# MODULE DESCRIPTION

| | | |
|---|---|---|
| Module code | full-time studies: | **Z-ZIP1-E-733** |
| | part-time studies: | **Z-ZIPN1-E-733** |
| Module name | **Ecological Engineering** | |
| Module name in Polish | **Inżynieria proekologiczna** | |
| Valid from academic year | **2023/2024** | |

## MODULE PLACEMENT IN THE SYLLABUS

| | |
|---|---|
| Field of study | **MANAGEMENT AND PRODUCTION ENGINEERING** |
| Level of education | **1st degree** |
| Studies profile | **General** |
| Form and method of conducting classes | **Full-time and Part-time** |
| Specialisation | **Production and Innovation Management** |
| Unit conducting the module | **Department of Production Engineering** |
| Module co-ordinator | **Maria Krechowicz, PhD** |
| Approved by: | **Dariusz Bojczuk, PhD, DSc** |

## MODULE OVERVIEW

| | |
|---|---|
| Type of subject / group of subjects | **Specialist subject** |
| Module status | **Non-compulsory** |
| Language of conducting classes | **English** |
| Module placement in the syllabus - semester | **Semester VII** |
| Initial requirements | **No requirements** |
| Examination (YES/NO) | **NO** |
| Number of ECTS credit points | **2** |

| **Method of conducting classes** | | **Lecture** | **Classes** | **Laboratory** | **Project** | **Other** |
|---|---|---|---|---|---|---|
| **Per semester** | full-time studies: | **15** | | | **15** | |
| | part-time studies: | **9** | | | **9** | |

## TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

| Category | Symbol | Learning outcomes | Assignations to the directional learning outcomes |
|---|---|---|---|
| Knowledge | W01 | A student has basic knowledge of creating and analysing technical documentation with the elements of pro-ecological engineering designing, in particular concerning the subject of saving energy. | ZIP1_W06 |
| | W02 | A student has knowledge as regards making optimal choices of the selected pro-ecological activities (thermomodernisation undertakings). | ZIP1_W15 |
| | W03 | A student has knowledge as regards development and innovation trends in politics end pro-ecological activity. | ZIP1_W18 |
| Skills | U01 | A student can obtain information from literature, databases and other sources, working individually and in a team; can combine the obtained information, analyze and interpret, draw conclusions, formulate and justify opinions as regards pro-ecological data. | ZIP1_U01<br>ZIP1_U02 |
| | U02 | A student is able to develop simple documentation regarding the implementation of an engineering and organisational task and prepare a text containing an overview of the results and the process of the task implementation in terms of pro-ecological issues. | ZIP1_U03 |
| | U03 | A student can see the connections between engineering decisions and the non-technical area, including environmental, economic and legal aspects. | ZIP1_U15 |
| Social competences | K01 | A student understands the need of continuous improvement and is aware of the importance of professional action and responsibility for their own work and for jointly performed tasks. | ZIP1_K01<br>ZIP1_K03<br>ZIP1_K04 |
| | K02 | A student is aware of the importance and understands the relationship between engineering and non-technical activities in terms of the effects of environmental impact and responsibility for decisions made. | ZIP1_K02 |
| | K03 | A student is aware of the social role of a technical university graduate and understands the need to convey to the public in a generally comprehensible manner information on the achievements related to the field of study "Management and Production Engineering". | ZIP1_K06 |

## TEACHING CONTENTS

| Method of conducting classes | Teaching contents |
|---|---|
| Lecture | Principles of pro-ecological design, basics of energy-saving, passive and autonomous construction.<br>Energy audit and thermal modernization of buildings.<br>Prospects for the development of renewable energy in Poland.<br>Wind energy.<br>Solar collectors and photovoltaic installations.<br>Agricultural biogas plants.<br>Case study of pro-ecological engineering applications in industrial plants. |

| | |
|---|---|
| Project | Development of a passive building concept.<br>Design of thermal insulation of the side walls or the roof of the selected building with polystyrene / mineral wool.<br>Design of a lighting installation with the use of MTW (Small Wind Turbine).<br>Design of a photovoltaic installation covering the demand for electricity needed to power the selected facility.<br>Agricultural biogas plant project.<br>Design of domestic hot water preparation installation with the use of solar collectors. |

## METODS OF ASSESSING TEACHING RESULTS

| Symbol | Methods of checking the learning outcomes *(select X)* | | | | | |
|---|---|---|---|---|---|---|
| | **Oral exam** | **Written exam** | **Test** | **Project** | **Statement** | **Other** |
| W01 | | | | X | | |
| W02 | | | X | | | |
| W03 | | | X | | | |
| U01 | | | | X | | |
| U02 | | | | X | | |
| U03 | | | | X | | |
| K01 | | | | X | | |
| K02 | | | | X | | |
| K03 | | | | X | | |

## FORM AND CONDITIONS OF PASSING

| Form of classes | Form of credit | Passing conditions |
|---|---|---|
| Lecture | Credit with grade | Obtaining at least 50% of the points from the lecture test. |
| Project | Credit with grade | Obtaining at least 50% of points from the written version of the project and at least 50% from checking the message during the discussion when submitting the project. |

## STUDENT WORKLOAD

| Balance of ECTS points | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Type of student's activity | Student's workload | | | | | | | | | | Unit |
| | | full-time | | | | | part-time | | | | | |
| 1. | Participation in the activities | Lc | C | Lb | P | O | Lc | C | Lb | P | O | h |
| | | 15 | | | 15 | | 9 | | | 9 | | |
| 2. | Other (consultation, exam) | 2 | | | 2 | | 2 | | | 2 | | h |
| 3. | **Number of hours of a student's assisted work** | **34** | | | | | **22** | | | | | h |
| 4. | **Number of ECTS credit points which are allocated for assisted work** | **1,4** | | | | | **0,9** | | | | | ECTS |
| 5. | **Number of hours of a student's unassisted work** | **16** | | | | | **28** | | | | | h |
| 6. | **Number of ECTS credit points which a student receives for unassisted work** | **0,6** | | | | | **1,1** | | | | | ECTS |
| 7. | **Work input connected with practical classes** | **25** | | | | | **25** | | | | | h |
| 8. | **Number of ECTS credit points which a student receives for practical classes** | **1,0** | | | | | **1,0** | | | | | ECTS |
| 9. | **Total number of hours of a student's work** | **50** | | | | | **50** | | | | | h |
| 10. | **Punkty ECTS za moduł** *1 ECTS=25 hours* | **2** | | | | | | | | | | ECTS |

## LITERATURE


1. Kanoglu M., Cengel Y., Cimbala J. (2020), *Fundamentals and Applications of Renewable Energy*, McGraw-Hill Education.
2. Krechowicz M., Piotrowski, J.Z. (2021), *Comprehensive Risk Management in Passive Buildings Projects*, Energies, 14 (20), 6830.
3. Passive House Institute: https://passivehouse.com/
4. Sumera T., Olkuski T. (2022), *Improving the thermal performance of existing buildings in light of the requirements of the EU directive 2010/31/EU in Poland*, Open Chemistry, 20(1), 40-51.
5. Wijeysundera N. (2022), *Principles of Renewable Energy Engineering with Worked Examples*. World Scientific.