Economics of Innovation – Elective Package

TU/e

Economics of Innovation (This flyer will be updated soon)		
Offered by	Department of Industrial Engineering and Innovation Sciences	
Language	English	
Primarily interesting for	Industrial Engineering, Majors Psychology and Technology, Built Environment, Industrial Design and industrial Engineering	
Not allowed for	Major Sustainable Innovation	
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Content and composition

Innovation is needed to realize the transition to sustainability. Traditionally, innovation has been studied because of its relation to economic growth. In this package, we analyze the economic motives for innovation and the policies used to stimulate innovation and to steer it in a more sustainable direction. Innovation is a complex process and the result of the interactions firms, consumers, and other actors in a particular institutional environment. Firms pursue different strategies to be innovative and countries and regions have different policies in place to create a favorable environment for innovation. The Eindhoven region is an example of a region that has been very successful in doing so. In studying the mechanisms underlying the innovation process we provide insights why some firms, industries, regions and countries are more successful than others.

It is *strongly recommended* to follow the courses in the order shown in the table below: 0SV30 is the introductory course and provides an initial basis by defining the key concepts in the economics of innovation and main mechanism underlying the innovation process. 0SV60 focuses on innovation policy: how can we stimulate and steer the innovation process and create the conditions for firms to be innovative? 0SV70 is an (OGO) project course where students learn to apply the knowledge from 0SV30 and 0SV60 to a large infrastructure project using the tools of social cost-benefit analysis. Finally, in the optional course 0SV100 students use advanced theories and methodologies of economics of innovation to analyze actual problems of innovation for sustainability.

Course code	Course name	Level classification
0SV30	Economics of innovation: Introduction	1. Basic
0SV60	Economic policy	2. Deepening
0SV70	Evaluating economic policy: SCBA (OGO)	3. Advanced
Optional:	Economics of Innovation: Advanced	3. Advanced
0SV100		

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Course descriptions

Economics of Innovation: Introduction (0SV30)

This course offers an overview of how innovations are created and how they impact economies. The course starts from the perspective of the firm and deals with questions such as: why and how do firms innovate? We will introduce the view of the innovating firm as the bridge between science/technology and market, translating scientific and technical advances into new products and services. Innovation involves a number of strategic challenges: why are certain firms more successful in innovation than other? How can firms use patents and other intellectual property rights to profit from innovation?

We stress how firms do not operate in isolation, but are influenced by their external environment including suppliers, users, government, universities, and stakeholders. We will then move from the analysis of the firm to the analysis of the sector in which it operates, and further to the national system. We will tackle questions like: how do sectors/countries differ in terms of their innovation?

Learning goals:

After completion of the course, the student:

- 1. Has knowledge of and insight into the core concepts, theoretical frameworks and methodologies of economics of innovation.
- 2. Understands the main economic concepts that describe the innovation process
- 3. Is able to apply innovation theories to interpret differences in innovation patterns across firms, sectors and countries
- 4. Is able to identify indicators to compare in a quantitative manner the innovative performance of firms, sectors and countries

Economic Policy (0SV60)

How can policy stimulate innovation? This course provides students with theoretical and practical insights into why and when policy measures are necessary, how they can be pursued, and how they relate to innovation processes. We further build on the microeconomic theory from 0SV30 to emphasize policy interventions, in contrast to a pure market process, and introduce the concept of market failure. Furthermore, we discuss the impact of economic interventions and regulations on the market. Important concepts in the course are economic rationality and social welfare, the theory of perfect competition, market failure, regulation and competition policy.

After completion of the course, the student:

- 1. Has knowledge of and insight into the core concepts, theoretical frameworks and methodologies of innovation policy
- 2. Can explain and apply microeconomic theory and methods determining the behavior of economic agents, industry, and markets.
- 3. Is able to apply microeconomic theory to identify and describe situations in which markets fail to deliver the best outcome from the private and social welfare point of view.
- 4. Is able to explain why market failures have crucial implications for the innovativeness and the overall level of investment in research and development of an economy.
- 5. Is able to identify and analyze economic policy tools the public sector can implement to correct market failures, especially in the innovation and sustainability domain.

Economic Policy in Practice: SCBA (OGO) (0SV70)

OSV70 is an (OGO) project course where students learn to apply the knowledge and skills gained from OSV30 and OSV60 to evaluate large-scale infrastructural projects using the tools and methods of societal cost-benefit analysis and life cycle analysis. These methods enable the students to use the economic principles of the other courses to make a quantified decision about specific large scale projects where the interests of many different types of stakeholders are involved.

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As large-scale infrastructural projects might require government involvement, market failure rationales and welfare trade-offs have to be evaluated to justify public investment. Social cost benefit analysis is the standard methodology to evaluate large infrastructural projects and to estimate their environmental effects. Recently, the SCBA methodology has been used evaluate costs and benefits of innovation projects in the areas of smart energy, smart ICT and smart buildings. In addition, concepts like Life Cycle Analysis (LCA) are combined with SCBA to better address issues like circularity and sustainability. With SCBA, policy makers have an opportunity to evaluate in a quantitative manner the social costs and benefits of particular investment projects. In this course student develop the practical skills to perform SCBA's and apply these skills to an ongoing innovation project.

Learning goals:

After completion of the course the student is able to:

- Apply theoretical and conceptual insights on economic and innovation policy to real-life large scale infrastructural projects
- Understand how economic policy rationales can be operationalized and evaluated based on a social costbenefit analysis.
- Apply the method of SCBA to real life projects
- Provide strategic advice on different options for infrastructure projects based on the SCBA
- Critically reflect on the value and limitations of the theories, and methods used.
- Collaborate and plan effectively in groups to design and execute a research project.

Economics of Innovation Advanced (0SV100)

What is the relation between innovation, firm strategy, and sustainability? This course deals with key questions about the role of innovation, competition, and its impact on sustainability. This course allows students to master advanced theories to understand processes of firm change, innovation and competition and their relation to sustainability.

The theories refer to processes related to economics of innovation at two levels.

- At the firm level: Firms are the place where most innovations develop. At this level, the course covers theories on firm innovation, competition, strategic management and change, and explores their tentative link to sustainability.
- At the industry level, innovation activities differ with respect to the industry context. At this level, the course will deal with economic processes of how firms in groups compete and/or collaborate within industries and how this effects the greening of industry.

This course builds upon the courses 0SV30 (Economics of Innovation: an introduction) and 0SV60 (Economic Policy) but goes significantly beyond those courses as it covers concepts and theories that are more advanced and complementary to those in prior courses. The theoretical part of the course is reinforced with application of theories to cases and economic processes.

Learning goals:

After completion of the course, the student:

- Has advanced knowledge of and insight into concepts, theoretical frameworks and methodologies of economics of innovation, and
- Is able to apply this knowledge and skills to analyze actual problems of innovation for sustainability.