PPOL 5250 Innovation and Sustainability, Fall 2023-2024

4 September 2023

Date & Time: Monday, 13:30-16:20
Venue: Room 2304
Teaching Mode: Lectures and discussions

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Course Description
This course examines the role of innovation in achieving sustainability. Among the issues to be discussed include models of technological change, systems approaches to innovation, intellectual property rights, research and development, and case studies in various sectors concerning sustainability. The mechanisms of co-evolution of technology and institutions in facilitating innovation for sustainability are examined from a global perspective.

Background
In moving towards global sustainability, we need to make a balanced approach to achieving environmental protection and economic and social development from a long-term perspective. While new technologies can contribute to producing economic growth and societal benefits, they could also pose potential risks to human health and the environment. It is critical to understand how innovation is created and implemented in our efforts for sustainability. We will then be able to discuss implications for public policy and institutional design in influencing the behavior of relevant stakeholders involved in innovation.

Course Objectives
This course aims to provide students with basic concepts and methodologies for analyzing the mechanisms and processes of creating innovation and examining feasible options for public policy in facilitating sustainability. An integrated approach is explored in designing and implementing science, technology and innovation policy and environmental and sustainability policy. Students learn how to use various types of knowledge from an interdisciplinary perspective and to propose policy and institutional measures for addressing sustainability
challenges.

**Intended Learning Outcomes**

Upon successful completion of the course, students are expected to be able to:

- Understand basic concepts and methodologies and apply them for analyzing the mechanisms and processes of creating innovation and examining feasible options for public policy in facilitating sustainability.
- Articulate issues and challenges in designing and implementing science, technology and innovation policy and environmental and sustainability policy.
- Evaluate various approaches to policy and institutional measures for addressing sustainability challenges.
- Demonstrate argumentative reasoning and critical thinking in interpersonal dialogues, oral presentations and group reports.

**Teaching and Learning Activities**

Tasks and activities designed to facilitate students’ achievement of the intended learning outcomes:

- Interactive Lectures: Interactive lectures are designed to facilitate application and synthesis of assigned readings (3 hours per week).
- Readings: Readings provide students with the knowledge base necessary to participate effectively in interactive lectures.
- Assignments: Students will be asked to work on assignments to ensure that they understand what is discussed in the class.
- Group project: Students are asked to choose a policy topic by themselves and conduct policy analysis by applying the principles and methods that have learned during the lectures.

**Course Activities and Grading Criteria:**

Course grades will be based on class participation (10%), assignments (50%), and group project (40%).

- **Class Participation (10%)**: Students are encouraged to actively participate in discussions with the instructor and other students in class.
- **Assignments (50%)**: Students will be asked to work on specific themes by applying the concepts and methodologies developed in the class.
- **Group project (40%)**: Students will be asked in a group to analyze a particular problem concerning innovation and sustainability and to make a policy proposal to tackle the problem. Creating innovation to tackle with sustainability challenges, including environmental, energy, and health issues, has been increasingly regarded as an important
policy agenda. In this group work theme, students will aim to prepare a paper analyzing and proposing science, technology, and innovation policies to address such challenges. Students will first identify the challenges that science and technology can help to solve and analyze the characteristics of such issues. Referring to reviews of existing studies, they will consider what theoretical frameworks can be employed for this purpose. They will then conduct case studies concerning specific themes, which will involve collecting and analyzing relevant data and information. Finally, they will identify and explore possible policy options and make concrete policy proposals. Students will be asked to make a presentation on mid-term progress and a final presentation. Each group member must present. Then students will be asked to submit a final report on problem analysis and policy proposal (3,000 – 5,000 words).

Readings
Core Reading

Additional References

Course Schedule

*Class 1 – Monday 4 September 2023*
Introduction to Innovation and Sustainability
• What Is Innovation?
• The Microeconomic Effects of Innovation
• Interaction between Producers and Users of Innovation
• Innovations and Market Failure
• Restoring Incentives to Invent and Innovate
• Firms Competing through Innovation

**Required Reading**


**Supplementary Readings**


**Class 2 – Monday 11 September 2023**

**Innovation and the Role of Intellectual Property**

- Why Are Intellectual Property Rights Awarded?
- Patents
- Trademarks
- Designs and Utility Models
- Copyright
- Further Questions about IPRs

**Required Reading**


**Supplementary Readings**

**Class 3 – Monday 18 September 2023**

**Measurement of Innovation**
- How Can Innovation Be Measured?
- Illustrations of Innovation Statistics
- Productivity at the Firm, Industry, and Economy Level
- Comparing Productivity and Growth across Countries

**Required Reading**

**Supplementary Readings**

**Class 4 – Monday 25 September 2023**

**National Innovation System**
- The National Innovation System
- The Central Role of R&D
- The Government-University Axis
- The University-Business Axis
- The Government-Business Axis
- National Innovation Systems in Emerging Markets

**Required Reading**

**Supplementary Readings**


Class 5 – Monday 9 October 2023

Markets and Diffusion of Innovation

• Entrepreneurship and New Firms
• Innovation and Firms
• Markets and Innovation
• Empirical Evidence on the Returns to Innovation
• Evidence on Interactions between Competition and Innovation
• Modeling the Rate of Adoption of an Innovation
• Statistical Evidence on Rates of Adoption
• Spillovers and Social Returns to Innovation
• Empirical Studies of Social Returns
• Spatial Dimensions of Spillovers

Required Reading


Supplementary Readings


**Class 6 – Monday 16 October 2023**
**Innovation, Work, and Globalization**
• What Is Globalization?
• World Trade in Historical Perspective
• Theories of Trade and Growth
• International Knowledge and Technology Flows: Theory and Evidence
• International Financial Flows
• International Aspects of IPRs
• Microeconomic Models of Innovation and Labor Markets
• Innovation and Labor Markets: Evidence from Firms
• Macroeconomic and Trade Models of Innovation and Labor Markets

**Required Reading**

**Class 7 – Monday 30 October 2023**
**Economic Policies for Innovation**
• Microeconomic Policies to Promote Firm-Level Innovation
• Is the Intellectual Property System Working?
• Incentive Systems for Encouraging Firm-Level R&D
• Other Innovation Policies
• Macroeconomic Issues and Policy
• Macroeconomic Evidence on IPRs and Economic Growth
• Trade-Related Aspects of Intellectual Property (TRIPS)
• Intellectual Property Rights, Exhaustion, and Parallel Imports
• Piracy and Counterfeit
• R&D in the Global Economy
• International Migration of Skilled Labor

**Required Readings**

**Supplementary Reading**

**Class 8 – Monday 6 November 2023**

**Innovation for Energy and the Environment**

• Fundamentals of Environmental Economics
• Economics of Technological Change
• Innovation: Induced Innovation, Impacts of Technological Change
• Diffusion: Diffusion within Countries, Diffusion across Countries
• Technological Change in Aggregate Energy-Environment Models: Exogenous Technological Change, Endogenous Technological Change
• Implications for Environmental and Technology Policy

**Required Reading**


**Supplementary Readings**


**Class 9 – Monday 13 November 2023**

**Innovation Policies for Sustainability**

• Innovation policy for climate change mitigation and adaptation
• Policy strategies to promote sustainability innovation
• Technological exploration and exploitation
• Evolution of three frames for innovation policy

**Required Reading**

Supplementary Readings


Class 10 – Monday 20 November 2023

Final Presentation of Group Projects 1
- Final presentation for 10 minutes and questions and answers for 10 minutes

Class 11 – Monday 27 November 2023

Final Presentation of Group Projects 2
- Final presentation for 10 minutes and questions and answers for 10 minutes