Projekt "Perspektywy Współpraca Synergia Zarządzanie w Tarnowie" współfinansowany jest przez Unię Europejską ze środków Europejskiego Funduszu Społecznego w ramach Programu Operacyjnego Wiedza Edukacja Rozwój. Projekt realizowany w ramach konkursu Narodowego Centrum Badań iRozwoju z III Osi priorytetowej: Szkolnictwo wyższe dla gospodarki i rozwoju; Działanie 3.5 Kompleksowe programy szkół wyższych. Nr umowy odofinansowanie projektu: POWR.03.05.00-00-Z087/17-00.

Module SYLLABUS

Organizational unit name	The Polytechnic Institute – Department of Electrical Engineering		
Field of study	Electrical Engineering, Electronics Engineering		
Module name	Electrical Engineering Innovation – Your Successful Project		
Module code	POWER.IP.8	**Erasmus code**	
ECTS	3	**Module type**	Optional
Year of study	4	**Semester**	7

Form of classes	**Hours total**	**Form of assessment**
Laboratory classes	30	Graded credit

Coordinator teacher	dr inż. Agnieszka Lisowska-Lis		
Academic teacher	dr inż. Agnieszka Lisowska-Lis		
Language of instruction	English		
Basic courses	Yes	**Open course / course at the another field of study**	Yes
Profile of education	Practical profile	**Study level**	First-cycle level

Prerequisites and additional requirements
Student successfully passed any theoretical course of basics of electrical or electronics engineering (lecturing or tutoring). Minimum 20 ECTS in this field.

Learning outcomes for module

No.	**Student after module completion has the knowledge/knows how to/is able to Learning outcome code**	**Learning outcome type**	**Method of learning outcomes verification**	**Form of classes**
				Laboratory
1.	Student improves the professional vocabulary.	Knowledge	Test	N
2.	Renewable energy sources - (eg heat pump) - laboratory exercises. The student acquires the skills to conduct the experiment. Student develops documentation in English. Student develops a report. He/ she analyzes and interprets the results of the experiment.	Skills	Laboratory	Y
3.	Project preparation - project phases, analysis of opportunities and threats, design concepts.	Skills	Laboratory	Y

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4.	Social skills, team work, work in groups	Social competence	Laboratory activities	N
5.	Soft skills: empathy, searching for solutions to a given problem,	Social competence	Laboratory activities	Y
6.	Innovations in the power industry, innovations in engineering	Knowledge	Test	N
7.	Student improves the professional English knowledge.	Knowledge Skills	Laboratory	Y

Didactic methods

Type of activities:
Project + tutoring.

Didactical methods:
Discussion, presentations, brain storming, project.
Technical visit.
Laboratory experiment and laboratory tests (under supervision).

Rules of assessment

To pass the course student must:

- pass the introduction test
- be prepared for the classes, experiments
- analyze the achieved results, prepare the reports
- prepare the conceptual project dedicated to an electrical engineering innovation
- prepare and present to the group an essay (study) based on literature and technical guidelines dedicated to an electrical engineering innovation
- pass the finals test

Module content (brief)

Laboratory:
1. Introduction: Electrical safety
2. Theoretical introduction: repetition of knowledge in basics of electrical engineering (definitions, electrical elements, calculations, vocabulary and common mistakes). Laboratory demonstration.
3. Theoretical introduction: repetition of knowledge in power engineering (power grid, machinery and equipment, photovoltaics basics, solar systems, wind energy basics, heat pump). Laboratory demonstration.
4. Laboratory experiment with the heat pump. Preparing a report.
5. Test or colloquium
6. How to effectively obtain information and plan an interview. Work in groups.
7. Limitations of the human brain and senses. How to use these restrictions to improve security. What to draw attention to when designing. Work in groups.
8. Where to look for ideas for innovation? New challenges in electrical engineering: electromobility, distributed energy generation systems, high voltage safety systems. Laboratory presentation. Work in groups.
9. Where to look for ideas for innovation? New challenges in electrical engineering: energy storage, fuel cells application, smart grids. Laboratory presentation. Work in groups.
10. Visit to the renewable energy power plant or smart grid managing center.
11. Brain storming – searching for project ideas. SWOT analysis. Design project method - searching for project ideas. Tutoring.
12. Interview
13. Preparing a conceptual project. /possible – the stage of project modeling /. Tutoring.
14. Presentation the result. Students Project summary. Laboratory
15. Summary. Final Test

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Module content (comprehensive)
Electrical Safety. Theoretical introduction: repetition of knowledge in basics of electrical engineering (definitions, electrical elements, calculations, vocabulary and common mistakes). Repetition of knowledge in power engineering (power grid, machinery and equipment, photovoltaics basics, solar systems, wind energy basics, heat pump). Laboratory experiment with the heat pump. Preparing a report. How to effectively obtain information and plan an interview. Limitations of the human brain and senses. (How to use these restrictions to improve security. What to draw attention to when designing.) Where to look for ideas for innovation in aspect of new challenges in electrical engineering: electromobility, distributed energy generation systems, high voltage safety systems, energy storage, fuel cells application, smart grids. Visit to the renewable energy power plant or smart grid managing center. Methods of searching for project ideas: brain storming, design project method. Interview. Preparing a conceptual project. /possible – the stage of project modeling /. Student project results presentation.
Recommended literature and teaching resources
Basic literature: 1. Lisowska-Lis A. "Electrical Engineering Innovation – Your Successful Project"; Module code: POWER.IP.8" materials. 2. teaching materials provided by the teacher 3. https://en.wikipedia.org/wiki/Portal:Energy 4. Learn Engineering – The virtual university. instructions and films https://www.youtube.com/channel/UCqZQJ4600a9wIfMPbYc60OQ 5. Leonardo Energy Org. didactical materials https://www.leonardo-energy.org/

Connection with area of study	engineering sciences
Student workload (ECTS credits balance)	
Student workload form	Student workload [hours]
Participation in laboratory activities, (optional: in professional visit). Working on project.	30
Completion of reports, project. Self study.	35
Individual consultations.	10
Summary student workload	75
Module ECTS credits	
Workload of the direct assistance of the academic teacher	**2**
Workload of the practical classes	**3**

Annotation:
1 hour = 45 minutes