CES Lectures

Professor Christoph Carnehl

Bocconi University

Gives a series of lectures on

The Economics of Science and Innovation

1 Economic Properties of Knowledge

2 Incentives and Knowledge Production

3 Discovery as Search in Complex Environments

Dates: Tuesday, 07/07/2026, 10:15 – 11:45

Wednesday, 08/07/2026, 14:15 – 15:45

Tuesday, 14/07/2026, 10:15 – 11:45

Location: CES, Schackstr. 4, 2nd floor, seminar room (214)

Registration for PhD and MQE students: For an official recognition and confirmation of participation of the lecture in your transcript, registration at My ECONPAS the CES Lectures is mandatory. Please adhere to the registration deadline for this course as no registration is possible after this date.
If you cannot register at MyECONPAS please contact the MGSE PhD Office mgse-phd@econ.lmu.de.

The Economics of Science and Innovation

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The course begins by introducing the basic economic properties of knowledge and ideas that make the study of science and innovation distinct from other areas of economics. We then turn to the incentives shaping researchers' choices in both academia and industry, and to their consequences for the direction and quality of knowledge production. The course concludes by introducing and discussing a tractable modeling framework for innovation and scientific discovery as search in complex environments, using realized paths of Brownian motion to map research actions (such as research questions or products) into outcomes (such as answers or the value of an innovation).

Class Schedule

Tuesday	07 July 2026	10:15 – 11:45	Economic Properties of Knowledge
Wednesday	08 July 2026	14:15 – 15:45	Incentives and Knowledge Production
Tuesday	14 July 2026	10:15 – 11:45	Discovery as Search in Complex Environments

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Lecture 1 Economic Properties of Knowledge — 07 July 2026

We will discuss the importance of knowledge generation for society and highlight the basic properties of knowledge and ideas that make studying science and innovation distinct from other topics in economics.

Main Sources

- Kevin A. Bryan and Heidi L. Williams, "Innovation: Market Failures and Public Policies," *Handbook of Industrial Organization* 5(1), 281–388, 2021.
  Chapters 1 and 2

Supplementary Sources

- Robert M. Solow, "Technical Change and the Aggregate Production Function," *The Review of Economics and Statistics* 39(3), 312 – 320, 1957.
- Kenneth J. Arrow, "Economic Welfare and the Allocation of Resources for Invention," *The Rate and Direction of Inventive Activity: Economic and Social Factors*, Princeton University Press, 609–626, 1962.

- Charles I. Jones, "The Past and Future of Economic Growth: A Semi-Endogenous Perspective," *Annual Review of Economics* 14(1), 125–152, 2022.
- Martin L. Weitzman, "Recombinant Growth," *The Quarterly Journal of Economics* 113(2), 331–360, 1998.
- Paul M. Romer, "Endogenous Technological Change," *Journal of Political Economy* 98(5), S71–S102, 1990.
- Vannevar Bush, "Science, the Endless Frontier: A Report on a Program for Postwar Scientific Research," *Office of Scientific Research and Development*, 1945.
- Nicholas Bloom, Charles I. Jones, John Van Reenen and Michael Webb, "Are Ideas Getting Harder to Find," *American Economic Review* 110(4), 1104-1144, 2020.
- Richard Nelson, "The Link Between Science and Invention," *The Rate and Direction of Inventive Activity: Economic and Social Factors*, Princeton University Press, 549 – 584, 1962.
- Richard Nelson, "The Simple Economics of Basic Scientific Research," *Journal of Political Economy* 67(2), 297–306, 1959.
- Philippe Aghion and Peter Howitt, "A Model of Growth through Creative Destruction," *Econometrica* 60(2), 323-351, 1992.
- Philippe Aghion, Mathias Dewatripont and Jeremy C. Stein, "Academic Freedom, Private Sector Focus, and the Process of Innovation," *RAND Journal of Economics* 39(3), 617–635, 2008.

Lecture 2 Incentives and Knowledge Production 08 July 2026

Both corporate and academic research respond to incentives. We study some of important dimensions of the environment in which researchers operate and their consequences for the researchers' choices and knowledge production.

Main Sources

- Ryan Hill and Carolyn Stein, "Race to the Bottom: Competition and Quality in Science," *Quarterly Journal of Economics* 140(2), 1111–1186, 2025.
- Hugo Hopenhayn and Francesco Squintani, "On the Direction of Innovation," *Journal of Political Economy* 129(7), 1991–2022, 2021.

Supplementary Sources

- Gustavo Manso, "Motivating Innovation," *Journal of Finance* 66(5), 1823–1860, 2011.

- Ryan Hill and Carolyn Stein, "Scooped! Estimating Rewards for Priority in Science," *Journal of Political Economy* 133(3), 793–845, 2025.
- Robert K. Merton, "Priorities in Scientific Discovery: A Chapter in the Sociology of Science," *American Sociological Review* 22(6), 635–659, 1957.
- Partha Dasgupta and Paul David, "Towards a New Economics of Science," *Research Policy* 23(5), 487–521, 1994.
- Kyle Myers, "The Elasticity of Science," *American Economic Journal: Applied Economics* 12(4), 103 – 134, 2020.
- Christoph Carnehl, Marco Ottaviani and Justus Preusser, "Designing Scientific Grants," *Entrepreneurship and Innovation Policy and the Economy* 4(1), 139–178, 2025.

Lecture 3 Discovery as Search in Complex Environments **14 July 2026**

Innovation and scientific discovery are the outcome of search in complex environments. In this lecture, we will introduce a rich and tractable modeling framework of this search process: using realized paths of a Brownian motion for the mapping from actions (such as research questions or products) to outcomes (such as answers to research questions or the value of an innovative product).

Main Sources

- Steven Callander, "Searching and Learning by Trial and Error," *American Economic Review* 101(6), 2277–2308, 2011.
- Christoph Carnehl and Johannes Schneider, "A Quest for Knowledge," *Econometrica* 93(2), 623–659, 2025.
- Martino Banchio and Christoph Carnehl, "The Simple Economics of Discovery," *working paper*, 2026.

Supplementary Sources

- Arjada Bardhi and Steven Callander, "Learning in a Correlated World," *Annual Review of Economics*, 2026.
- Steven Callander, Nicolas Lambert and Niko Matouschek, "Innovation and Competition on a Rugged Technological Landscape," *American Economic Journal: Microeconomics*, forthcoming.
- Boyan Jovanovic and Rafael Rob, "Long Waves and Short Waves: Growth through Intensive and Extensive Search," *Econometrica* 58(6), 1391–1409, 1990.