The course will introduce the students to theories, models and empirical evidence on technological change and innovation, with the goal to provide a broad overview of the field and to identify the main research questions. The topics of the course will range from the sources, characteristics and impact of technological change and innovation, to innovation and the dynamics of firms, industries and the economy, to the role of technology in the catching up and competitiveness of firms, industries and countries. The program consists of 12 major topics, one for each class.

- TECHNOLOGY, INNOVATION AND EVOLUTIONARY THEORY
- THE SCHUMPETERIAN FIRM
- SCHUMPETERIAN COMPETITION: MODELS AND EVIDENCE
- INNOVATION, MARKET STRUCTURE AND INDUSTRY DYNAMICS
- MODELLING INNOVATION AND INDUSTRY EVOLUTION
- DEMAND AND INNOVATION
- THE DIFFUSION OF NEW TECHNOLOGIES
- PATENTS AND IPR
- R&D COLLABORATIONS AND THE CLUSTERING OF INNOVATORS
- INNOVATION SYSTEMS AND INSTITUTIONS
- TECHNOLOGY, CATCHING UP AND NEW EMERGING LEADERS
- PUBLIC POLICY FOR TECHNOLOGY, INNOVATION AND DIFFUSION

Each class will be structured in the following way. FM will introduce the topics by addressing the main issues in a broad way. Discussion will follow. In the last part of the class, there will be students presentations of specific papers related to the topics: the main research questions and the way they have been addressed and answered in the papers presented in class will be discussed. All students are required to read the assigned readings before the class and to be able to discuss them in class.

Evaluation:

- Participation and discussion in class: ¼ of final grade
- Presentation of papers: ¼ of final grade
- Term paper: ½ of final grade
The term paper will be a short paper (max 15 pages) which can be:
a) a review and critique of some papers regarding a specific topic of the course;
b) a proposal concerning original research in one of the topics examined in the course.

PROGRAM OF THE COURSE AND READING LIST

Each class will have mandatory readings (** are mandatory).

For each topic, additional readings are provided for the students interested in that specific topic either for the paper-review or the paper-proposal

1. TECHNOLOGY, INNOVATION AND EVOLUTIONARY THEORY


** Dosi G., Nelson R. Technological change and industrial dynamics as evolutionary processes LEM Pisa 2009/April, also in Hall B. Rosenberg N. Handbook of the Economics of Innovation Elsevier 2010

A useful book containing several relevant articles is:
Malerba F. Brusoni S. Perspectives on innovation Cambridge University Press Cambridge 2007

Useful handbooks are:
Hall B. Rosenberg N. Handbook of the Economics of Innovation Elsevier 2010

Classic works:
Nelson R., Recent evolutionary theorizing about economic change, JEL, 1995

2. THE SCHUMPETERIAN FIRM

** Dosi G. Nelson R. Winter S. The nature and dynamics of organizational capabilities Oxford University Press 2001 Chapter 1

** Katkalo S. Pitelis C. Teece D. On the nature and scope of dynamic capabilities Industrial and corporate change August 2010
Winter S. Towards a new Schumpeterian theory of the firm Industrial and Corporate Change 2006, 1


Winter S. Understanding dynamic capabilities Strategic Management Journal 24, 2003

3. SCHUMPETERIAN COMPETITION: MODELS AND EVIDENCE

** Breschi S., Malerba F., Orsenigo L., Technological regimes and sectoral patterns of innovation, Economic Journal, 2000

**Suarez F. and Lanzolla G. The role of environmental dynamics in building a first mover advantage Academy of management review 2007 32, 377-392.

**Bergek A. at al. Technological discontinuities and the challenge for incumbent firms: destruction, disruption or creative accumulation? Research Policy 42 (2013) 1210-1224

Adner R. Snow D. Old technology responses to new technology threats Industrial and corporate change 2010 n. 5

Franco A. Sarkar MB and Agarwal R. Swift and smart: the moderating effects of technological capabilities on the market pioneering-firm survival relationship Management Science 2009, n. 11 vol 55

Klenner P. Ex-ante evaluation of disruptive susceptibility in established value networks- When are markets ready for disruptive innovations? Research Policy 42 (2013) p. 914-927

Kim J. and Lee C. Technological regimes and the persistence of first-mover advantages Industrial and Corporate Change 2011 n 5 1305-334

Peneder M. Technological regimes and the variety of innovation behavior: creating integrated taxonomies of firms and sectors Research Policy 2010 39, 323-334

Castellacci F. and Zheng Technological regimes, Schumpeterian patterns of innovation and firm level productivity growth Industrial and corporate change 2010 19, 1829-1865


Henderson R. “Underinvestment and incompetence as responses to radical innovation: evidence from the photoligraphic alignment industry” RAND Journal of Economics 1993

Castellacci F. Technological Regimes and sectoral differences in productivity growth Industrial and Corporate Change 2007
4. INNOVATION, MARKET STRUCTURE AND INDUSTRY DYNAMICS

** Malerba F. Innovation and the dynamics of industries: progress and challenges *International Journal of Industrial Organization* 2007

** Dahl M. Sorenson O. The who, why and how of spin-offs *Industrial and Corporate change* 2013 September

** Jacobides M. and Winter S. The co-evolution of capabilities and transaction costs: explaining the institutional structure of production *Strategic Management Journal* 2005 26, 395-413

Klepper S. Sleeper S. *Entry by spin-off* *Management Science* 2005


Shane S. Technology regimes and new firm formation *Management Science* 2001 47, 1173-1190


Dosi G. Statistical regularities in the evolution of industries in Malerba F. Brusoni F. *Perspectives on innovation* Cambridge University Press 2007


Bartelsman E. Scarpetta S. Schivardi F Comparative analysis of firm demographics and survival: micro-evidence from the OECD countries *Industrial and Corporate Change* 2005 14

Carrol G. Hannan M. *The demography of corporations and industries* Princeton University Press 1999

5. MODELLING INNOVATION AND INDUSTRY EVOLUTION


** Jacobides M. How capabilities differences, transaction costs and learning curves interact to shape vertical scope *Organization Science* 2008 v. 19, n2

Cabral L. Industry shake outs *Industrial and Corporate Change* 2012 (3)
Lenox M. Rockart S. Lewin A.  Interdependency, competition and the distribution of firms and industry profits  *Management Science* 2006, n.5


Malerba F., Orsenigo L., 2002, Innovation and market structure in the dynamics of the pharmaceutical industry and biotechnology: towards a history friendly model” *Industrial and Corporate Change* 2002

6. DEMAND AND INNOVATION

** Von Hippel E. “Democratizing innovation” MIT Press 2004 Introductory chapter**

** Adner R. When are technologies disruptive: a demand based view of the emergence of competition *Strategic Management Journal* 2003, 8**

** Chatterji A. Fabrizio K. How do Product users Influence Corporate Invention? *Organization Science* 2012 n.4 p. 971-987**

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Fontana and Malerba  Demand as a source of entry and the survival of new semiconductor firms *Industrial and corporate change* 2010 n. 5

Buenstorf G. and Klepper S. Submarket dynamics and innovation: the case of the US tire industry *Industrial and corporate change* 2010 n.5

Adner R. Levinthal D. Demand heterogeneity and technology evolution: implications for product and process innovation *Management Science* 2001, 47


7. THE DIFFUSION OF INNOVATION


** Kay N. Rerun the tape of history and QWERTY always wins *Research Policy* 2013 (42) p. 1175-1187**

** Greve H. Fast and expensive: the diffusion of a disappointing innovation *Strategic Management Journal* 2011 32**

Battisti G. Stoneman P. Inter and intra firm effects in the diffusion of new process technology *Research Policy* 2003

Thoma G. Striving for a large market: evidence from a general purpose technology in action *Industrial and corporate change* 2009 18 p107-138


Bresnahan T. General purpose technologies *Handbook of Economics of Innovation* North Holland 2010


8. PATENTS AND IPR

** Cohen W. Goto A. Nagata A. Nelson R. Walsh J. R&D spillovers, patents and the incentives to innovate in Japan and the US *Research Policy* 2002


Forero Pinedo The impact of stronger intellectual property rights on science and technology in developing countries *Research Policy* 2006, 35

Jaffe A. Trajtenberg M. *Patents, citations and innovations* MIT Press 2001

Arora A. Ceccagnoli A R&D and the patent premium *International Journal of Industrial Organization* 2008


Scotchmer S. *Innovation and incentives* MIT Press 2004 Introduction

Gallini N., How well is the US patent system working?, *Journal of Economic Perspectives*, 2002

Dosi G. Marengo L. Pasquali How much should society fuel the greed of innovators *Research policy* 2006 n. 35
9. R&D COLLABORATIONS AND THE CLUSTERING OF INNOVATORS


** Baum J. Cowan R. Jonard N. Network independent partner selection and the evolution of innovation networks Management Science 2010

** Breschi S. and Lissoni F. Mobility of skilled workers and co-invention networks Journal of Economic Geography 2009

Cowan R. Jonard N. Knowledge portfolio and the organization of innovation networks Academy of Management Review 2009

Cowan R. “Network models of innovation and knowledge diffusion” in Breschi and Malerba Oxford University Press 2005


10. INNOVATION SYSTEMS AND INSTITUTIONS


**Murmann P. The coevolution of industries and important features of their environments Organizationl Science 2013 n.1 58-78

Mairesse J. Mohnen P. Using innovation surveys for econometric analysis Handbook of Economics of Innovation North Holland 2010

Fagerberg J. Mowery D. Nightingale P. The heterogeneity of innovation: evidence from the Community Innovation Surveys Industrial and Corporate Change 2012 n.5 1175-1180

Fatas-Villafranca, Sanchez-Choliz and Janre G. “Modeling the co-evolution of national industries and institutions” Industrial and corporate change 2008 n. 17
11. TECHNOLOGY, CATCHING UP AND NEW EMERGING LEADERS

** Malerba F. and Nelson R. Catching up in different sectoral systems: evidence from six industries. Industrial and Corporate Change 2011


Amsden A., Chu W., Beyond Late Development, MIT press, 2003 Cambridge


12. PUBLIC POLICY FOR TECHNOLOGY, INNOVATION AND DIFFUSION

** Cimoli M. Dosi G. Nelson R. Stiglitz J. Institutions and policies shaping industrial development LEM WP series 2006/2


** Bleda M. Del Rio P the market failure and the system failure rationale in technological innovation systems Research Policy 2013 42, 1035-1052
Malerba F. Increase learning, break knowledge lock-ins and foster dynamic complementarities: evolutionary and system perspectives on technology policy in industrial dynamics in D. Foray (ed) *The new Economics of Technology Policy* Elgar 2009


Hall B., Lerner J. The financing of R&D and innovation in *Handbook of Economics of innovation* North Holland 2010

Lundvall B.A. Borras S. Science, technology and innovation policy *Handbook of Innovation* 2005
