Course guide
240286 - 240EN43 - Prototyping for Energy Projects

Last modified: 07/09/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.

Degree: MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2022). (Optional subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** English

LECTURER

Coordinating lecturer: Sumper, Andreas

Others: Sumper, Andreas
Jené Vinuesa, Marc
Gonzalez De Miguel, Carlos

PRIOR SKILLS

None

REQUIREMENTS

It is recommended to take also the subject 240285 - 240EN42 - Futures thinking and ideation for energy projects

TEACHING METHODOLOGY

The course uses an innovative teaching methodology that combines challenge-based learning, prototyping and design thinking. Through the challenges created in the futures thinking, students are involved in hands-on learning, applying design thinking principles to prototype a proof of concept and iterate creative solutions, fostering a deep understanding of problem-solving processes and encouraging innovative thinking.

LEARNING OBJECTIVES OF THE SUBJECT

This subject aims to give students a holistic understanding of long-term energy problems and solutions. It also provides insight into rapid prototyping techniques, allowing students to explore the formulation of the moonshot concept and develop a solution, culminating in prototyping a proof of concept to validate their proposed solution's feasibility and potential impact.

STUDY LOAD

Type	Hours	Percentage
Hours small group	30,0	66.67
Hours large group	15,0	33.33

Total learning time: 45 h

CONTENTS

Content

Description:
This subject is organized in activities. Consult the activities on this sheet.

ACTIVITIES

Introduction to long term energy problems and solutions

Description:
In this activity, participants will be introduced to long-term energy problems and solutions, acquire essential insights into the energy sector's challenges, and explore potential strategies and innovations for sustainable energy solutions.

Specific objectives:
The specific objectives of this activity are to enable students to understand the principles underlying the Moonshot methodology and its application to energy challenges, empowering them to think big, think outside the box and propose innovative and transformative solutions for the energy sector.

Material:
Comprehensive handouts, informative PowerPoint presentations, and several business model canvases and templates are included in the course materials for this activity.

Full-or-part-time: 8h
Theory classes: 2h
Guided activities: 1h
Self study: 5h

TAUM and Sensors

Description:
In this activity, participants engage in the TAUM (the almost useless machine) project, which introduces fabrication, computing and the basic skills required to design, develop and manufacture a wide range of artefacts within a Fab Lab.

Specific objectives:
By prototyping a mechanical artefact that 'makes' something, participants gain practical experience and skills in the process of bringing ideas to life through hands-on fabrication and innovation.

Material:
This activity uses a combination of course notes and PowerPoint presentations as instructional materials to guide the students. In addition, the Fab Lab provides the hardware components and materials required for the activity, ensuring that students have access to the necessary tools and resources to successfully engage in the fabrication and prototyping process.

Full-or-part-time: 37h
Theory classes: 8h
Guided activities: 4h
Self study: 25h

Solution development

Description:
During this activity, students will actively apply a business-oriented approach to contextualise the moonshot solution, examine market dynamics, assess feasibility and consider financial viability.

Specific objectives:
The specific objectives of this activity are to guide participants in the process of finding a well-defined formulation of the Moonshot concept, covering ambitious and innovative ideas while gaining a deep understanding of its potential from a business perspective. By exploring market dynamics and assessing commercial viability, participants can effectively assess their Moonshot business potential.

Material:
Comprehensive handouts, informative PowerPoint presentations, and several business model canvases and templates are included in the course materials for this activity.

Full-or-part-time: 37h
Theory classes: 8h
Guided activities: 4h
Self study: 25h

Prototyping

Description:
In this activity, students develop a proof of concept for their proposed solution using digital fabrication tools and an iterative approach. Through the use of rapid prototyping techniques and refinement iterations, students can bring their innovative ideas to life and validate the feasibility and effectiveness of their solutions.

Material:
This activity uses a combination of course notes and PowerPoint presentations as instructional materials to guide the students. In addition, the Fab Lab provides the hardware components and materials required for the activity, ensuring that students have access to the necessary tools and resources to engage in the fabrication and prototyping process successfully.

Full-or-part-time: 43h
Theory classes: 12h
Guided activities: 6h
Self study: 25h

GRADING SYSTEM

The evaluation includes the assessment of narratives, problem analysis, ideation, moonshot ideas, business tools, final reports, presentations and peer reviews. Most of the work will be carried out in groups.
Project Work Report. 30%
Final project pitch. 20%
Deliverables performed individually or in groups. 30%
Attendance and participation in practical activities and class project work. 20%

EXAMINATION RULES.

Students must properly document and cite all sources used in their work, following the specified citation style or guidelines provided by the course. Plagiarism is strictly forbidden. When using AI tools to generate text, students should ensure that the output conforms to ethical standards and academic integrity.