Economics of Innovation

1. Introductory note

Program authors: Dirk Meissner

General Description of the Program:
The course is delivered to bachelor and master students of The National Research University - Higher School of Economics/HSE. It is delivered in modules. The course length is 324 academic hours in total of which 96 hours are classroom hours for lectures and seminars and 228 hours are devoted to self study. Academic control forms are one written exam and one presentation. The course contains 4 modules which are mutually exclusive but collectively exhaustive to cover the subject.

Pre-requisites

- Basics of economics and / or management
- Basics of policy and institutional analysis
- Basic understanding of the relationships between STI and socio-economic development
- Interdisciplinary and systemic thinking

Course Objective

The course spans 1 academic module. Students are assessed with a written exam. The teaching is based on selected writings and experiences of members of the international laboratories for Science and Technology Studies and Economics of Innovation. In addition selected reputed scholars and experts are invited bringing together views from different perspectives on science, technology and innovation, e.g. economics, policy studies, business management, sociology to provide in-depth learning opportunities for all students.

Lectures are designed to deliver theoretical frameworks and international experiences. In addition a concluding session in each lecture is devoted to the applicability of the international experiences and the theoretical framework to the Russian context. Eventually the final lecture of the course, as well as drawing together the contributions of the previous weeks, elaborates the potentials and limitations of the theoretical knowledge taught (including that drawing on international experiences) for innovation actors in the framework of the Russian Federation. The course is accompanied by a seminar, and some sessions will feature additional foreign experts.

Accompanying seminars introduce and develop new approaches to understand and further develop different facets of innovation thinking and to provide participants with ready to use state of the art knowledge as well as academic training.

Course Language: English.
Abstract

The course introduces the basic theories and concepts underlying the state of the art economics. Innovation and technical change is central to long-term economic growth but it is treated very differently in economic theories. In a comparative manner this course presents technical change within major theoretical approaches: neoclassical and endogenous growth models and evolutionary structural models. Particular attention is given to an economic model combined with a spatial theoretical framework of regional trajectories of growth. The model is based upon complementarities around innovations forming development blocks that are driving processes of structural change. Thus, the interplay between innovations, economic transformation and economic growth is studied with an emphasis on major carrier branches both historically and in contemporary times.

The course will discuss different types of STI cooperation between different actors, e.g. institutions of higher education, research institutes and companies of different countries. Such linkages take various forms, e.g. formal and informal or project related and in the long term unspecified. For each form of STI linkage and co-operations the special characteristics will be discussed. A major stream of the course is devoted to international (multilateral) research facilities which impose special challenges to national STI policy and management.

The course describes approaches of measuring the impact of STI on socio-economic development. Furthermore, factors governing the diffusion of innovations - including the interplay between economic and institutional change - are studied. The concept of innovation systems and the underlying theoretical approaches are a major element of the course.

- Innovation and economic growth
- Innovative behaviour of companies: economic models
- National innovation systems: typologies, elements and interrelations between actors

Training Objectives

- up to date knowledge on STI
- training of interdisciplinary and systemic thinking
- training of problem identification and solution

Target audience

- Bachelor and Master students
2. **Thematic Plan**

   a) Lectures

<table>
<thead>
<tr>
<th>Module</th>
<th>topic</th>
<th>academic hours</th>
<th>classroom hours</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Perspectives on STI</td>
<td>The emergence of “innovation” as a core concept and ambition</td>
<td>12</td>
<td>4</td>
<td>8</td>
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<tr>
<td></td>
<td>Innovation as systemic phenomenon, national, regional and sectoral innovation systems</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>Evolutionary and other lines of study, approaches to research, management and measurement</td>
<td>6</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Economics of innovation, technology, R&amp;D and knowledge</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td><strong>total</strong></td>
<td></td>
<td><strong>30</strong></td>
<td><strong>10</strong></td>
<td><strong>20</strong></td>
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<tr>
<td>2 STI in contemporary innovation systems</td>
<td>Knowledge Intensive Business Services</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>Institutions, communication and relationships in innovation systems</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>Clusters, milieux, and technopoles</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<td></td>
<td>Comparative analysis of STI and performance</td>
<td>6</td>
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<td></td>
<td>Innovation behavior of STI actors</td>
<td>6</td>
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<td></td>
<td>University-Industry linkages I</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>University-Industry linkages II</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td><strong>total</strong></td>
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<td><strong>42</strong></td>
<td><strong>14</strong></td>
<td><strong>28</strong></td>
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<tr>
<td>3 Scanning and Shaping STI</td>
<td>Capturing value from STI</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>Globalization of science and technology I</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<tr>
<td></td>
<td>Globalization of science and technology II</td>
<td>6</td>
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<td>4</td>
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<td>Governance of STI I</td>
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<td>Governance of STI II</td>
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<td></td>
<td>From science policy to innovation policy</td>
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<td></td>
<td>Strategic intelligence for policy and planning I</td>
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<td></td>
<td>Strategic intelligence for policy and planning II</td>
<td>6</td>
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<tr>
<td></td>
<td>Decisions in STI I</td>
<td>6</td>
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<td></td>
<td>Decisions in STI II</td>
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<td>4</td>
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<tr>
<td><strong>total</strong></td>
<td></td>
<td><strong>60</strong></td>
<td><strong>20</strong></td>
<td><strong>40</strong></td>
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<td>4 STI, regulation and financing of</td>
<td>Public funding of STI I</td>
<td>6</td>
<td>2</td>
<td>4</td>
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<td></td>
<td>Public funding of STI II</td>
<td>6</td>
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<td>4</td>
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<td></td>
<td>Managing science and technology institu-</td>
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<td>2</td>
<td>4</td>
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</tbody>
</table>
b) seminars

The seminar consists of an introductory session which highlights the phenomena in discussion, introduces the theoretical background and practical applicability. Supervision of students will be offered using a mid term interim presentation of additional information and facts by the supervisor and individual consultations during the seminar. Following these introductory session students will develop a practical applicable concept for a given problem which is based on sound scientific grounds. The session ends with the introduction of core themes for which the students are asked to prepare a presentation. Finally these concepts are introduced in a concluding session which is devoted to presentations of concepts developed by students and a concluding discussion of these concepts from both a scientific and a practical view. Students will develop concepts in teams and be supervised during development of their concepts.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Total academic hours</th>
<th>Class hours</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory presentation</td>
<td>36</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Interim presentation / individual consultations</td>
<td>56</td>
<td>16</td>
<td>40</td>
</tr>
<tr>
<td>Presentations</td>
<td>64</td>
<td>12</td>
<td>52</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>156</strong></td>
<td><strong>40</strong></td>
<td><strong>116</strong></td>
</tr>
</tbody>
</table>

3. **Basic literature**

- Gokhberg L. Indicators for science, technology and innovation on the crossroad to Foresight, in Science, Technology and Innovation Policy for the Future — Potentials and
4. **Education control forms**

Final control (F): written exam (120 minutes multiple choice exam)
Seminar (S): Oral presentation at the end of the seminar.

The overall course grade (10-point scale) is calculated as a sum of
\[ G = 0.5 \times F + 0.5 \times S \]

The overall course grade \( G \) (10-point scale) includes results achieved by students in their exam \( F \), seminar \( S \); it is rounded up to an integer number of points.

**Summary Table: Correspondence of ten-point to five-point system’s marks**

<table>
<thead>
<tr>
<th>Ten-point scale [10]</th>
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</thead>
<tbody>
<tr>
<td>1 – unsatisfactory</td>
</tr>
<tr>
<td>2 – very bad</td>
</tr>
<tr>
<td>3 – bad</td>
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<tr>
<td>4 – satisfactory</td>
</tr>
<tr>
<td>5 – quite satisfactory</td>
</tr>
<tr>
<td>6 – good</td>
</tr>
<tr>
<td>7 – very good</td>
</tr>
<tr>
<td>8 – nearly excellent</td>
</tr>
<tr>
<td>9 – excellent</td>
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<tr>
<td>10 – brilliant</td>
</tr>
</tbody>
</table>
6 Programme Contents

Module 1- Perspectives of STI

Topic 1 The emergence of “innovation” as a core concept and ambition

Topic outline:
- Main types of innovation defined
- Meaning and typologies of technology, knowledge and innovation
- General features and characteristics of innovation, technology and knowledge

Main references/books/reading:
- Chapters 1 (Fagerberg), 4 (Pavitt), 17 (Hall) in Jan Fagerberg, David Mowery, and Richard Nelson (eds) The Oxford Handbook of Innovation Oxford: Oxford University Press, 2004

Topic 2 Innovation as systemic phenomenon, national, regional and sectoral innovation systems

Topic outline:
- networks of actors to generate ideas, inventions and innovation
- national, regional and micro (e.g.) company perspective
- organization of networks to generate innovation

Main references/books/reading:
- Freeman, C.: Technology and Economic Performance: Lessons from Japan, Pinter, London.1987

Topic 3 Evolutionary and other lines of study, innovation systems, approaches to research, management and measurement

Topic outline:
- Evolutionary and other lines of study, approaches to research, management and measurement
- Comparative analysis of national innovation systems
- Innovation system components and their interplay
Inventory of innovation system elements and assessment

Main references/books/reading:
- Chapter 3 (Powell) and Chapter 7 (Edquist), 14 (Malerba) in Jan Fagerberg, David Mowery, and Richard Nelson (eds) The Oxford Handbook of Innovation Oxford: Oxford University Press, 2004

Topic 4. Economics of innovation technology, R&D and knowledge

Topic outline:
- Technology as artefacts and as knowledge; R&D and other sources of technological knowledge;
- Innovation as an economic phenomenon

Main references/books/reading:
- Freeman and Soete, op coit

Module 2. STI in contemporary innovation systems

Topic 1 Knowledge Intensive Business Services

Topic outline:
- changing requirements towards competences of innovation managers and organization of innovation undertakings – needs for response by companies, RTOs and policy makers
- approaches towards making innovation activities sustainable

Main references/books/reading:
- Freeman, C.: Technology and Economic Performance: Lessons from Japan, Pinter, London.1987

**Topic 2  Institutions, communication and relationships in innovation systems**

**Topic outline:**
- changing requirements towards competences of innovation managers and organization of innovation undertakings – needs for response by companies, RTOs and policy makers
- approaches towards making innovation activities sustainable

**Main references/books/reading:**
- Freeman, C.: Technology and Economic Performance: Lessons from Japan, Pinter, London. 1987

**Topic 3  Clusters, milieux, and technopoles**

**Topic outline:**
- the pathway from idea to innovation – process models and networks
- establishing and managing clusters and technopoles – key success factors

**Main references/books/reading:**
- Myers, M. B.; Rosenbloom, R. S.: Rethinking the role of research – leadership in innovation requires mastering 'radical incrementalism'. Research, Technology, Management, May / June 1996, S. 14-18

**Topic 4  Comparative analysis of STI and performance**

**Topic outline:**
- growth and trade
- macroeconomic theory and evidence vs. firm-level performance
- different levels of absorptive power in companies

**Main references/books/reading:**
• Teece, D.J., Dynamic Capabilities and Strategic Management: Organizing for Innovation and Growth Management (2009), Vol 18, Issue: March, Pages: 509-533

Topic 5. Innovation behavior of STI actors

Topic outline:
• Incentives for innovation
• diffusion of innovations and consumer behavior

Main references/books/reading:
• Chapters 1 and 2 of A Cawson, L Haddon and I Miles, 1995, The Shape of Things to Consume
• Chapter 16 (Miles) in Jan Fagerberg, David Mowery, and Richard Nelson (eds) The Oxford Handbook of Innovation Oxford: Oxford University Press, 2004

Topic 5. Connecting enterprises and the science base: University-Industry-links I/II

Topic outline:
• Connecting enterprises and the science base: University-industry links
• Fundamental and applied research, commercialisation and spin-offs

Main references/books/reading:
• Institute of Innovation Research, 2003, Knowing How, Knowing Whom: A Study of the Links between the Knowledge Intensive Services Sector and The Science Base ,
Module 3. Scanning and Shaping STI

Topic 1 Capturing value from STI

Topic outline:
- complementary assets
- disruptive innovation
- dominant designs

Main references/books/reading:
- Michael G. Jacobides et al., 2006, Benefiting from innovation: Value creation, value appropriation and the role of industry architectures, Research Policy Volume 35, Issue 8, Pages 1200-1221

Topic 2 Globalization of science and technology I /II

Topic outline:
- Global science communities
- Cross border cooperation vs regional efforts

Main references/books/reading:

Topic 3 Governance of STI I/II

Topic outline:
- Governance of innovation at national level – the role of innovation governance bodies
- Governance of innovation at company level – organization of innovation

Main references/books/reading:

Topic 4 From science policy to innovation policy

Topic outline:
- systemic approaches towards policy design
- implementing and monitoring innovation policy measures
- impact assessment of innovation policy measures
Main references/books/reading:

**Topic 5 Strategic intelligence for policy and planning I/II**

**Topic outline:**
- Approaches towards collecting and analyzing STI related information
- Creating roadmaps policy and company strategies

**Main references/books/reading:**
- Foresight for the development of forest sector in Finland till 2020. Future Forum on Forests of Finland. Future challenges to the finnish forest sector.- University of Joensuu, Finland and Ministry of Agriculture and Forestry of Finland. http://www.metsafoorumi.fi

**Topic 5 Decisions in R&D and innovation management I/II**

**Topic outline:**
- Financing R&D projects, project selection and management
- Structures of innovation management
- Organization of the innovative company

**Main references/books/reading:**
- Tidd and Bessant, op cit

**Module 3. STI, regulation and financing of STI**

**Topic 1 Public funding of STI I/II**

**Topic outline:**
- Methods of public funding of STI
- Public vs private funding of STI
Main references/books/reading:

- Paul A. Davida, Bronwyn H. Hall, Andrew A. Toole, Is public R&D a complement or substitute for private R&D? A review of the econometric evidence, Research Policy Volume 29, Issues 4-5, April 2000, Pages 497-529

Topic 2  Managing science and technology institutions

Topic outline:

- development of research strategies
- human resources management in science and technology institutions
- internationalization of science and technology institutions

Main references/books/reading:


Topic 3  Public Services and Public Sector Innovation

Topic outline:

- service innovation in the public sector – e-government
- defense related innovation – specific case for public sector innovation

Main references/books/reading:

Topic 4  Public-Private Partnerships for STI

Topic outline:
- Public Private Partnerships (PPP) in the STI policy mix
- Taxonomy of PPPs

Main references/books/reading:
- Audretsch, David B.; Bozeman, Barry; Combs, Kathryn L.; Feldman, Maryann; Link, Albert N.; Siegel, Donald S.; Stephan, Paula; Tassey, Gregory; Wessner, Charles (2002b): The Economics of Science and Technology. Journal of Technology Transfer, Vol. 27: 155-203

Topic 5  Social Innovation

Topic outline:
- Perception and motivation of social innovation
- Boundaries of social innovation

Main references/books/reading:

Module 5 - Final lecture

Topic outline:
- Course review
• Synthesis
• implications for the RF