



## Subject card

|   |  |  |                                     |            |         |         |     |
|---|--|--|-------------------------------------|------------|---------|---------|-----|
| Subject name and code                       | Modern Analytical Techniques, PG_00048919  |  |                                     |            |         |         |     |
| Field of study                              | Chemistry in Construction Engineering  |  |                                     |            |         |         |     |
| Date of commencement of studies             | October 2020   | Academic year of realisation of subject  | 2022/2023                           |            |         |         |     |
| Education level                             | first-cycle studies  | Subject group  |                                     |            |         |         |     |
| Mode of study                               | Full-time studies  | Mode of delivery   | at the university                   |            |         |         |     |
| Year of study                               | 3  | Language of instruction  | Polish                              |            |         |         |     |
| Semester of study                           | 5  | ECTS credits   | 4.0                                 |            |         |         |     |
| Learning profile                            | general academic profile   | Assessment form  | assessment                          |            |         |         |     |
| Conducting unit                             | Department of Analytical Chemistry -> Faculty of Chemistry   |  |                                     |            |         |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   | dr hab. inż. Justyna Płotka-Wasyłka  |                                     |            |         |         |     |
|   | Teachers   | dr hab. inż. Justyna Płotka-Wasyłka<br>dr hab. inż. Mariusz Marć<br>prof. dr hab. inż. Andrzej Wasik<br>dr inż. Małgorzata Rutkowska<br>dr inż. Bartłomiej Cieślik<br>dr inż. Tomasz Majchrzak<br>dr inż. Natalia Jatkowska<br>prof. dr hab. inż. Bożena Zabiegała<br>prof. dr hab. inż. Agata Kot-Wasik |                                     |            |         |         |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial                            | Laboratory | Project | Seminar | SUM |
|   | Number of study hours  | 15.0   | 0.0                                 | 30.0       | 0.0     | 15.0    | 60  |
|   | E-learning hours included: 0.0   |  |                                     |            |         |         |     |
|   | Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=3783">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=3783</a>  |  |                                     |            |         |         |     |
| Learning activity and number of study hours | Learning activity  | Participation in didactic classes included in study plan   | Participation in consultation hours | Self-study | SUM     |         |     |
|   | Number of study hours  | 60   | 5.0                                 | 35.0       | 100     |         |     |
| Subject objectives                          | Acquaintance with modern analytical techniques in theory and practice that will enable analysis building materials, monitoring and analytics of environmental pollution originating from squares construction, emitted from building materials |  |                                     |            |         |         |     |

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| Learning outcomes               | Course outcome   | Subject outcome   | Method of verification  |
|                                 | K6_W08   | The student is able to analyze phenomena and provide methods for them analysis and monitoring, so much needed in terms of construction  | [SW1] Assessment of factual knowledge<br>[SW3] Assessment of knowledge contained in written work and projects   |
|                                 | K6_W03   | After completing the course, the student will have knowledge of issues related to analytical techniques, which can be used for analysis and pollution monitoring building materials and construction sites. | [SW1] Assessment of factual knowledge   |
|                                 | K6_U06   | After completing the course, the student will have knowledge of issues related to analytical techniques, which can be used for analysis and pollution monitoring building materials and construction sites. | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools<br>[SU5] Assessment of ability to present the results of task |
| Subject contents                | <p>1. Spectroscopic techniques used to analyze building materials</p> <p>2. Theoretical and practical basics in the use of chromatographic techniques. Analysis of building materials and processing of received data.</p> <p>3. Chemical sensors, an electronic nose type used to analyze and monitor release pollution from building materials.</p> <p>4. Micro-extraction techniques used to prepare samples for analysis. Building materials and their solid, liquid and gas impurities.</p> |   |   |
| Prerequisites and co-requisites | Basic knowledge of chemistry. Knowledge of the dangers arising from emissions of building materials.   |   |   |
| Assessment methods and criteria | Subject passing criteria   | Passing threshold   | Percentage of the final grade   |
|                                 | lecture  | 60.0%   | 45.0%   |
|                                 | seminas  | 60.0%   | 10.0%   |
|                                 | lab  | 60.0%   | 45.0%   |

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| Recommended reading  | Basic literature   | <p>1. Marian Kamiński, Podstawowe pojęcia i parametry opisujące układy chromatograficzne. Podstawowe zasady efektywnego stosowania chromatografii cieczowej do rozdzielania i oznaczania składu mieszanin, PG, 2010</p> <p>2. Praca zbiorowa pod redakcją M. Kamiskiego Chromatografia cieczowa, CEEM, Gdask, 2004.</p> <p>3. D. Berek, M. Dressler, M. Kubin, K. Marcinka Chromatografia elowa PWN<br/>Warszawa 1989.</p> <p>4. European Committee for Standardization, Safety of toys. Organic chemical compounds. Methods of analysis, BS EN 71-11:2005</p> <p>5. M. Marć, B. Zabiegała, J. Namieśnik, Trends Anal. Chem., 32 (2012) 76</p> <p>6. A. Kot-Wasik, B. Zabiegała, M. Urbanowicz, E. Dominiak, A. Wasik, J. Namieśnik, Anal. Chim. Acta 602 (2007) 141</p> <p>7. M. Urbanowicz, B. Zabiegała, J. Namieśnik, Anal. Bioanal. Chem., 399 (2011) 277</p> <p>8. A. Cygański, Podstawy metod elektroanalitycznych, WNT, Warszawa, 1999.</p> <p>9. S L R Ellison, A Williams, Quantifying Uncertainty in Analytical Measurement, EURACHEM/CITA, 2011.</p> |
|  | Supplementary literature   | <p>J. Warych, Oczyszczanie przemysłowcy gazów odlotowych, WNT, Warszawa, 1988.</p> <p>W. Lewandowski, Techniczno-technologiczne i aparaturowe aspekty ochrony powietrza, Wydawnictwo Poli-techniki Gdańskiej, Gdańsk, 2011</p>   |
|  | eResources addresses   | Adresy na platformie eNauczenie:   |
| Example issues/<br>example questions/<br>tasks being completed | Gas chromatography, liquid chromatography, spectroscopic techniques, sensors, electronic nigt, qualitative analysis, quantitative analysis, building materials, dust emissions from building materials and construction sites, monitoring, road infrastructure and environmental pollution |  |
| Work placement   | Not applicable   |  |