

Management Science II, Summer Term 2019
ESMT Learning Center (Main Building), Schlossplatz 1
Thursdays 9:00am to 12:00noon (please see separate schedule for further details)

Part 1: The organization of science

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Part 2: Creativity and Innovation

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Part 3: Innovation, Intellectual Property Rights and the Market for Technology

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Course overview

Scientific advances and innovation in general are central to economic growth. Economists and managers are acutely interested in understanding when and how innovation leads to competitive advantage on the firm level and economic growth on the aggregate level. The complex processes leading to innovation have been analyzed extensively in management, microeconomics as well as macroeconomics. While briefly looking at macroeconomic growth models accounting for innovation, this course focuses on theoretical and predominantly empirical analyses taking a managerial and micro perspective.

The first part of the course focuses on “The organization of science” and tackles questions related the production of scientific knowledge. The second part of the course links “creativity and innovation” activities of individuals, teams and networks of actors. The third part of the course focuses on the

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economics of innovation and dives into studies of “Innovation, Intellectual Property Rights and the Market for Technology”.

Course format

We will meet once a week for three hours. In each meeting, you are expected to have prepared the assigned readings for each session. While reading the papers it may be useful to first identify the research question, major concepts used to formulate the research problem, the methodology used, key findings and its major shortcomings or weaknesses. You should then be able to suggest research ideas on how to address the weak or problematic aspects of the article. For selected sessions, we have invited an external guest to talk about cutting-edge methods in different fields of research.

Selected readings are available at: <https://cloud.esmt.org/s/DA2WFTegREYJKcE>

Each participant will be assigned to present at least one paper in class during the course depending on the number of participants. The student assigned the paper being discussed is not only expected to introduce the paper but also to lead the class discussion. The presentation assignments will be communicated after the first session.

Moreover, in selected sessions the course participants have the choice to replicate the results of empirical papers based appropriate datasets using the software package STATA. We will discuss whether there is demand for those exercises during the first meeting.

Prerequisites

Participants should be familiar with basic microeconomic tools as well as have a basic understanding of multivariate regression analysis. Some exercises might be carried out using STATA (www.stata.com). While knowledge of STATA is not a prerequisite for the course familiarity with the software package is helpful.

Course evaluation

Performance evaluation will be based on three building blocks:

Class participation (20%) The course will be highly interactive and you are expected to advance discussions in the class-room by your participation. Note that the evaluation of your class participation will be based on quality not quantity.

Paper presentations (30%) You are expected to present at least one paper during the course (see above).

Term paper/referee report (50%) Grading of the written contribution is based on one individual assignment for which each student is expected to write one referee report on a recent research paper. The instructors will provide a list of research papers on the topics of each part of the course from which students could choose one paper to prepare a referee report. The list of research papers will be provided during the course. Alternatively, students can opt to write a term paper in the form of a research proposal. **Referee reports and research proposals are due by August 9th, 2019.**

Part 1: The organization of science

Henry Sauermann

Course Sessions

Session 1
Thursday, April 18, 2019
9:00–12:00

Session topic	Knowledge and the cumulative nature of science
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Readings:

Robert W. Weisberg (2006): Creativity: Understanding innovation in problem solving, science, invention, and the arts. Pages 6-34

Thomas Kuhn (1996): The structure of scientific revolutions. Chapters 1-4, 6, 8-12 (book, classic that belongs in your bookshelf)

Session 2
Thursday, April 25, 2019
9:00–12:00

Session topic	Teams and collaboration
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Readings:

Paula Stephan (2012): How Economics Shapes Science, chapter 4 "The production of research: People and patterns of collaboration"

Stefan Wuchty, Benjamin Jones, and Brian Uzzi (2007): The increasing dominance of teams in the production of knowledge

Jasjit Singh and Lee Fleming (2010): Lone inventors as sources of breakthroughs: Myth or reality?

Haeussler & Sauermann (2017): Authorship and contribution disclosures

Session 3
Thursday, April 25, 2019
14:00-17:00

Session topic	The institution of science/rewards and incentives
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Readings:

Robert Merton (1973): The sociology of science, 3 chapters:

- Ch. 13: The normative structure of science
- Ch. 14: Priorities in scientific discovery
- Ch. 20. The Matthew Effect in science

Partha Dasgupta and Paul David (1994): Toward a new economics of science

Aloysius Siow (1998): Tenure and other unusual personnel practices in academia

Nico Lacetera and Lorenzo Zirulia (2011): The economics of scientific misconduct

Part 2: Creativity and Innovation

Linus Dahlander

Course Sessions

Session 4
Thursday, May 2, 2019
9:00–12:00

Session topic **Individual perspectives of creativity and innovation**

- Papers:
- Amabile, T. 1985. The Social Psychology of Creativity, Chapter 4, Springer-Verlag, 65-96.
- Berg, J. M. (2016). Balancing on the creative highwire: Forecasting the success of novel ideas in organizations. *Administrative Science Quarterly*, 61(3), 433-468
- Oldham, G. R. & Cummings, A. 1996. Employee Creativity: Personal and Contextual Factors at Work. *Academy of Management Journal*, 39(3): 607-634.
- Elsbach, K. D. & Kramer, R. M. 2003. Assessing creativity in Hollywood pitch meetings: Evidence for a dual-process model of creativity judgements. *Academy of Management Journal*, 46(3): 283.
- Mueller, J. S., Melwani, S., & Goncalo, J. A. 2012. The Bias Against Creativity: Why People Desire but Reject Creative Ideas. *Psychological Science*, 23(1): 13-17.

Session 5
Thursday, May 9, 2019
9:00–12:00

Session topic **Team perspectives of creativity and innovation**

- Papers:
- Criscuolo, P., L. Dahlander, T. Grohsjean, and A. Salter (2017). Evaluating novelty: The role of panels in the selection of R&D projects. *Academy of Management Journal* 60(2): 433–460.

Hargadon, A. & Sutton, R. I. 1997. Technology brokering and innovation in a product development firm. *Administrative Science Quarterly*, 42(4): 716-749.

Perry-Smith, J. E. 2006. Social yet creative: The role of social relationships in facilitating individual creativity. *Academy of Management Journal*, 49(1): 85-101.

Taylor, A. & Greve, H. R. 2006. Superman or the Fantastic Four? Knowledge combination and experience in innovative teams. *Academy of Management Journal*, 49(4): 723-740.

Session 6
Thursday, May 16, 2019
9:00–12:00

Session topic

Network perspectives of creativity and innovation

Papers:

Powell, W. W., K. W. Koput, et al. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative Science Quarterly* 41: 116-145.

Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology* 110(2): 349-399.

Ahuja, G. (2000). Collaboration networks, structural holes and innovation: a longitudinal study. *Administrative Science Quarterly* 45: 425-455.

Fleming, L., S. Mingo and D. Chen (2007). Collaborative brokerage, generative creativity, and creative success. *Administrative Science Quarterly* 52: 443-475.

Reagans, R., and B. McEvily (2003), Network structure and knowledge transfer: the effects of cohesion and range. *Administrative Science Quarterly*, 48(2): 240-267.

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Part 3: Innovation, Intellectual Property Rights and the Market for Technology

Stefan Wagner

Readings

Readings will be assigned for each of the sessions (see below). These typically are scholarly papers published in leading economic and management journals.

Moreover, Scotchmer (2004)'s book on intellectual property rights provides an excellent background reading for much of the course:

Scotchmer, Suzanne (2004): Innovation and Incentives. MIT Press, Cambridge MA.

To get a first overview on the theoretical literature on the economics of IP (and patents, in particular) I suggest reading the brief but excellent summary in

Pollock, R. (2008): The economics of knowledge: A review of the theoretical literature. Working Paper, Cambridge University.

(http://rufuspollock.org/economics/papers/economics_of_knowledge_review.pdf)

A summary of the more recent work (also putting more emphasis on empirical studies) can be found in

Hall, B. and Harhoff, D. (2012): Recent Research on the Economics of Patents, NBER Working Paper 17773, National Bureau of Economic Research NBER.

(http://elsa.berkeley.edu/~bhall/papers/HallHarhoff12_NBER_w17773.pdf)

Sampat, B. (2018): A Survey of empirical evidence on patents and innovation, NBER Working Paper 25383, National Bureau of Economic Research NBER.

(<https://www.nber.org/papers/w25383>)

Participants interested in a comprehensive textbook covering all aspects of innovation, intellectual property rights and economic growth are referred to an optional reading

Greenhalgh, C. and Rogers, M. (2010): Innovation, Intellectual Property, and Economic Growth. Princeton University Press, Princeton and Oxford.

Course Sessions

Session 7
 Thursday, May 23, 2019
 9:00–12:00

Session topic

The nature and importance of innovation

We begin by defining what economists and management scholars mean by *innovation* and outlining the whole supply chain of innovations: from its basis in such activities as scientific invention

and information gathering activities through the widespread diffusion of new knowledge embodied in new processes and products within the economy. In this context, we discuss the role of National Innovation Systems for the conduct of R&D. Finally, we will discuss the incentives for profit maximizing agents to engage in innovative activities and scrutinize to what extent market based mechanisms can lead to an optimal level of innovative activities in an economy.

- Required reading:
- Branstetter, L. and Sakakibara, M. (2002): When do research consortia work well and why? Evidence from Japanese panel data. *American Economic Review* 91, 143-159.
- Solow, R. (1956): A contribution to the theory of economic growth. *Quarterly Journal of Economics* 70, 65-94.
- Teece, D. (1986): Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy* 15, 285-205.
- Optional reading:
- Arrow, K. (1962): Economic welfare and the allocation of resources for invention. In R. Nelson (Ed): *The Rate and Direction of Inventive Activity*, 1962, Princeton University Press, Princeton.
- Freeman, C. (1995): The national system of innovation in historical perspective. *Cambridge Journal of Economics* 19, 5-24.
- Nordhaus, W. (1969): *Inventions, Growths and Welfare: A theoretical treatment of Technological Change*. M.I.T Press, Cambridge MA.
- Romer, P. (1990): Endogenous Technological Change. *The Journal of Political Economy* 98(5), 71-102.

Session 8
Thursday, June 6, 2019
9:00–12:00

Session topic

A primer on intellectual property rights

During this session we will introduce a set of legal tools establishing incentives to innovate as they allow capturing the value of innovations by excluding third parties from using them: copyrights, trademarks, trade secrets and patents. The first part of the session helps to understand the power and limitations of these tools. During the second part, we will focus on the protection of technical know-how using patent rights. This includes a discussion of

empirical papers analyzing the effect of patent rights on innovative activities.

- Required reading:
- Budish, E., Roin, B. and Williams, H. (2015): Do fixed patent terms distort innovation? Evidence from cancer clinical trials. *American Economic Review*, Vol. 105 (7), 2044-2085.
- Moser, P. (2005): How Do Patent Laws Influence Innovation? Evidence from Nineteenth Century World's Fairs. *American Economic Review*, 95(4): 1214–36.
- Optional reading:
- Cohen, W., R. Nelson, and J. Walsh (2000). Protecting their intellectual assets: Appropriability conditions and why US manufacturing firms patent (or not). NBER Working Paper, no. 7552. Cambridge, MA.
- Landes, W. M. and Posner, R. A. (1987): Trademark law: an economic perspective. *Journal of Law and Economics* 30(2): 265-309.
- Scotchmer, S. (2004) – 3rd Chapter: A primer for nonlawyers on intellectual property.
- Wright, B. (1983): The economics of invention incentives: Patents, Prizes, and Research Contracts. *The American Economic Review* 73(4), 691-707.

Session 9
Thursday, June 13, 2019
9:00–12:00

Session topic

Cumulative innovation and licensing

Innovation often is cumulative in its nature in the sense that there is technological dependency between different innovations over time and innovators often build on existing technologies. This has implications for the design of patent regimes and mechanism that enable a “market for technology”, such as licensing agreements. We will review theoretical and empirical work focusing on these issues.

- Required reading:
- Arora, A. and Ceccagnoli, M. (2006): Patent Protection, Complementary Assets, and Firms’ Incentives for Technology Licensing. *Management Science* 52(2), 293-308.
- Gallini, N. and Wright, B. (1990): Technology Transfer under Asymmetric Information. *The RAND Journal of Economics* 21(1), 147-160.

Gans, J. and Hsu, D. and Stern, S. (2008): The impact of uncertain intellectual property rights on the market for ideas: Evidence from patent grant delays. *Management Science* 54(5), 982–997.

Hegde D, Luo H. (2017): Patent Publication and the Market for Ideas. *Management Science*.

Optional reading:

Merges, R. and Nelson, R. (1990): On the Complex Economics of Patent Scope. *Columbia Law Review* 90(5), 839-916.

Scotchmer, S. (1991): Standing on the Shoulders of Giants: Cumulative Research and the Patent Law. *The Journal of Economic Perspectives* 5(1), 29-41.

Scotchmer, S. (2004): 5th Chapter: Standing on the shoulders of Giants: Protecting cumulative innovators.

Scotchmer, S. (2004): 6th Chapter: Licensing, Joint Ventures and Competition Policy.

Session 10
Thursday, June 20, 2019
9:00–12:00

Session topic

An introduction to available data-sources – an empirical perspective on the patent system

Having discussed important (micro)economic tools for the analysis of IP related questions we now turn our attention to empirical work. In this session we will discuss the content and the availability of patent data.

The second part of the session will be devoted to hands-on STATA exercises. First, I will introduce the concept of survival models that are usually not covered in standard econometrics courses. Second, we take the models to data and replicate the findings of Harhoff/Wagner (2009).

Required reading:

Harhoff, D. and Wagner, S. (2009): The Duration of Patent Examination. *Management Science* 55(12), 1969-1984.

Kiefer, N. (1988): Economic Duration Data and Hazard Functions, *Journal of Economic Literature*, Vol. 26(2), 646-679.

Stephen Jenkins provides excellent free material on survival analysis covering both theoretical treatment as well as its implementation in STATA. If you are interested in this topic your recommended to have

a look at <https://www.iser.essex.ac.uk/resources/survival-analysis-with-stata>.

Optional reading: Griliches, Z. (1990): Patent Statistics as Economic Indicators: A survey. *Journal of Economic Literature* 28(4), 1661-1707.

Hall, B. and Jaffe, A. and Trajtenberg, M. (2001): The NBER Patent Citation Data File: Lessons, Insights and Methodological Tools. NBER Working Paper 8498, NBER, Cambridge MA.

Session 11
Thursday, June 27, 2019
9:00–12:00

Session topic

Patent thickets, patent trolls and other frictions in the market for technology – is the patent system broken?

Most patent offices have seen an explosion of patent filings over the last two decades. We will discuss what is behind this surge in patent filing rates and analyze resulting problems for innovating firms – most notably the emergence of hold-up situations in complex high-technology industries (mobile phones).

Data work optional.

Required reading:

Cockburn, I. and MacGarvie, M. (2011): Entry and Patenting in the Software Industry. *Management Science* 57(5): 915-933.

Hall, B. and Ziedonis, R. (2001): The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry 1976-1995. *RAND Journal of Economics* 32(1), 101-128.

Harhoff, D., von Graevenitz, G. and Wagner, S. (2016): Conflict resolution, public goods and patent thickets. *Management Science*, Vol. 62(3): 704–721.

Optional reading:

Bessen, J./ Meurer, M. (2009): *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk*. Princeton University Press.

Kortum, S. and Lerner, J. (1998): What is behind the Recent Surge in Patenting? *Research Policy* 28(1), 1–22.

Scotchmer, S. (2004): 7th Chapter: Litigation and Enforcement.

Shapiro, C. (2001): Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting. In: *Innovation Policy and the Economy*, Vol. 1, 119-150, M.I.T. Press, Cambridge MA.

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Von Graenitz, G. and Wagner, S. and Harhoff, D. (2011): How to Measure Patent Thickets – A Novel Approach. *Economics Letters* 111(1), 6-9.

Additional Multimedia to watch/listen to before or after the session (**highly recommended!**):

Patent Absurdity: how software patents broke the system (Video, 30 mins), available at <http://patentabsurdity.com/>

When Patents Attack (Audio report, 60 mins), available at <http://www.thisamericanlife.org/radio-archives/episode/441/when-patents-attack>

Session 12
Thursday, July 4, 2019
9:00–12:00

Session topic	Measuring knowledge flows using patent data
	Despite the existence of IP regimes excludability of third parties from ideas usually is incomplete and knowledge flows between firms. In this session we will review empirical studies that focus on the measurement of knowledge flows and the underlying mechanisms.
Required reading:	<p>Correida, R. and Rosenkopf, L. (2010): Should Auld Acquaintance be Forgotten? The Reverse Transfer of Knowledge through Mobility Ties. <i>Strategic Management Journal</i> 31, 159-181.</p> <p>Jaffe, A. and Trajtenberg, M. and Henderson, R. (1993): Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations. <i>The Quarterly Journal of Economics</i> 108(3), 577-598.</p> <p>Singh, J. (2005): Collaborative Networks as Determinants of Knowledge Diffusion Patterns. <i>Management Science</i> 51(5), 756-770.</p>
Optional reading:	<p>Almeida, P. and Kogut, B. (1999): The Localization of Knowledge and the Mobility of Engineers in Regional Networks. <i>Management Science</i> 45(7), 905–917.</p> <p>Michel, J. and Bettels, M. (2001): Patent citation analysis – A closer look at the basic input data from patent search reports. <i>Scientometrics</i> 51(1), 185-201.</p> <p>Wagner, S., Hoisl, K. and Thoma, G. (2013): Overcoming localization of knowledge: The role of professional service firms. Forthcoming in: <i>Strategic Management Journal</i>, available at http://dx.doi.org/10.1002/smj.2174</p>

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Session 13
Thursday, July 11, 2019
9:00–12:00

Session topic **Final presentations – Wrap up**

This is the last session of the course. Participants will have a chance to present the status of their written assignment in order to get feedback from the class and the instructors.

Required reading: none