Integrated Project of the Year in Sustainable Energy

Basic information

Field of study Renewable Energy and Energy Management **Speciality** All **Department** Faculty of Energy and Fuels **Study level** Second-cycle (engineer) programme **Study form** Full-time studies **Education profile** General academic	**Didactic cycle** 2021/2022 **Subject code** EiPEOZS.IIi2HS.5ecf6ed16cdfd.21 **Lecture languages** English **Mandatory** Obligatory **Block** Humanities and Social Sciences Modules **Subject related to scientific research** No

Subject coordinator	Artur Wyrwa
Lecturer	Artur Wyrwa

Period Semester 2	**Examination** Assessment **Activities and hours** Lecture: 15, Project classes: 60	**Number of ECTS points** 6.0

Goals

C1	Making students aware of the importance of integration of engineering skills, innovation and entrepreneurship.
C2	Transfer the knowledge on systematic inventive thinking, the elements of a business model and the development of a business plan.
C3	Encouraging students to use analytical business skills to develop business opportunities.

Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
Knowledge – Student knows and understands:			
W1	the steps of the development of a business plan. Student can list and describe the business model components.	EOZ2A_W06	Project, Report, Presentation
W2	thinking tools for creation of innovation.	EOZ2A_W06	Project, Report, Presentation
Skills – Student can:			
U1	translate innovations into business solutions. Can make a preliminary economic analysis of own proposal for a business in the fuel – energy sector. Can determine the value that business brings to clients. Is able to analyse the market for the product/service and identify competitors.	EOZ2A_U07	Project, Report, Presentation
U2	think beyond boundaries and systematically explore and generate new ideas. Is able to write a business plan and to make an oral presentation in English for potential investors. Can demonstrate own contribution to the team work.	EOZ2A_U09	Project, Report, Presentation
U3	use knowledge, ideas and technology to create new or significantly improved products and services.	EOZ2A_U02	Project, Report, Presentation
Social competences – Student is ready to:			
K1	demonstrate the ability to take responsibility and collaborate with others while working in a team.	EOZ2A_K02	Project, Report, Presentation

Programme content that ensure achieving learning outcomes for the module

The content of the programme includes lectures and project classes. The module implements the concept of challenge-based education. Students will work in teams on a real-life challenge. As a result of research and discussion, they will develop a proposal for an energy product or service that will solve the problem. Considering their products/services students will also prepare and defend a business plan.

Calculation of ECTS points

Activity form	**Average amount of hours* needed to complete each activity form**
Lecture	15
Project classes	60
Preparation for classes	30
Preparation of project, presentation, essay, report	50
Student workload	**Hours** 155

Workload involving teacher	Hours 75

* hour means 45 minutes

Study content

No.	Course content	Subject learning outcomes	Activities
1.	1. Introduction to business planning. Scope and evaluation rules. The role of the business. Corporate social responsibility. 2. What is the business plan and what it is used for. Functions of the business plan. Discussion of the golden rules to keep in mind in writing a business plan. 3. Introduction to the business model. Determination of the value chain, vision and targets. 4. Description of the business. Competitive advantage and unique selling proposition. The product/service. Positioning in the value chain. 5. Market description. Market segmentation and targeting. 6. Determination of actors in a game – direct/indirect competitors and allies. 7. Economic analysis. Revenue and cost models. Cash flow calculation. 8. The chain of unwanted events. 9. Five methods for Systematic Inventive Thinking. 10. Presentation of templates for preparation of the project of the business plan and financial calculations. During the lectures, students are encouraged to interact with each other and with the lecturer. In order to implement the elements of active learning, each lecture contain at least two forms to be filled in by the students (e.g. online voting, drag and drop, single choice/multiple choice questions, etc.), the results of which is the subject of a short discussion or exchange of opinions.	W1, W2	Lecture

2.	During project classes students work in teams on real-life challenge-driven projects (each team constist of ca. 8-10 students). The challenge can be determined either by the students themselves or by the industrial partners. The challenge should be addressed by offering new energy products and services for which business models should be elaborated. When the challenge is defined by the students, it needs to be checked and approved by the professor. In the second case the industry partners set students a real-life challenge to work on. In their work students use brainstorming and crashing techniques to develop their own solutions using methods such as the Chain of Unwanted Events and Systematic Inventive Thinking. Through a process of discussion and research they come up with a proposition of an energy product or service that solve the challenge. Considering their products/services students also prepare and defend a business plan. During preparation period, students are given consultations (on campus or, on demand by distance learning). The teaching material will be available at the subject website. The course is finalized by the meeting during which all the students present and defend the prepared business plans in front of the committee that consist of invited guests, possibly AGH innovation brokers, as well as EIT Innoenergy and industrial representatives. Additionally, they are asked to write a personal short paper on their experience of the team work and giving own examples of taking the responsibility.	U1, U2, U3, K1	Project classes

Course advanced

Teaching methods:

Lectures, Multimedia presentation, Discussion, Group work method, Brainstorming, Challenge based learning

Activities	Examination methods	Credit conditions
Lecture	Project, Report, Presentation	
Project classes	Project, Report, Presentation	Presentation of the results of the project takes place in front of the committee that consists of invited guests, possibly AGH innovation brokers as well as EIT Innoenergy and industrial representatives.

Additional info

The lectures and projects can take a form of physical and/or online meetings. The website for the module is available under the address: http://home.agh.edu.pl/~awyrwa

Requirements and method of completing particular forms of classes

In order to pass the classes it is necessary to obtain positive partial marks from the project report and final presentation (at least 3.0).

Method of calculating the final grade

The final grade (FG) is determined on the basis of AGH regulations regarding assesment thresholds and using the following equation:

FG = 0,5*P*R +0,5*S*R
where:
P - grade from the project report,
S - grade from the project presentation,
R: 1- for first evaluation deadline and 1st retake and 0,9 for 2nd retake.
The final grade is determined to two decimal places without rounding, in accordance with the following rule depending on the numerical value: 1) from 3.00 verbal rating: sufficient (3.0) 2) from 3.21 verbal mark: plus sufficient (3.5) 3) from 3.71 verbal mark: good (4.0) 4) from 4.21 verbal mark: plus good (4.5) 5) from 4.71 verbal mark: very good (5.0).
Grades indicate that a student (in reference to EIT OLOs 2,3,4):
5,0 - systematically uses analytical business skills to recognize, assess and/or develop business opportunities in relation to all dimensions covered in his project (market, customers, competition, sustainability), finds solutions to address his/her project's main challenges and creates new products or services,
4,5 - systematically uses analytical business skills to recognize, assess and/or develop business opportunities in relation to several dimensions covered in his project (market, customers, competition, sustainability), finds solutions to address some of his/her project's challenges and creates significantly new products or services,
4,0 - uses limited analytical business skills to recognize, assess and/or develop business opportunities in relation to some dimensions covered in his (market, customers, competition, sustainability), combines a collection of available ideas to address some of his/her project's challenges and creates improved products or services that exist,
3,5 - shows limited awareness of the role of analytical business skills to recognize, assess and/or develop business opportunities in relation to some dimensions covered in his/her project, reformulates and apply available ideas to address some of his/her project's challenges,
3,0 - shows limited awareness of the role of analytical business skills to recognize, assess and/or develop business opportunities in relation to one dimensions covered in his/her project,
2,0 - No evidence of the Intended Learinig Outcomes shown.

Method and procedure for compensating for missed coursework resulting from student absence from classes

One non-attendance is allowed in obligatory classes, which requires the student to independently master the material processed at that time. In the case of a student's absence two times, the student is required to independently master the material being taught during the class and pass it in the form and date specified by the teacher (latest in the last week of the course). A student who, without justification, missed more than two compulsory classes may not be clasified.

Entry requirements

Students should have the knowledge, skills and understanding needed for sucessful leadership, teamwork and team building.

Attendance requirements for particular classes, with indication whether student attendance is compulsory

Lectures: students attendance is highly recommended but not mandatory. The material of the lectures is performed in the order listed in the syllabus. Students are encouraged to ask questions, fill-in the forms aimed at maintaining active learning and clarify doubts on an ongoing basis. Audiovisual registration of the lecture requires the permission of the lecturer.
Project classes: students presence is mandatory. Students form teams in which they work on solutions to real-life challenges. Students can call on the teacher and industry partners for information and guidance throughout the project.

Literature

Obligatory

1. Butler, D. "Business Planning. A guide to business start-up". Butterworth Heinemann Books. 2000.
2. Blackwell, E. "How to Prepare a Business Plan", revised 4th edition. London and Sterling, VA. 2004.

Optional

1. Materials of the Innoenergy Business Creation Unit. Available online: https://bc.innoenergy.com [Accesed 7.04.2020]

Directional learning outcomes

Code	Content
EOZ2A_K02	Is aware of responsibility for the tasks performed, is willing to think and act in an entrepreneurial and professional manner, is aware of compliance with the principles of professional ethics and the cultivation and dissemination of appropriate practices, as well as initiation of actions for the benefit of the social community and public interest, including the rational use of energy and provision of the national energy security.
EOZ2A_U02	Is able to use knowledge to plan and conduct research on energy processes using various methods, including experimental ones, is able to use available software and create own computer codes for the purpose of analysis of the solution, is able to perform a critical analysis of results and prepare a synthetic compilation presenting the results of conducted research in terms of economic and environmental analysis.
EOZ2A_U07	Is able also to assess the impact of energy systems on the global functioning of civilization, including society, natural environment, economic and social development and related issues, is able to present own point of view to a wide range of audiences, also using a foreign language and presentations illustrating advanced technical and non-technical problems in the field of energy.
EOZ2A_U09	Is able to plan self-learning using various forms of information acquisition, including professional publications (also in a foreign language) and to conduct self-learning by criticall analysis of the information acquired.
EOZ2A_W06	Knows and understands the general principles for developing individual entrepreneurship, including: principles of business plan development and business management, economics and management in the energy sector and environmental protection.