Course guide
240435 - 240PE038 - Service-Learning Project in the Stem Field 3

Last modified: 27/06/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 732 - OE - Department of Management.
709 - DEE - Department of Electrical Engineering.
749 - MAT - Department of Mathematics.
712 - EM - Department of Mechanical Engineering.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Minguella Canela, Joaquim

Others: Peña Carrera, Marta
Boix Aragonès, Oriol
Doria Cerezo, Arnau
Lusa Garcia, Amaia
Minguella Canela, Joaquim

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
01 EIN. ENTREPRENEURSHIP AND INNOVATION: Knowing about and understanding how businesses are run and the sciences that govern their activity. Having the ability to understand labor laws and how planning, industrial and marketing strategies, quality and profits relate to each other.
02 SCS. SUSTAINABILITY AND SOCIAL COMMITMENT. Being aware of and understanding the complexity of social and economic phenomena that characterize the welfare society. Having the ability to relate welfare to globalization and sustainability. Being able to make a balanced use of techniques, technology, the economy and sustainability.
05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.
CT8. Gender perspective. To know and to understand, from the scope of the degree itself, the inequalities due to sex and gender in society; to integrate the different needs and preferences based on sex and gender in the design of solutions and problem solving.

TEACHING METHODOLOGY

The subject is conceived as a combination of sessions - on characteristic topics - deployed by the teaching staff with an expository nature (descriptions, characterizations, representations, explanations, arguments...), independent learning activities and participatory student activities (individual actions, joint activities...).
Conventional and non-conventional teaching methodologies are used (discussions, teamwork, sharing of criteria...). The student has a very effective role and active methodologies are used - starting from the basis that there are very different learning styles. The work method promotes student contributions. The subject is articulated based on the contribution of the student group, a delicate component to establish if you take into account that we are dealing with students of diverse origins who are only a little used to talking in public.
It is an educational proposal that combines learning processes and service to society with an innovative methodology. The university students will act as mentors for the students of the educational centers (primary, secondary, high school), illustrating the applications of science, technology, engineering and mathematics. University students will put into practice the knowledge, skills and abilities specific to their degree.

LEARNING OBJECTIVES OF THE SUBJECT

- General objective
To promote a more inclusive, equitable and quality education through the learning of STEM disciplines (Science, Technology, Engineering and Mathematics) and the service-learning methodology.
- Specific objectives
To promote STEM disciplines among primary, secondary and high school students.
To learn service-learning methods for STEM disciplines.
To learn to plan, organize and develop group work sessions.
To develop effective oral and written communication.
To learn technological topics (3D printing, wearable technology, etc.).
To contribute to the reduction of the gender gap in the STEM disciplines.
To provide an enriching educational experience for university students, promoting their personal and professional development, as well as their training in values â□□â□□of social commitment and responsibility.
To promote inclusion and equal opportunities for all students, regardless of their social or economic background.
To improve student motivation and school success, especially in the areas of science, technology and mathematics.
To promote collaboration between educational centers and universities, establishing relationships of trust and joint work for the improvement of education, companies and other institutions related to the STEM disciplines.
To consolidate a more comprehensive training in the context of engineering and society, with the aim of being able to assume a more active role, constructively critical and facilitator of solutions.

CONTENTS

1. Competence training

Description:
A training will be offered for the university students who will participate in the project on the skills needed to carry out the project.

Full-or-part-time: 30h
Theory classes: 12h
Guided activities: 9h
Self study : 9h

2. Definition and planning of the sessions

Description:
The content of the project will be defined, in particular the content of the sessions, its development will be planned and the work team will be organized.

Full-or-part-time: 45h
Theory classes: 18h
Guided activities: 13h 30m
Self study : 13h 30m

3. Selection and contact with the educational centers

Description:
Different educational centers from diverse socio-economic backgrounds will be contacted to select those that will participate in the project.

Full-or-part-time: 15h
Theory classes: 6h
Guided activities: 4h 30m
Self study : 4h 30m

4. Implementation of the project in the selected schools

Description:
The activities scheduled in the educational centers will be carried out. Data will be collected before and after the intervention to evaluate its impact.

Full-or-part-time: 15h
Theory classes: 6h
Guided activities: 4h 30m
Self study : 4h 30m

5. Project evaluation

Description:
An evaluation of the project will be carried out to identify strengths and weaknesses and propose possible improvements for future editions.

Full-or-part-time: 45h
Theory classes: 18h
Guided activities: 13h 30m
Self study : 13h 30m

GRADING SYSTEM

The academic methodology seeks the involvement of the student. Fundamentally, a formative assessment is carried out, which allows a feedback system to be based on it and which serves the teaching staff to perceive assimilations of what is being done.
In participatory activities, students are organized into teams. Each team must consider actions that arise throughout the sessions.
The final grade is calculated as follows:
– Session design (contents): 25%
– Planning and organization of sessions (preparation, logistics): 25%
– Development of the sessions (includes active participation): 50%

BIBLIOGRAPHY

Basic:
- Fernandez, M.; Cabos, S.; Roca, E. ; Serrano, M. . "Let's Go Engineering". Congrés Dones, Ciència i Tecnologia, WSCITECH 2019 [en línia] [on line]. Available on: https://idus.us.es/bitstream/handle/11441/97917/Comunicacin-Terrassa-2019-p%C3%A1ginas-2-18.pdf?sequence=1&isAllowed=y.-
.- Olmedo-Torre, N.; Peña, M.; López, M. ; Sanz, M. ; López, D.. "Mentoring female high students for a STEM career". Frontiers in Education Conference [on line]. Available on: 10.1109/FIE.2018.8658683.
- García, A. L. G., Hurtado, A. G., & Aranda, B. E.. "Why Don't Girls Choose Technological Studies? Adolescents' Stereotypes and Attitudes towards Studies Related to Medicine or Engineering". Psicooncologia [on line]. Available on: 10.5209/rev_sjop.2011.v14.n1.6..

RESOURCES

Other resources:
The students will have the ETSEIB Digital Manufacturing Space as a workplace or workshop.
Support material will be delivered throughout the course.