Course guide
240436 - 240PE039 - Service-Learning Project in the Stem Field M1

Last modified: 29/06/2023

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

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).

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

LECTURER

Coordinating lecturer: Peña Carrera, Marta

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

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
CT1. (ENG) EMPRENEDORIA I INNOVACIÓ: Conèixer i comprendre l'organització d'una empresa i les ciències que regeixen la seva activitat; tenir capacitat per comprendre les normes laborals i les relacions entre la planificació, les estatègies industrials i comercials, la qualitat i el benefici.
CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

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 conversing 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
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
Promote STEM disciplines among primary, secondary and high school students.
Learn service-learning methods for STEM disciplines.
Learn to plan, organize and develop group work sessions.
Develop effective oral and written communication.
Learn technological topics (3D printing, wearable technology, etc.).
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 of social commitment and responsibility.
Promote inclusion and equal opportunities for all students, regardless of their social or economic background.
Improve student motivation and school success, especially in the areas of science, technology and mathematics.
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.
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. Competences training

Description:
A training session will be held 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 project will be defined, its development will be planned and the work team will be organized.

Full-or-part-time: 60h
Theory classes: 24h
Guided activities: 18h
Self study : 18h

3. Selection and contact with 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: 30h
Theory classes: 12h
Guided activities: 9h
Self study : 9h

4. Implementation of the project in 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. Evaluation of the project

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: 15h
Theory classes: 6h
Guided activities: 4h 30m
Self study : 4h 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.
As a guideline, a final rating is reached taking into account:
– Session design (contents): 25%
– Planning and organization of sessions (preparation, logistics): 25%
– Development of the sessions (includes active participation): 50%

BIBLIOGRAPHY

Basic:
- Bauer, M. W. . Why Europe's girls aren't studying STEM [on line]. London, UK, 2016. Available on: https://news.microsoft.com/europe/features/dont-european-girls-like-science-technology/.- Fernandez, M.; Cabos, S.; Roca, E. ; Serrano, M. . Let's Go Engineering. Congrés Dones, Ciència i Tecnologia, WSCITECH 2019, 2019. pp. 221–228.
- "Mentoring female high students for a STEM career". Olmedo-Torre, N.; Peña, M.; López, M. ; Sanz, M. ; López, D. . Frontiers in Education Conference [on line]. 2018. Available on: doi: 10.1109/FIE.2018.8658683.
- "Why Don't Girls Choose Technological Studies? Adolescents' Stereotypes and Attitudes towards Studies Related to Medicine or Engineering". García, A. L. G., Hurtado, A. G., & Aranda, B. E. . Psicooncologia [on line]. 2015. Available on: https://doi.org/10.5209/rev.- Sáinz, M., Castaño, C., Meneses, J., Fàbregues, S., Müller, J., Rodó, M., ... & Garrido, N. . ¿Por qué no hay más mujeres STEM? Se buscan ingenieras, físicas y tecnólogas. 2017.

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.