## MODULE SPECIFICATION

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|---|---|
| Module code | |
| Module title in Polish | **GOSPODARKA ODPADAMI PRZEMYSŁOWYMI** |
| Module title in English | **Industrial Waste Management** |
| Module running from the academic year | 2016/2017 |

## A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

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| Field of study | **Environmental Engineering** |
| Level of qualification | first cycle<br>(first cycle, second cycle) |
| Programme type | academic<br>(academic/practical) |
| Mode of study | full-time<br>(full-time/part-time) |
| Specialism | Water Supply, Treatment of Wastewater and Solid Waste |
| Organisational unit responsible for module delivery | **Division of Waste Management** |
| Module co-ordinator | Jolanta Latosińska , PhD, Eng. |
| Approved by: | **Prof. Maria Żygadło** |

## B. MODULE OVERVIEW

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| Module type | core module<br>(core/programme-specific/elective HES*) |
| Module status | compulsory module<br>(compulsory/optional) |
| Language of module delivery | **Polish/ English** |
| Semester in the programme of study in which the module is taught | semester 7 |
| Semester in the academic year in which the module is taught | winter semester<br>(winter semester/summer semester) |
| Pre-requisites | None<br>(module code/module title, where appropriate) |
| Examination required | No requirements<br>(Yes/No) |
| ECTS credits | 1 |

* elective HES – elective modules in the Humanities and Economic and Social Sciences

| Mode of instruction | lectures | classes | laboratories | project | others |
|---|---|---|---|---|---|
| Total hours per semester | 15 | | | | |

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## C. LEARNING OUTCOMES AND ASSESSMENT METHODS

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| **Module aims** | The aim of the module is to familiarise students with the current state of industrial waste management condition in Poland. Other aims are as follows: discussing binding legal standards regulating industrial waste management (together with accepting the issues of dangerous waste); presenting world procedures directed at minimizing the impact of waste on the environment; familiarising students with the selected methods of neutralising and utilising industrial waste applied in the country and in the world. |

| Module outcome code | Module learning outcomes | Mode of instruction *(l/c/lab/p/ others)* | Corresponding programme outcome code | Corresponding discipline-specific outcome code |
|---|---|---|---|---|
| W_01 | A student has general knowledge on the classification of waste, the principles of international transport of waste and the duties of waste producers. | l | IŚ_W09 | T1A_W03, T1A_W04, T1A_W05, T1A_W06; T1A_W07 |
| W_02 | A student knows basic principles of management as regards the selected industrial waste. Moreover, a student knows the fundamentals of limiting the production of waste. | l | IŚ_W07 | T1A_W01; T1A_W03 T1A_W08 |
| W_03 | A student knows the principles of waste management as well as the methods of utilising radioactive and dangerous waste on the basis of asbestos waste. | l | IŚ_W09 | T1A_W03, T1A_W04, T1A_W05, T1A_W06; T1A_W07 |
| W_04 | A student knows the principles of thermal neutralising dangerous waste. | l | IŚ_W09 | T1A_W03, T1A_W04, T1A_W05, T1A_W06; T1A_W07 |
| U_01 | A student is able to classify waste. | l | IŚ_U05 | T1A_U03, T1A_U04 |
| U_02 | A student is able to assess the methods of neutralising the selected industrial waste (including the dangerous one). | l | IŚ_U18 | T1A_U03; T1A_U10 T1A_U12; T1A_U14 T1A_U15 |
| U_03 | A student is capable of assessing the impact of the selected industrial waste on the environment. | l | IŚ_U27 | T1A_U15 |
| K_01 | A student understands the necessity of passing knowledge on waste management to the society. | l | IŚ_K06 | T1A_K06; T1A_K07 |
| K_02 | A student is aware of the necessity of raising his/her knowledge as regards waste management. | l | IŚ_K03 | T1A_K01; T1A_K02 T1A_K04 |
| K_03 | A student understands the necessity of technological progress as well as the necessity of implementing new technical solutions as regards waste management. | l | IŚ_K09 | T1A_K02 |

### Module content:

1. Topics to be covered in the lectures
2. Topics to be covered in the classes
3. Topics to be covered in the laboratories

| No. | Topics | Module outcome code |
|---|---|---|

| | | |
|---|---|---|
| 1 | The conditions of industrial waste management in Poland (quantitative balance) and a legal state. International transport of waste. Permits in waste management. The duties of waste producers. Waste register. The chart of waste transport. | W_01<br>U_01<br>K_02<br>K_03 |
| 2 | The idea and principles of Clean Production. Environmental Management Systems. ISO 14000 norms and the EMAS system. | W_02<br>K_02 |
| 3 | The amount and place of generating asbestos waste. Health hazards concerning asbestos (i.e. the reasons of asbestos harmfulness and the diseases brought on). The principles of removing asbestos products. The methods of neutralising asbestos. | W_03<br>U_03<br>K_01<br>K_02<br>K_03 |
| 4 | The problem of industrial waste (the characteristics of waste, disposing in the environment, neutralising, and utilisation) for the selected groups of industrial waste (mining waste, commercial power industry waste, waste generated by the machining and steelwork industry). | W_02<br>U_02<br>K_02<br>K_03 |
| 5 | The problems of industrial waste, cont. The characteristics of waste, disposing in the environment, neutralising, recycling for the selected groups of industrial waste (waste generated by agricultural-grocery industry, waste from oil processing, waste generated by the chemistry industry). | W_02<br>U_02<br>U_03<br>K_03 |
| 6 | Radioactive waste: their sources, hazards, legal fundamentals as regards management, neutralisation in Poland and in the world. | W_03<br>K_01<br>K_02<br>K_03 |
| 7-8 | Thermal methods of neutralising dangerous waste. Fuel properties of industrial waste. The installations of combusting industrial waste. Recycling dangerous waste. The installations for thermal processing of dangerous waste. | W_04<br>K_01<br>K_02<br>K_03 |

## Assessment methods

| Module outcome code | **Assessment methods**<br>*(Method of assessment; for module skills − reference to specific project, laboratory and similar tasks)* |
|---|---|
| W_01 | A test |
| W_02 | A test |
| W_03 | A test |
| W_04 | A test |
| U_01 | A test |
| U_02 | A test |
| U_03 | A test |
| K_01 | A test |
| K_02 | A test |
| K_03 | A test |

## D. STUDENT LEARNING ACTIVITIES

| ECTS summary | | |
|---|---|---|
| | **Type of learning activity** | **Study time/ credits** |
| **1** | Contact hours: participation in lectures | **15** |
| **2** | Contact hours: participation in classes | |
| **3** | Contact hours: participation in laboratories | |
| **4** | Contact hours: attendance at office hours (2-3 appointments per semester) | **2** |
| **5** | Contact hours: participation in project-based classes | **-** |
| **6** | Contact hours: meetings with a project module leader | **-** |
| **7** | Contact hours: attendance at an examination | |
| **8** | | |
| **9** | **Number of contact hours** | **17** *(total)* |
| **10** | **Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)* | **0.68** |
| **11** | Private study hours: background reading for lectures | **4** |
| **12** | Private study hours: preparation for classes | |
| **13** | Private study hours: preparation for tests | **4** |
| **14** | Private study hours: preparation for laboratories | |
| **15** | Private study hours: writing reports | |
| **16** | Private study hours: preparation for a final test in laboratories | |
| **17** | Private study hours: preparation of a project/a design specification | |
| **18** | Private study hours: preparation for an examination | |
| **19** | | |
| **20** | **Number of private study hours** | **8** *(total)* |
| **21** | **Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)* | **0.32** |
| **22** | **Total study time** | |
| **23** | **Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)* | **1** |
| **24** | **Number of practice-based hours** *Total practice-based hours* | |
| **25** | **Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)* | |

## E. READING LIST

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|---|---|
| References | 1. Żygadło M., Woźniak M, Combustion waste characteristics, Storage and applicaton, Scholars' Press, 2015<br>2. Pusch R, Geological storage of highly radioactive waste, current concepts and plans for radioactive waste disposal, Springer-Verlag, Geramny, 2008<br>3. Żygadło M., Principles of waste management and treatment, Politechnika Świętokrzyska , 2015<br>4. Waste: A Handbook for Management, Ed. Letcher T., Vallero D.A., Elsevier, USA, 2011<br>5. Industrial waste treatment: contemporary practice and vision for the future, Ed. Nelson Leonard Nemerow, Amsterdam, Elsevier, 2007<br>6. Advances hazardous industrial waste treatment, Ed. Lawrence K. Wang, Nazih K. Shammas, |

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| | Yung-Tse Hung, CRC/Taylor & Francis, 2009<br>7. Tang W. Z Physicochemical treatment of hazardous wastes, Boca Raton, Lewis Publishers, 2004<br>8. Haggar Salah M, Sustainable industrial design and waste management: cradle-to-cradle for sustainable development, Amsterdam, Elsevier, 2007 |
| Module website | |