

Department of Logic and Philosophy of Science

Simon Huttegger, Department Chair

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The Department of Logic and Philosophy of Science (LPS) brings together faculty and students interested in a wide range of topics loosely grouped in the following areas: general philosophy of science; philosophy of the particular sciences; logic, foundations and philosophy of mathematics; and philosophy of mathematics in application. LPS enjoys strong cooperative relations with UCI's Department of Philosophy; in particular, the two units jointly administer a single graduate program which offers the Ph.D. in Philosophy. LPS also has strong interconnections with several science departments, including Mathematics and Physics, as well as the School of Biological Sciences, the Donald Bren School of Information and Computer Sciences, the Departments of Cognitive Sciences and Economics, and the graduate concentration in Mathematical Behavioral Sciences. The Program in Law and Graduate Studies is a concurrent degree study leading to a J.D. from the School of Law in conjunction with a Ph.D. in the Department of Logic and Philosophy of Science.

Salzburg Exchange Program

LPS and the Department of Philosophy jointly administer an Exchange Program with the University of Salzburg. The program has two parts. The Scholarly Exchange provides opportunities for faculty and graduate students in LPS and Philosophy to visit Salzburg and for faculty and graduate students from Salzburg to visit one or the other of the UCI units. The Program also sponsors joint conferences, held alternately in Irvine and in Salzburg; these are co-sponsored by Salzburg and the UCI Interdisciplinary Program in the History and Philosophy of Science.

To be eligible for the Salzburg Exchange, a graduate student must have advanced to candidacy. The selected student spends one semester in Salzburg, usually teaching one course in the general area of the thesis topic. An upper-division course may be taught in English, but lower-division courses must be taught in German. (Some previous visitors have learned serviceable German by attending a Goethe institute during the preceding summer.) Typically, a Salzburg visitor will receive a Salzburg Fellowship intended to cover travel expenses, and a stipend; those who teach while in Salzburg will also receive a salary intended to cover living expenses (including health and dental insurance).

Applications from LPS graduate students (including a curriculum vita and syllabi for courses that might be taught) should be sent to the LPS Salzburg Exchange Director by November 1.

Program in Law and Graduate Studies (J.D./Ph.D.)

Highly qualified students interested in combining the study of law with graduate research and/or professional qualifications in Logic and Philosophy of Science are invited to undertake concurrent degree study under the auspices of UC Irvine's Program in Law and Graduate Studies (PLGS).

Students in this program pursue a coordinated curriculum leading to a J.D. degree from the School of Law in conjunction with a Ph.D. degree in the Department of Logic and Philosophy of Science. Contact the PLGS Program Director's office for additional information at 949-824-4158, or by email to plgs@law.uci.edu. A full description of the program, with links to all relevant application information, can be found at the School of Law Concurrent Degree Programs website (<http://www.law.uci.edu/academics/interdisciplinary-studies/concurrent-degrees.html>) and in the School of Law School section (<http://catalogue.uci.edu/schooloflaw/#lawandgraduatestudies>) of the *Catalogue*.

- Philosophy, Ph.D. (School of Social Sciences)
- Philosophy, Political Science, and Economics, M.A. (4+1)

Faculty

Jeffrey A. Barrett, Ph.D. Columbia University, *Professor of Logic and Philosophy of Science; Philosophy*

Jean-Paul Carvalho, Ph.D. Oxford University, *Associate Professor of Economics; Logic and Philosophy of Science; Religious Studies*

Matthew Foreman, Ph.D. University of California, Berkeley, *Distinguished Professor of Mathematics; Logic and Philosophy of Science* (ergodic theory and dynamical systems, logic and foundations)

Steven A. Frank, Ph.D. University of Michigan, *Distinguished Professor and Donald Bren Professor of Ecology and Evolutionary Biology; Logic and Philosophy of Science*

Isaac Goldbring, Ph.D. University of Illinois at Urbana-Champaign, *Associate Professor of Mathematics; Logic and Philosophy of Science* (logic and foundations)

Jeremy Heis, Ph.D. University of Pittsburgh, *Associate Professor of Logic and Philosophy of Science; Philosophy*

Donald Hoffman, Ph.D. Massachusetts Institute of Technology, *Professor of Logic and Philosophy of Science; Logic and Philosophy of Science*

Simon Huttegger, Ph.D. University of Salzburg, *Department Chair and Professor of Logic and Philosophy of Science*

Arthur D. Lander, Ph.D. University of California, San Francisco, *Donald Bren Professor and Professor of Developmental and Cell Biology; Biomedical Engineering; Logic and Philosophy of Science* (systems biology of development, pattern formation, growth control)

Penelope Maddy, Ph.D. Princeton University, *Professor Emeritus of Logic and Philosophy of Science; Mathematics; Philosophy*

David B. Malament, Ph.D. The Rockefeller University, *Professor Emeritus of Logic and Philosophy of Science*

John Manchak, Ph.D. University of California, Irvine, *Professor of Logic and Philosophy of Science; Religious Studies*

Michael T. McBride, Ph.D. Yale University, *Professor of Economics; Logic and Philosophy of Science; Religious Studies*

Toby Meadows, Ph.D. University of Melbourne, *Assistant Professor of Logic and Philosophy of Science*

Louis E. Narens, Ph.D. University of California, Los Angeles, *Professor of Cognitive Sciences; Logic and Philosophy of Science* (measurement, logic, metacognition)

Cailin O'Connor, Ph.D. University of California, Irvine, *Associate Professor of Logic and Philosophy of Science*

Lisa Pearl, Ph.D. University of Maryland, College Park, *Professor of Language Science; Logic and Philosophy of Science* (language development, linguistics, computational sociolinguistics, cognitive modeling)

Lauren Ross, Ph.D. University of Pittsburgh, *Assistant Professor of Logic and Philosophy of Science*

Donald G. Saari, Ph.D. Purdue University, *UCI Distinguished Professor Emeritus of Economics; Logic and Philosophy of Science; Mathematics*

Barbara W. Sarnecka, Ph.D. University of Michigan, *Professor of Cognitive Sciences; Logic and Philosophy of Science* (cognitive development, language development, number concepts, conceptual change, individual cognitive development, historical development of science and mathematics)

Gregory Scontras, Ph.D. Harvard University, *Assistant Professor of Language Science; Logic and Philosophy of Science* (semantics, pragmatics, computational modeling, heritage bilingualism)

Brian Skyrms, Ph.D. University of Pittsburgh, *UCI Distinguished Professor of Logic and Philosophy of Science; Economics; Philosophy*

P. Kyle Stanford, Ph.D. University of California, San Diego, *Professor of Logic and Philosophy of Science; Philosophy*

James O. Weatherall, Ph.D. Stevens Institute of Technology, *Professor of Logic and Philosophy of Science*

Kai Wehmeier, Ph.D. University of Münster, *Director, Center for the Advancement of Logic, its Philosophy, History, and Applications and Dean's Professor of Logic and Philosophy of Science; Language Science; Philosophy*

Daniel Whiteson, Ph.D. University of California, Berkeley, *Professor of Physics and Astronomy; Logic and Philosophy of Science*

Martin Zeman, Ph.D. Humboldt University of Berlin, *Professor of Mathematics; Logic and Philosophy of Science* (logic and foundations)

Courses

LPS 29. Critical Reasoning. 4 Units.

Introduction to analysis and reasoning. The concepts of argument, premise, and conclusion, validity and invalidity, consistency and inconsistency. Identifying and assessing premises and inferences. Deductive versus inductive reasoning, and introduction to the probability calculus. Evaluating definitions. Informal fallacies.

Same as PHIL 29.

(II and Vb).

LPS 30. Introduction to Symbolic Logic. 4 Units.

An introduction to the symbolism and methods of the logic of statements, including evaluation of arguments by truth tables, the techniques of natural deduction, and semantic tableaux.

Same as LSCI 43, PHIL 30.

(Vb)

LPS 31. Introduction to Inductive Logic. 4 Units.

Philosophical questions concerning the foundations of scientific inference, e.g., the traditional problem of induction, the Goodman paradox, the concept of cause, Mill's method of inductive reasoning, probability calculus, different interpretations of probability, and their interaction in inductive reasoning.

Same as PHIL 31.

(II, Va)

LPS 40. The Nature of Scientific Inquiry. 4 Units.

Investigates the nature, scope, and status of scientific knowledge and the methods used to acquire it. Uses concrete historical examples from a variety of scientific fields to identify distinctive features of the scientific enterprise and explore their significance.

(II)

LPS 60. The Making of Modern Science. 4 Units.

Surveys the history of science and mathematics since the Scientific Revolution, examining central developments both chronologically and thematically, as well as investigating their significance for contemporary philosophical debates about the role and status of current scientific theories.

Same as HIST 60.

(GE II or GE IV).

LPS H80. Scientific Realism and Instrumentalism. 4 Units.

Explores competing views of the character and status of theoretical knowledge in science, including challenges to and defenses of the view that contemporary scientific theories offer straightforward and accurate descriptions of how things stand in otherwise inaccessible domains of nature.

Restriction: Campuswide Honors Collegium students only.

(II)

LPS H81. What is Space? . 4 Units.

Historical, philosophical, scientific exploration of the concept of "space." Questions of interest include: What kind of a thing is space? How can we know what space is like? How is space different from time.

Restriction: Campuswide Honors Collegium students only.

(II)

LPS 91. The Philosophy of Sex. 4 Units.

Discusses the origins of biological sex, dynamics of sexual selection, sex differences in humans, and the construction of gender in human societies. Seeks to understand the role social values play in the creation of science.

Same as PHIL 91.

Overlaps with LPS H91.

(III)

LPS H91. The Philosophy and Biology of Sex. 4 Units.

Covers the origins of biological sex, dynamics of sexual selection, the evolution and cultural creation of sexual behavior in humans, and the construction of gender in human societies.

Restriction: Campuswide Honors Collegium students only.

(II and III).

LPS H95. Jurisprudence and Constitutional Law. 4 Units.

Applies competing theories of the nature of law and legal reasoning to evaluate decisions of the U.S. Supreme Court in controversial areas of constitutional law such as free speech, privacy, sexual conduct, affirmative action, and political campaign contributions.

Restriction: Campuswide Honors Collegium students only.

(III)

LPS 100W. Writing Philosophy. 4 Units.

Discussion of those aspects of writing of special importance in philosophy, e.g., philosophical terminology, techniques for evaluating arguments, philosophical definitions and theories. At least 4,000 words of assigned composition based on philosophical readings.

Prerequisite: Satisfactory completion of the Lower-Division Writing requirement.

Same as PHIL 100W.

Restriction: Upper-division students only.

(Ib)

LPS 104. Introduction to Logic. 4 Units.

Introduction to sentence logic, including truth tables and natural deduction; and to predicate logic, including semantics and natural deduction.

Same as LSCI 142, PHIL 104.

LPS 105A. Elementary Set Theory. 4 Units.

An introduction to the basic working vocabulary of mathematical reasoning. Topics include sets, Boolean operations, ordered n-tuples, relations, functions, ordinal and cardinal numbers.

Same as LSCI 145A, PHIL 105A.

LPS 105B. Metalogic. 4 Units.

Introduction to formal syntax (proof theory) and semantics (model theory) for first-order logic, including the deduction, completeness, compactness, and Löwenheim-Skolem theorems.

Prerequisite: LSCI 145A or LPS 105A or PHIL 105A

Same as LSCI 145B, PHIL 105B.

Overlaps with MATH 150.

LPS 105C. Undecidability and Incompleteness. 4 Units.

Introduction to the formal theory of effective processes, including recursive functions, Turing machines, Church's thesis, and proofs of Gödel's incompleteness theorem for arithmetic, and Church's undecidability theorem for first-order logic.

Prerequisite: LSCI 145B or LPS 105B or PHIL 105B

Same as LSCI 145C, PHIL 105C.

Concurrent with LPS 205C.

LPS 106. Topics in Logic . 4 Units.

Selected topics in mathematical or philosophical logic.

Prerequisite: PHIL 105B or LPS 105B

Repeatability: Unlimited as topics vary.

Same as PHIL 106.

LPS 108. Topics in Induction, Probability, and Decision Theory. 4 Units.

Selected topics in induction, probability, and decision theory.

Repeatability: Unlimited as topics vary.

Same as PHIL 108.

LPS 113. Topics in Modern Philosophy. 4 Units.

Focuses on the works of central philosophical figures of modern Philosophy (e.g., Descartes, Leibniz, Hobbes, Locke, Hume, Kant) or on the treatment of one or more central philosophical problems by a number of these figures.

Repeatability: Unlimited as topics vary.

Same as PHIL 113.

LPS 115. Topics in History of Analytic Philosophy. 4 Units.

Review of central theories or figures in the history of analytic philosophy. Emphasis on writings of Frege, Russell, Schlick, Carnap, and Quine. Topics include the nature of meaning and truth, the synthetic/analytic distinction, and scientific knowledge.

Repeatability: Unlimited as topics vary.

Same as PHIL 115.

LPS 120. Topics in Metaphysics. 4 Units.

Examines central philosophical questions concerning our own fundamental nature and that of the world around us (e.g., causation and necessity, determination, free will, personal identity, the mind-body problem).

Repeatability: Unlimited as topics vary.

Same as PHIL 120.

LPS 121. Topics in the Theory of Knowledge . 4 Units.

One or more topics in the theory of knowledge, e.g., the nature of rational justification, of perceptual knowledge, of a priori knowledge.

Repeatability: Unlimited as topics vary.

Same as PHIL 121.

LPS H123. What is Disease?. 4 Units.

Explores philosophical issues associated with scientific efforts to understand and explain disease.

Restriction: Campuswide Honors Collegium students only.

(II)

LPS H125. What Is Time? . 4 Units.

Engages the question "what is time?" by drawing on physics, philosophy, fiction, film, and psychology. Organized around understanding and addressing the tension between time as represented in physics and our immediate temporal experience.

Restriction: Campuswide Honors Collegium students only.

(III)

LPS 140. Topics in Philosophy of Science. 4 Units.

Selected topics in contemporary philosophy of science, e.g., the status of theoretical entities, the confirmation of theories, the nature of scientific explanation.

Repeatability: Unlimited as topics vary.

Same as PHIL 140.

LPS 141B. Geometry and Spacetime. 4 Units.

An examination of the foundations of the special theory of relativity, with emphasis on the geometry of Minkowski spacetime, and its relation to both Euclidean and non-Euclidean (hyperbolic) plane geometries.

Prerequisite: MATH 2D and (MATH 3A or MATH 6G)

Same as PHIL 141B.

LPS 141D. Probability and Determinism. 4 Units.

An examination of a cluster of interrelated issues concerning probability, determinism, logic, and the foundations of quantum mechanics.

Prerequisite: MATH 2D and (MATH 3A or MATH 6G)

Same as PHIL 141D.

LPS H141. Honors Philosophy of Quantum Mechanics. 4 Units.

An examination of the standard von Neumann-Dirac formulation of quantum mechanics. The quantum measurement problem is discussed along with several proposed solutions, including GRW, many-worlds, man-minds, and Bohm's theory.

Overlaps with LPS 141C.

Restriction: Campuswide Honors Collegium students only.

LPS 142W. Writing/Philosophy of Biology. 4 Units.

Philosophy of biology, e.g., scientific method in biology, the structure of evolutionary theory, teleology, ethics, and evolution. Course work includes one 4,000-word and four 1,000-word papers.

Prerequisite: Satisfactory completion of the Lower-Division Writing requirement.

Same as PHIL 142W, BIOL E142W.

Restriction: Juniors only.

(Ib)

LPS 143. Topics in Philosophy of Psychology. 4 Units.

Selected topics in the philosophy of psychology, e.g., the nature of psychological explanation, reductionism, issues in cognitive, behavioral, and neuroscience.

Repeatability: Unlimited as topics vary.

Same as PHIL 143, PSYC 123P.

Restriction: Psychology Majors have first consideration for enrollment. Philosophy Majors have first consideration for enrollment.

LPS 144. Topics in Philosophy of Social Science. 4 Units.

Selected topics in the philosophy of the social sciences, e.g., Is their goal to understand behavior or to predict and control it?; Are they normative and the natural sciences not?; Do they incorporate philosophical doctrines about language and mind?.

Repeatability: May be taken for credit for 4 units as topics vary.

Same as PHIL 144.

LPS 145. Topics in Philosophy of Language. 4 Units.

Selected topics in the philosophy of language, e.g., the nature of meaning, mechanisms of reference, speech acts.

Repeatability: Unlimited as topics vary.

Same as LSCI 141, PHIL 145.

LPS 147. Topics in Philosophy of Mathematics. 4 Units.

Selected historical and contemporary topics in the philosophy of mathematics, e.g., mathematical truth and ontology, mathematical knowledge, the nature and role of proof, the workings of mathematics in application.

Repeatability: Unlimited as topics vary.

Same as PHIL 147.

LPS 199. Independent Study. 1-4 Units.

Independent research with Logic and Philosophy of Science faculty.

Repeatability: May be taken for credit for 12 units.

LPS 205A. Set Theory. 4 Units.

The basic working vocabulary of mathematical reasoning. Topics include: sets, Boolean operations, ordered n-tuples, relations, functions, ordinal and cardinal numbers.

Same as PHIL 205A.

LPS 205B. Metalogic. 4 Units.

Formal syntax (proof theory) and semantics (model theory) for first-order logic, including the deduction, completeness, compactness, and Loewenheim-Skolem theorems.

Prerequisite: PHIL 205A or LPS 205A

Same as PHIL 205B.

LPS 205C. Undecidability and Incompleteness. 4 Units.

Formal theory of effective processes, including recursive function, Turing machines, Church's thesis, proofs of Goedel's incompleteness theorem for arithmetics, and Church's undecidability for first-order logic.

Prerequisite: PHIL 205B or LPS 205B

Same as PHIL 205C.

Restriction: Graduate students only.

Concurrent with LPS 105C.

LPS 206. Topics in Logic . 4 Units.

Studies in selected areas of logic. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 206.

LPS 213. Topics in Modern Philosophy. 4 Units.

Studies in selected areas of modern philosophy. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 213.

LPS 215. Topics in Analytic Philosophy. 4 Units.

Studies in selected areas of analytic philosophy. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 215.

LPS 220. Topics in Metaphysics. 4 Units.

Studies in selected areas of metaphysics. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 220.

LPS 221. Topics in Epistemology. 4 Units.

Studies in selected areas of epistemology. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 221.

LPS 221A. Medical Epistemology. 4 Units.

Analysis of epistemological issues concerning medical research and healthcare. Topics may include medical evidence, transmission of medical knowledge in the doctor-patient interaction, medical expertise, epistemology of medical disagreement, classification of illness, well-being, philosophy of pain, or medical decision making.

Same as PHIL 221A.

Restriction: Graduate students only.

LPS 232. Topics in Political and Social Philosophy. 4 Units.

Studies in selected areas of political and social philosophy. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 232.

LPS 240. Topics in Philosophy of Science. 4 Units.

Studies in selected areas of philosophy of science. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 240.

LPS 241. Topics in Philosophy of Physics. 4 Units.

Studies in selected areas of philosophy of physics. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 241.

LPS 242. Topics in Philosophy of Biology. 4 Units.

Studies in selected areas of philosophy of biology. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 242.

LPS 243. Topics in Philosophy of Psychology. 4 Units.

Selected topics in the philosophy of psychology, e.g., the nature of psychological explanation, reductionism, issues in cognitive, behavioral, and neuroscience.

Repeatability: Unlimited as topics vary.

Same as PHIL 243, PSYC 231P.

LPS 244. Topics in Philosophy of Social Science. 4 Units.

Studies in selected areas of philosophy and social science. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 244.

LPS 245. Topics in Philosophy of Language. 4 Units.

Studies in selected areas of philosophy of language. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 245.

LPS 246. Topics in Philosophy of Logic. 4 Units.

Studies in selected areas of philosophy of logic. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 246.

LPS 247. Topics in Philosophy of Mathematics. 4 Units.

Studies in selected areas of philosophy of mathematics. Topics addressed vary each quarter.

Repeatability: Unlimited as topics vary.

Same as PHIL 247.

LPS 289. Logic and Philosophy of Science Workshop. 1-4 Units.

A two- or three-quarter-long workshop on selected topics in logic and philosophy of science.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

LPS 298. Independent Study. 4-12 Units.

Independent research with Logic and Philosophy of Science Faculty.

Repeatability: May be taken for credit for 12 units.

LPS 299. Directed Research. 1-12 Units.

Directed study with Logic and Philosophy of Science Faculty.

Repeatability: May be repeated for credit unlimited times.

LPS 399. University Teaching. 4-12 Units.

Required of and limited to Teaching Assistants.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be taken for credit for 12 units.