MGT-641

# Technology and Public Policy - Technology and innovation policies for grand and global challenges

Foray Dominique

| Cursus | Sem. | Type |
|---|---|---|
| EDOC General and external courses | | Opt. |

| | |
|---|---|
| Language of teaching | English |
| Credits | 2 |
| Session | |
| Exam | Term paper |
| Workload | 60h |
| **Hours** | **24** |
| Courses | 24 |
| **Number of positions** | **39** |

## Frequency

Every year

## Remark

The course will start on August 29 from 13.15 to 17.00 in Room SG 0213. The next dates are available under Reference week.

## Summary

This course addresses the design of policies for Grand Challenges. It aims at providing a policy toolkit - about innovation, economic regulation and societal inclusion - while supporting students about writing the first pillars of a roadmap to address one specific Grand Challenge.

## Content

1 - Grand Challenges and Mission oriented policies
Perspectives on Grand Challenges and Mission-oriented policies
Why is innovation central (not only technology) and so what are the differences?
Interactive session A "What is your Grand Challenge?" - short presentation & discussion
Contextualizing Grand Challenges in the problem-solution space
2 - Innovation economics
Innovation as an economic discovery
Measuring innovation
Interactive session B - "Locating your Grand Challenge in the problem/solution space"
Methodologies & guidelines - Introducing the roadmap and its essential pillars
3 - Changing the technology
Promoting innovation to solve Grand Challenges - the toolbox
Intellectual Property Rights - also for Grand Challenges?
Open discussion on Covid vaccine versus climate solutions - what are the differences?
4 - Changing the economy
Fixing externalities
Exploring new trade offs between financial gains and social impacts
Interactive session C -"Changing the technology for my Grand Challenge"
5 - Involving society
Involving citizens as knowledge producers and innovation adopters
Raising public awareness
Interactive session D -"Changing the economy for my Grand Challenge"
Methodologies & guidelines - Assembling the roadmap and the Tinbergen assignment theorem
6 - Governing the big transformation
Better rules for policy: embeddedness, discipline and public accountability
Policy monitoring and evaluation
Interactive session E -"First pillars of the transformational roadmap"
Conclusion - The Hidden Hand

7 - After the course - writing a short strategic paper - including contextualization and the first pillars of the transformational roadmap

## Note

Let's just take the first sentences in Foray, Mowery and Nelson (Research Policy, 2012):
"Societies today face a number of formidable challenges, many of them global in scope. These include adverse climate change, devastating diseases that are not yet under control, uncontrolled population growth in many low-income countries combined with stagnant or declining populations in many high-income economies, rapid urbanization in low-income economies that places stress on the provision of public services, massive education needs in all parts of the world, the development of piped water and sanitation in poor countries, the increase in agricultural productivity in the South, and others. All these challenges can be sub-divided into more specific and segmented societal goals. The definition of a Grand Challenge includes also the fact that solutions are not just about technology: the development of new technologies alone will not solve any of these problems. However, for some at least the creation and adoption of more effective and appropriate technologies is a necessary part of any solution. It is also evident that market forces alone cannot induce all of the R&D investment that is needed for these solutions, and that government programs to aid in the development and deployment of the relevant technologies are needed."
In a nutshell the kind of GCs to be studied in this course involve all types of capital (human, natural, infrastructural & tangible) which are central to secure growth and development and are characterized by various types of crisis (overuse and overexploitation, insufficient support and or performance, uncontrolled growth, etc..). GCs as eradicating criminal activities, stopping civil wars or fighting against poverty will not be considered as too broad or not fundamentally related to technologies and innovations.

For all of the concerned Grand Challenges technological innovations are central BUT solutions are not just about technology. Solutions need to also include economic, societal and institutional changes. Solutions need also to rely on both market forces and government programmes as well as in many cases on a strong involvement of philanthropy and donors .

While we recognise that every Grand Challenge has some sectoral specificities and requires specialised expertise, we also think that all of them (at least those the course will cover) share a common set of features so that there is a great deal of value in sharing policy practices, experiences and outcomes across Grand Challenge cases and discussing the potential transposition of what works somewhere to other contexts and cases. These common features involve for instance the centrality of innovation (not just of technology), the policy toolkit to promote both innovation and diffusion in the considered domains, the need for novel economic regulations to incentivise firms to innovate in the desired direction, the inclusion of society in the innovation process and finally the need to establish better rules for mission-oriented innovation policies.

Given this primary choice - which is to address a variety of cases from a policy point of view - it is useful to distinguish between **Domains** of potential Grand Challenges such as global health or climate and **Grand Challenges** per se which can be numerous within each domain. This means that while the course will cover a limited number of domains - many more specific Grand Challenges can be -dealt with- if they correspond to the predefined domains. For instance - within the global health domain - many Grand Challenges can be identified such as fighting obesity, using AI technologies to prevent cancers, developing certain kinds of vaccines to eradicate tropical diseases, etc. Predefining a small number of domains will allow us to both generate and handle a certain diversity of cases.

Examples of Grand Challenge

Horizon Europe - 5 Mission areas
Healthy oceans, seas, coastal and inland waters
Cancer
Climate neutral and smart cities
Soil health and food
Adaptation to climate change - including societal transformations
The European Green Deal
The UN Sustainable Development Goals

## Keywords

Grand Challenge, innovation, mission-oriented policy

## Learning Prerequisites

### Important concepts to start the course

Preparation to the Course
Choosing a field/a sector/a societal challenge for the assignment to be briefly presented in Interactive Session A. It is up to students to contact Dominique Foray before the course to discuss their choices

**It is important that all students (or teams of 2 students) come to the Interactive Session A with a tentative idea about the "grand challenge" they would like to address in terms of innovation policy as well as with a short structured presentation (see Interactive session A â## below). This is the only barrier to entry for this course!**

## Learning Outcomes

By the end of the course, the student must be able to:

- Theorize the centrality of innovation (rather than of technology) to address Grand Challenges
- Generalize the application of policy tools and programs across several different Grand Challenge cases

## Assessment methods

Teams of two students are designing a policy roadmap for a specific Grand Challenge - to be developed during the interactive sessions (Days 1, 2, 4, 5 and 6) (presentations not graded). The objective of each team is to finalize a strategy document (3 to 4 pages) - to be delivered 2 weeks after Day 6.

The strategy document will define priority areas and transformational goals - given the Grand Challenge which has been defined - as well as the policy instruments and programs which should be deployed to achieve the goals

## Resources

### Bibliography

Research Policy, special issue, ed. by Foray, Mowery and Nelson, vol.41, issue 10, december 2012; Smart specialisation: opportunities and challenges for regional Innovation Policies, D.Foray, Routledge, 2015; Accelerating innovation in energy, Henderson and Newell, NBER, 2012; The Moon and the Ghetto revisited, R.Nelson, 2010

### Ressources en bibliothèque

- Research Policy (online)
- Smart specialisation / Foray
- Accelerating innovation in energy / Henderson
- The moon and the ghetto revisited / Nelson

### Moodle Link

- https://go.epfl.ch/MGT-641