



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Pre-diploma Project [N2EPiO1-ECiO>PP]

### Course

|                                         |                   |
|-----------------------------------------|-------------------|
| Field of study                          | Year/Semester     |
| Industrial and Renewable Energy Systems | 1/2               |
| Area of study (specialization)          | Profile of study  |
| Thermal and Renewable Energy            | general academic  |
| Level of study                          | Course offered in |
| second-cycle                            | Polish            |
| Form of study                           | Requirements      |
| part-time                               | compulsory        |

### Number of hours

|           |                    |       |
|-----------|--------------------|-------|
| Lecture   | Laboratory classes | Other |
| 0         | 0                  | 0     |
| Tutorials | Projects/seminars  |       |
| 0         | 9                  |       |

### Number of credit points

3,00

### Coordinators

dr hab. inż. Rafał Ślefarski prof. PP  
rafal.slefarski@put.poznan.pl

### Lecturers

### Prerequisites

Student has knowledge of the basics of writing papers and reports in the field of mechanics. Student should also be able to present a description and calculation of the basic thermodynamic processes of thermal energy conversion systems in gas industry.

### Course objective

To acquaint students with necessary knowledge about research projects and conducting research related to the preparation of the master's thesis. To acquaint students with basic principles of writing scientific papers and reports.

### Course-related learning outcomes

Knowledge:

has expanded knowledge about the development directions of gas industry and renewable energy sources including economical and environmental aspects.

knows the economic and legal aspects of activities related to energy production based on fossil and renewable energy sources.

has knowledge about legal aspects related to use of energetic systems and security of fuel supply .

### Skills:

is able to formulate and test hypotheses related to simple research problems in fields of gas industry and renewable energy resources.

is able to use analytical, simulation and experimental methods for scientific research in topics related to use of gaseous fuels.

is able to design - in accordance with the given specification - and implement processes for gas industry sector renewable energy, using appropriately selected methods, techniques, tools and materials.

### Social competences:

is ready to critically assess knowledge and received content in range of security of energy production and distribution.

he is ready to initiate actions for the social interest related to environmental protection.

is ready to think and act in an entrepreneurial way.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Project: the skills acquired during the design class will be assessed on the basis of the solution to the engineering problem presented by the student during the last class presentation.

## Programme content

Project: Scientific papers, The genesis of thesis topics, Sources of scientific and technical information and ways to use of them, formulating hypotheses, models and modelling, the structure of the thesis, the technique of writing research papers, editorial rules, elements of scientific language: regularities, laws, theories, principles, Fundamentals of experiment theory (research planning, development of research methodology, construction of test object models, analysis of results)

## Course topics

1. Thesis as a scientific paper – key areas
2. Literature review using available databases
3. Presentation of experimental research results and numerical simulations
4. Development of a decarbonisation scenario for a selected area of the economy
5. Preparation of a technical, economic and environmental analysis of energy source changes in energy systems

## Teaching methods

Project: multimedia presentation illustrated with examples given on a blackboard and performance of tasks given by the teacher - practical exercises, discussion, combined with an assessment of examples of research projects related to the topic of the thesis

## Bibliography

### Basic

Gołaś A. Inżynierskie metody analizy numerycznej i planowanie eksperymentu, Wydawnictwo AGH Leszek W., Badania empiryczne, wyd. ITE, Radom 1997.

Majchrzak J., Mendel T., Metodyka pisania prac magisterskich i dyplomowych. Wydawnictwo Akademii Ekonomicznej w Poznaniu, Poznań 2005.

Korzyński M., Metodyka eksperymentu. Planowanie, realizacja i statystyczne opracowanie wyników eksperymentów technologicznych, PWN

### Additional

Leszek W. Nieempiryczne procedury badawcze w naukach przyrodniczych i technicznych. Wydawnictwo ITE

Zederowowski, R. Technika pisania prac magisterskich i licencjackich, CeDeWu

Polański Z., Planowanie doświadczeń w technice. PWN, Warszawa

## Breakdown of average student's workload

|                                                                                                                                         | Hours | ECTS |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Total workload                                                                                                                          | 90    | 3,00 |
| Classes requiring direct contact with the teacher                                                                                       | 9     | 0,30 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 81    | 2,70 |