



Syllabus

Academic Year	2020/2021
Program	Law, Digital Innovation and Sustainability
course	Economics of Innovation
Term	I semester
Year	1
SSD	SECS-P/06 - Economia applicata
Credits	6

The course aims to introduce the main theories on innovation and empirical evidence on how they impact society. The course will introduce the concept of industrial dynamics and relationship firms, technology, innovation, competition, and the context. The course will provide an overview of the characteristics and of technologies and which is their impact on change and innovation. The analysis will take in consideration different levels. Hence the course will explore the role of innovation in shaping the dynamics of firms and industries. One of the main goals is to provide the tools to understand industrial dynamics and transformation and which role innovations and technologies have in enabling an organization to catch-up and increase the competitiveness of the firm, but also of the entire sector and its influence on the country growth and competitiveness.

INSTRUCTIONAL GOAL Besides, the course will explore the role of institutions in shaping industrial and competition dynamics. Hence, another goal of the class is to study and understand the role of innovation for the welfare system and local development as well as accomplishing sustainable development goals. The rise of global challenges in recent years will be taken as an example to assess if and how mission-oriented innovation can have an impact on the global level impact local ecosystems. The course will also explore the effectiveness and the impact of regulation and policy environment. Topics include markets for technology, innovation, intellectual property (IP), patent licensing, incentive contracts for delegated research and development (R&D), R&D contests and tournaments, technology standards, Standard Setting Organizations (SSOs), and entrepreneurship.

Economics of Innovation introduces also theoretical models of innovation. The course applies and elaborates on concepts and frameworks from game theory, industrial organization, contract theory, open and social innovation. The course also gives an introductory coverage of new databases in invention and innovation and reviews some of the extensive empirical analysis in innovation economics, providing additional digital and quantitative skills.

Knowledge and understanding:
By the end of the course, students should be able to:

- develop a critical comprehension of the inner functioning of innovation ecosystems and how they influence and impact social interactions and human development.
- understand different innovation ecosystems and their changes and challenges over time, as well as their future prospects.
- analyze the firm, industry and state dynamics and how they interconnect and influence each other
- comprehend the role of different agents in innovation ecosystems and its articulate interactions with national political, institutional and legal environments.

INTENDED LEARNING Throughout the class, students will learn how to collect and scrutinize economic data so as to be able to identify possible correlations between economic time-series.

OUTCOMES **Applying knowledge and understanding:**
Upon completing the study program, students will be able

- evaluate the impact of future changes in the innovation ecosystems architecture.
- assess and interpret different hypotheses explaining key economic, political, legal and social developments related to innovation.
- effectively communicate and work, as an expert in innovation issues.

Making judgements:
Upon completing the study program, students will be able to:



- present an informed scientific opinion in the public debate concerning institutional arrangements and policy decisions in the innovation market.
- apply reasoning in the main innovation economics subjects, thanks to the understanding of the economic and political aspects of innovation policy issues;
- gather and interpret information and data from different sources, in order to make judgements in an independent way;
- prepare original research supported by relevant bibliography and data analysis, and debate different perspectives to address the issue.

Communications Skills:

Upon completing the study program, students will be able to:

- develop the ability to communicate in written form through completing the assignment and oral form through the final exam and the class debate;
- use the notions and the communication of innovation economics;
- foster the development relational skills in international and multicultural settings;
- participate in a public policy debate, by researching and expressing expert opinions.

Learning skills:

Upon completing the study program, students will be able to:

- build an analytic toolbox from both economic and policy analysis;
- solve problems in dynamics settings and develop critical positions.

This ability will be acquired through: class participation, class debate, and research carried out for the drafting of the written assignment.

Pre-requisites

Students can easily follow the analytical content of this course if they have a basic knowledge in: Microeconomics, Macroeconomics, Economic Policy and International Economics. By basic knowledge we mean the command of the notions offered in the courses of Economics I and II at the first University degree as well as the learning of the standard models of International Economics.

Course content

The course is divided into four main parts. The first part introduces innovation economics fundamentals and it provides an overview of the different economic models of innovation and a descriptive introduction of new technologies. The second part explores the features and characteristics of the different innovation ecosystems. The third part of the course provides a critical evaluation of innovation economics and analyzes the role of institutions and the regulatory environment. Finally, the course will explore the main theoretical models and the methodology of analysis of the economics of innovation.

Topics that will be covered by this part of the course include the following:

- Innovation and Technological change
- Entrepreneurship and new Technologies;
- Innovative Complements and Substitutes;
- Innovation and its relationship with market structure and industry dynamics
- Prizes for Invention: Tournaments, Contests, and Races;
- Innovation and the territorial competitiveness
- International Trade and Innovation.
- Competitive Pressures and Incentives to Innovate.
- Innovation systems, institutions and public policy
- Intellectual Property and Patent Licensing;
- Contracts and Contests;
- Research in innovation economics

First part will provide an overview of key definitions and terminology in science, technology, and



innovation policy. The course will explore the emergence of new perspectives in science, technology, and innovation policy that question canonical views of the role of science and technology in society. It will also cover emerging models and approaches related to the advancement of new technology innovation. Hence, the first part will provide a description of the new technologies and how they interact with the existing paradigm and technologies. In this dynamic context, students will learn the importance of start-ups and new business ventures in proposing innovation through new technological and business model. The emergence of nanotechnology, synthetic biology, and geoengineering will serve as case studies for the discussion. A guest speaker may also be participating during this session.

In the second part, students will learn to analyze the relationships between firms and industries and how the competitive performance of firms is of primary importance for the region and the nations if the potential the longer-term, future implications of new technologies is taken into consideration. Hence, when studying economic of innovation, it is crucial to take into consideration the spillovers and productivity effects on the territory and the industry. Therefore, the management of innovation, thanks to the openness of the market and globalization, has an impact not only on the firm competitiveness but also on the territorial one.

The third part will be including the role played by key government agencies and other institutions. It will also cover the national and supranational innovation system frameworks and explore the ongoing globalization of science and technology research. The class comes to grip with the different approaches embedded in innovation ecosystems. We consider both successful examples, such as the US, Israeli and Chinese ecosystems, and the more problematic ones, such as the southern European innovation ecosystems. The rise of openness is addressed as one of the key challenges in innovation economics.

The course by looking at methodologies and steps in innovation processes. The students will be provided with a theoretical framework, case studies, and a quantitative analysis approach. The competences acquired during the course will support the students to research an answer to the most important economies of innovation open questions. How far (and how difficult) is the creation of a true innovation ecosystem, similar to the Israeli, US or Chinese ecosystem? Are digital innovations the only innovations possible? And, if so, in which areas? If further steps are not accomplished, what are the risks of moving backward? Which innovation ecosystem should be considered the state-of-the-art innovation ecosystem?

Reference Books

The analysis of very recent or current issues means that it is impossible to refer to a specific textbook. The slides, referring to a given lesson, will be made available to students in advance. However, in order to have a general and analytical view on the economic workings of innovation, students can refer to:

Wesley M. Cohen, 2010, "Fifty Years of Empirical Studies of Innovative Activity and Performance," Chapter 4, 129-213 in *Handbook of the Economics of Innovation*, Bronwyn H. Hall and Nathan Rosenberg, eds., Volume 1, (2010), Elsevier, Amsterdam,

Castellacci F. and Zheng (2010) Technological regimes, Schumpeterian patterns of innovation and firm level productivity growth *Industrial and Corporate Change* 19, 1829-1865

OP Eggers J.P. (2014) Competing technologies and industry evolution: the benefits of making mistakes in the flat panel display industry *Strategic Management Journal* (2014) February pp. 159- 17

Spulber, Daniel F., "Competing Inventors and the Incentive to Invent, *Industrial and Corporate Change*, Volume 22 (1), February, 2013, pp. 33-72, doi:10.1093/icc/dts013

Malerba F., Nelson R., Orsenigo L., Winter S. , (2016) *Innovation and industry evolution* Cambridge University Press

Moeen M. and Agarwal R. (2016) Incubation of an Industry: Heterogeneous Knowledge Bases and Modes of Value Capture *Strategic Management Journal*, 38, 566-587

Agarwal R. and Shah S. (2014) Knowledge sources of entrepreneurship: firm formation by academic user and employee innovators *Research Policy*, 43, 1109-1133

Spulber, D. F., 2013, "Innovation Economics: The Interplay among Technology Standards,



Competitive Conduct, and Economic Performance,” *Journal of Competition Law & Economics*, 9(4), pp. 777-825

Nelson R.R. et al. *Modern evolutionary economics: an Overview* Cambridge University Press 2018

Nordhaus, R. C., 1966, "Patent License Agreements," *The Business Lawyer*, 21, 3, April, pp. 643-659

Helfat C. and Campo-Rembado M. (2017) Integrative capabilities, vertical integration and innovation over successive technology lifecycles *Organization Science* 2016 , 27, 249,264

Anton, J. J. and D. A. Yao, 2002, "The Sale of Ideas: Strategic Disclosure, Property Rights, and Contracting," *Review of Economic Studies*, 69, 3, pp. 513-531, http://www.jstor.org/stable/1556708?seq=1#page_scan_tab_contents

Spulber, D. F., 2008, *Unlocking Technology: Antitrust and Innovation*, *Journal of Competition Law and Economics*, Volume 4, Number 4, December, pp. 915-966, doi:10.1093/joclec/nhn016

Gans, Joshua S., and Scott Stern, 2000, "Incumbency and R&D Incentives: Licensing the Gale of Creative Destruction," *Journal of Economics & Management Strategy*, 9, 4, pp. 485-511

Poblete, J. and D. F. Spulber, 2015, "Managing Innovation: Optimal Agency Contracts for Delegated R&D with Double Moral Hazard," *Kellogg School of Management Working Paper*, Northwestern University, Evanston, IL

Baye, Michael R., and Heidrun C. Hoppe, 2003, "The Strategic Equivalence of Rent-Seeking, Innovation, and Patent-Race Games," *Games and Economic Behavior*, 44, pp. 217-226

Hu, Albert G.Z. and I.P.L. Png. 2013, "Patent Rights and Economic Growth: Evidence from Cross-Country Panels of Manufacturing Industries," *Oxford Economic Papers*, 65, pp. 675-98

Lemley, M. A., 2012, "The Myth of the Sole Inventor," *Michigan Law Review*, 110, pp. 709-760. http://heinonline.org/HOL/Page?handle=hein.journals/mlr110&div=28&g_sent=1&collection=journals

Students are expected to read the papers/articles assigned each week

Teaching Methods

Slides will be available before the lesson covering each of the specific topics addressed in the course. Hence the traditional presentation of the analytical problems can be concise and leave room to Q&A and discussions.

Guests will give a lecture on Innovation Policy (names to be announced).

Assessment

The assessment of students learning will be centered on a written exam (50% of the final grade), and class participation including Students' presentation and class debate on the case studies (50% of the final grade).

The final week will conclude with student project presentations (15 minutes per presentation, plus 5 minutes for questions and discussion). There will be time for feedback and suggestions for how to improve the course going forward. Students are asked to work in groups to tackle an economic or policy problem concerning the Innovation debate (e.g. Digitalization, Sustainability, Sustainable development, Missions-oriented innovation), prepare original research supported by relevant bibliography and data analysis, and debate in class different perspectives to address the issue.

The written exam will consist in a paper draft according to the research methods and models described in class and their application to a specific case.
