations* (pp. 43–78). London: Routledge & Kegan Paul.

Further Reading

Godfrey-Smith, P. (2016). Popper's Philosophy of Science: Looking Ahead. In J. Shearmur & G. Stokes (Eds.), *The Cambridge Companion to Popper* (pp. 104–124). Cambridge University Press.

Kuhn, T. S. (1970). Logic of Discovery or Psychology of Research? In *Criticism and the Growth of Knowledge* (pp. 1–23). Cambridge: Cambridge University Press.

Musgrave, A. (2004). How Popper [Might Have] Solved the Problem of Induction. *Philosophy*, *79*(307), 19–31.

Week 5

Topic: Kuhn

Required Reading

Kuhn, T. S. (1970). *The Structure of Scientific Revolutions* (2nd ed.) (pp. 10–42). Chicago, IL: University of Chicago Press.

Further Reading

Bird, A. (2005). Naturalizing Kuhn. *Proceedings of the Aristotelian Society*, *105*(1), 99–117.

Kuhn, T. S. (1970). *The* Structure *of Scientific Revolutions* (2nd ed.) (pp. 92–135). Chicago, IL: University of Chicago Press.

Rouse, J. (2003). Kuhn's Philosophy of Scientific Practice. In T. Nickles (Ed.), *Thomas Kuhn* (pp. 101–121). Cambridge University Press.

Sankey, H. (1993). Kuhn's Changing Concept of Incommensurability. *British Journal for the Philosophy of Science*, *44*(4), 759–774.

Shan, Y. (2020). Kuhn's "wrong turning" and legacy today. *Synthese*, *197*(1), 381–406.

Week 6

Topic: Lakatos and Feyerabend

Required Reading

Lakatos, I. (1968). Criticism and the Methodology of Scientific Research Programmes. *Proceedings of the Aristotelian Society*, *69*, 149–186.

Further Reading

Feyerabend, P. (1962). Explanation, Reduction, and Empiricism. In H. Feigl & G. Maxwell (Eds.), *Scientific Explanation, Space, and Time,* (pp. 28–97). University of Minnesota Press.

Feyerabend, P. (2010). *Against Method* (4th ed.) (pp. 7-16 and 241-248). London: Verso.

Lakatos, I. (1970). History of Science and its Rational Reconstructions. *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association*, *1970*, 91–136.

Larvor, B. (1998). *Lakatos: An Introduction*. Routledge.

Week 7

Topic: Scientific Confirmation

Required Reading

Hempel, C. G. (1945). Studies in the Logic of Confirmation (I.). *Mind*, 54(213), 1–26.

Goodman, N. (1983). *The New Riddle of Induction. In Fact, Fiction, and Forecast* (pp. 59–83). Cambridge, MA: Harvard University Press.

Further Reading

Achinstein, P. (2008). Evidence. In S. Psillos & M. Curd (Eds.), *The Routledge Companion to Philosophy of Science* (pp. 337–348). Routledge.

Shan, Y. (2020). The Gap Problem in Hypothetico-Deductivism. In *Doing integrated history and philosophy of science: A case study of the origin of genetics*, (pp. 159-175). Springer.

Sprenger, J. (2011). Hypothetico-Deductive Confirmation. *Philosophy Compass*, *6*(7), 497–508.

Week 8

Topic: Scientific Explanation

Required Reading

Hempel, C. G. (2012). Two Basic Types of Scientific Explanation. In M. Curd, J. A. Cover, & C. Pincock (Eds.), *Philosophy of Science: The Central Issues* (pp. 657–666). New York and London: W. W. Norton & Company.

Further Reading

Kitcher, P. (1989). Explanatory Unification and the Causal Structure of the World. In P. Kitcher & W. C. Salmon (Eds.), *Scientific explanation* (pp. 410–505). University of Minnesota Press.

Salmon, W. (1971). Statistical Explanation. In W. Salmon (Ed.), *Statistical Explanation and Statistical Relevance,* (pp. 29–87). University of Pittsburgh Press.

Salmon, W. C. (1998). Why Ask, "Why?"?: An Inquiry Concerning Scientific Explanation. In *Causality and Explanation* (pp. 125–141). New York and Oxford: Oxford University Press.

Shan, Y. (2019). Contrastivism and Non-Contrastivism in Scientific Explanation. *Philosophy Compass*, *14*(8), e12613.

Week 9

Topic: Scientific Understanding

Required Reading

de Regt, H. W. (2009). Understanding and scientific explanation. In H. W. de Regt, S. Leonelli, & Kai Eigner (Eds.), *Scientific Understanding: Philosophical Perspectives*, (pp. 21–42). University of Pittsburgh Press.

Further Reading

Dellsén, F. (2020). Beyond explanation: Understanding as dependency modelling. *British Journal for the Philosophy of Science*, *71*(4), 1261–1286.

Khalifa, K. (2017). The philosophy of understanding. In *Understanding, explanation, and scientific knowledge*, (pp. 1-22) Cambridge University Press.

Week 10

Topic: Scientific Realism

Required Reading

Laudan, L. (1981). A Confutation of Convergent Realism. *Philosophy of Science*, *48*(1), 19 – 49.

Further Reading

Fine, A. I. (1984). The natural ontological attitude. In J. Leplin (Ed.), *Scientific Realism* (pp. 261–277). University of California Press.

Putnam, H. (1978). Lecture II. In *Meaning and the Moral Sciences*, (pp.18-33). London: Routledge & Kegan Paul.

Stanford, P. K. (2003). No Refuge for Realism: Selective Confirmation and the History of Science. *Philosophy of Science*, *70*(5), 913–925.

Worrall, J. (1989). Structural realism: the best of both worlds? *Dialectica*, *43*(1–2), 99–124.

Week 11

Topic: Underdetermination

Required Reading

Stanford, P. Kyle. 2006. Realism, Pessimism, and Underdetermination. In *Exceeding Our Grasp*, 3–26. Oxford: Oxford University Press.

Further Reading

Duhem, P. (1953). Physical Theory and Experiment. In *The Aim and Structure of Physical Theory* (P. P. Wiener, Trans.) (pp. 180–218). Princeton, NJ: Princeton University Press.

Kukla, A. (1993). Laudan, Leplin, Empirical Equivalence and Underdetermination. *Analysis*, *53*(1), 1–7.

Laudan, L., & Leplin, J. (1991). Empirical Equivalence and Underdetermination. *Journal of Philosophy*, *88*(9), 449–472.

Stanford, K. (2013). Underdetermination of Scientific Theory. In *Stanford Encyclopedia of Philosophy* (pp. 1–17).

Week 12

Topic: Scientific Progress

Required Reading

Bird, Alexander. 2007. What Is Scientific Progress?. *Noûs* 41 (1): 64–89.

Further Reading

Laudan, L. (1981). A Problem-Solving Approach to Scientific Progress. In I. Hacking (Ed.), *Scientific Revolutions* (pp. 144–155). Oxford University Press.

Niiniluoto, I. (2014). Scientific Progress as Increasing Verisimilitude. *Studies in History and Philosophy of Science Part A*, *46*, 73–77.

Shan, Yafeng. 2019. A New Functional Approach to Scientific Progress. *Philosophy of Science* 86 (4): 739–58.

Shan, Y. (Ed.). (2022). *New Philosophical Perspectives on Scientific Progress* (1st ed.). Routledge.

Week 13

Topic: Scientific Knowledge

Required Reading

Bird, A. (2010). Social Knowing: The Social Sense of 'Scientific Knowledge.' *Philosophical Perspectives*, *24*, 23–56.

Further Reading

de Ridder, J. (2014). Epistemic Dependence and Collective Scientific Knowledge. *Synthese*, *191*(1), 37–53.

Gilbert, M. (2000). Collective belief and scientific change. In M. Gilbert (Ed.), *Sociality and Responsibility: New Essays in Plural Subject Theory* (pp. 37–49). Rowman & Littlefield.