ENV-470 **Development engineering**

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Cursus	Sem.	Type
Energy Science and Technology	MA2	Opt.
Environmental Sciences and Engineering	MA2, MA4	Opt.
Minor in Integrated Design, Architecture and Sustainability	E	Obl.
Urban Planning and Territorial Development minor	E	Obl.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
TP	2 weekly
Number of positions	

Remark

Development Engineering: Innovation and Technologies in the Global South

Summary

This course teaches the fundamentals of technologies for development (Development Engineering) to design, pilot, and evaluate appropriate, affordable and robust technologies to address sustainable development challenges (e.g. poverty, environmental degradation) in emerging and developing countries.

Content

Lectures:
Week 1 (SH): Introduction to the course and to Development Engineering
Week 2 (SH): What is poverty?
Week 3 (SH): Innovative technologies for poverty reduction and sustainable development
Week 4 (SH): Design thinking
Week 5 (SH): Quantitative and qualitative research methods
Week 6 (SH): Guest lecturer from the Swiss Red Cross
Week 7 (KS) EssentialTech experience and projects
Week 8 (KS) Flipped classroom: Project strategy
Week 9 (KS) Flipped classroom: Product Value Chain (Part I)
Week 10 (KS) Flipped classroom: Product Value Chain (Part II)
Week 11 (KS) Flipped classroom: Sustainable Business Model Canvas
Week 12 (SH): Sustainability of development projects
Week 13 (KS +SH): Presentation of group work and discussion
Week 14 (SH+KS): Presentation of group work and discussion

Keywords

Development, development engineering, developing countries, emerging countries, Global South, poverty reduction, social entrepreneurship, technologies for development, sustainable business models, design thinking, human-centered design, value chain canvas, scale-up

Learning Outcomes

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

- Explain the technology for development intervention cycle
- Integrate the principles and elements of Development Engineering
- Distinguish appropriate, affordable and robust devices, technologies or technological interventions for development

- Differentiate the main development challenges faced by emerging and developing countries.
- Compare different approaches to technological development.
- Examine information in an interdisciplinary manner integrating the contributions and expertise of different disciplines.
- Identify sustainable solutions to complex problems.
- Apply the sustainable and socially responsible value chain canvas to specific contexts.

Transversal skills

- Set objectives and design an action plan to reach those objectives.
- Access and evaluate appropriate sources of information.
- Communicate effectively, being understood, including across different languages and cultures.
- Identify the different roles that are involved in well-functioning teams and assume different roles, including leadership roles.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Collect data.
- Give feedback (critique) in an appropriate fashion.
- Take account of the social and human dimensions of the engineering profession.

Teaching methods

Lectures (100% in English), group work/presentation, projection of film and discussion, and mandatory reading list.

Expected student activities

Homework, group work and presentation, mandatory reading of background material.

Assessment methods

- Elaboration of a questionnaire (10%)
- Project report (40%)
- Final presentations by video (50%)

Supervision

Office hours	Yes
Assistants	No
Forum	No
Others	Available for questions before the lectures.

Resources

Bibliography

Woolridge, Adrian. 2010. The world turned upside down. A special report on innovation in emerging markets. *The Economist*, 17.04.2010: 1-14
The final bibliography will be provided during the first day of the course.

Websites

- http://www.journals.elsevier.com/development-engineering/
- http://essentialtech.epfl.ch
- http://cooperation.epfl.ch
- http://sustainabledevelopment.un.org
- http://unsdsn.org

- http://www.gapminder.org

Moodle Link

- http:// Moodle link will be provided at course inception.

Videos

- http:// Various TED conferences