

## Subject card

|                                             |                                                                                                                                                                           |                                                          |                                         |                                     |                                                                          |            |     |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|--------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Engineering lecture - Selected techniques used for physicochemical analysis in industry and diagnostics, PG_00080705                                                      |                                                          |                                         |                                     |                                                                          |            |     |
| Field of study                              | Chemical Business                                                                                                                                                         |                                                          |                                         |                                     |                                                                          |            |     |
| Date of commencement of studies             | October 2025                                                                                                                                                              |                                                          | Academic year of realisation of subject |                                     | 2028/2029                                                                |            |     |
| Education level                             | Bachelor's studies                                                                                                                                                        |                                                          | Subject group                           |                                     | Obligatory subject group in the field of study<br>Optional subject group |            |     |
| Mode of study                               | full-time studies                                                                                                                                                         |                                                          | Mode of delivery                        |                                     | at the university                                                        |            |     |
| Year of study                               | 4                                                                                                                                                                         |                                                          | Language of instruction                 |                                     | Polish                                                                   |            |     |
| Semester of study                           | 7                                                                                                                                                                         |                                                          | ECTS credits                            |                                     | 2.0                                                                      |            |     |
| Learning profile                            | academic                                                                                                                                                                  |                                                          | Assessment form                         |                                     | credit                                                                   |            |     |
| Conducting unit                             | Faculty of Chemistry -> Rector                                                                                                                                            |                                                          |                                         |                                     |                                                                          |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                        |                                                          | dr hab. Aleksandra Dąbrowska            |                                     |                                                                          |            |     |
|                                             | Teachers                                                                                                                                                                  |                                                          |                                         |                                     |                                                                          |            |     |
| Lesson types                                | Lesson type                                                                                                                                                               | Lecture                                                  | Tutorial                                | Laboratory                          | Project                                                                  | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                     | 30.0                                                     | 0.0                                     | 0.0                                 | 0.0                                                                      | 0.0        | 30  |
|                                             | E-learning hours included: 0.0                                                                                                                                            |                                                          |                                         |                                     |                                                                          |            |     |
| 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                                                                                                                                                     | 30                                                       |                                         | 5.0                                 |                                                                          | 15.0       | 50  |
| Subject objectives                          | Learning modern techniques of physicochemical analysis and preparation for the use of these techniques in professional work, both in industrial and medical laboratories. |                                                          |                                         |                                     |                                                                          |            |     |
|                                             | Acquiring theoretical and practical knowledge regarding analytical methods, their principles of operation, applications and limitations.                                  |                                                          |                                         |                                     |                                                                          |            |     |
|                                             | Developing the ability to critically evaluate and interpret the operating parameters of the devices discussed and analyze source texts.                                   |                                                          |                                         |                                     |                                                                          |            |     |

| Learning outcomes               | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Subject outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Method of verification            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
|                                 | [BCHINŻ_W07] Describes the construction and operating principles of basic scientific, technological and control-measuring apparatus.                                                                                                                                                                                                                                                                                                                                         | Possessing advanced knowledge of the structure and principles of operation of scientific, technological and control and measurement equipment, which allows for the effective use of these tools in physicochemical analysis in industry and diagnostics.                                                                                                                                                                                                                                                                                                                                                                                                        | [SW4] test/exam - oral or written |
|                                 | [BCHINŻ_K01] Identifies the level of her/his own knowledge and skills as well as the need to update engineering knowledge, continuous professional training and personal development.                                                                                                                                                                                                                                                                                        | Awareness of the need for continuous education and updating of engineering knowledge, which is crucial for effective functioning in the dynamically developing field of physicochemical analysis in industry and diagnostics.                                                                                                                                                                                                                                                                                                                                                                                                                                    | [SK4] test/exam - oral or written |
|                                 | [BCHINŻ_W05] Describes the life cycle of devices, facilities and technical systems as well as modern environment-friendly technical solutions.                                                                                                                                                                                                                                                                                                                               | Conscious and responsible use of analytical techniques in industry and diagnostics thanks to advanced knowledge of the life cycle of analytical devices and modern, pro-ecological technical solutions.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | [SW4] test/exam - oral or written |
|                                 | [BCHINŻ_U09] Using the acquired knowledge, skills and various sources of scientific information independently prepares written papers and oral presentations.                                                                                                                                                                                                                                                                                                                | Effective communication of your discoveries and conclusions thanks to the use of a wide range of sources of scientific information and the ability to independently prepare written works and oral presentations.                                                                                                                                                                                                                                                                                                                                                                                                                                                | [SU4] test/exam - oral or written |
|                                 | [BCHINŻ_U08] Uses the chemical nomenclature and engineering terminology properly.                                                                                                                                                                                                                                                                                                                                                                                            | The ability to properly use chemical nomenclature and engineering terminology, which is necessary for effective communication and work in the field of physicochemical analysis in industry and diagnostics.                                                                                                                                                                                                                                                                                                                                                                                                                                                     | [SU4] test/exam - oral or written |
|                                 | [BCHINŻ_W06] Enumerates basic unit processes and describes issues in the field of technology and chemical engineering.                                                                                                                                                                                                                                                                                                                                                       | Effective use of analytical techniques in industry and diagnostics thanks to advanced knowledge of unit processes and issues in the field of chemical technology and engineering.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | [SW4] test/exam - oral or written |
| Subject contents                | The importance of physicochemical analysis in industry, pharmacy, medicine and modern laboratory diagnostics. Review of basic analytical methods (spectroscopic methods, separation methods, chromatographic methods, thermal analysis, electrochemical techniques, PCR, methods for testing surface-active substances). Trends and novelties in physicochemical analysis (new techniques and their potential applications, review of the latest research and publications). |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |
| Prerequisites and co-requisites |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Percentage of the final grade     |
|                                 | test (part III)                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 34.0%                             |
|                                 | test (part II)                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 33.0%                             |
|                                 | test (part I)                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 33.0%                             |
| Recommended reading             | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ol style="list-style-type: none"> <li>1. L. E. Reubsear, G. Tyge, <i>Chromatography</i>, Wydawnictwo Wiley Vch Verlag GmbH (2019).</li> <li>2. D. Corradini, T.M. Philips, <i>Handbook of HPLC</i>, CRC Press (2011).</li> <li>3. J. Kenkel, <i>Analytical Chemistry for Technicians</i> Third Edition, CRC Press LLC (2003)</li> <li>4. S.A.Bustin, <i>The PCR Revolution</i>, Cambridge University Press (2010).</li> <li>5. A.Longobardi Giva, <i>Flow Cytometry, First Principles</i>, A John Wiley and Sons inc. New York (2001).</li> <li>6. T.F. Tadros, <i>Applied Surfactants.Principles and Applicatons</i>, Wiley Vch Verlag GmbH (2005).</li> </ol> |                                   |
|                                 | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Books and scientific publications indicated by the lecturer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |
|                                 | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Basic<br><a href="https://bg.ug.edu.pl/">https://bg.ug.edu.pl/</a> - books, e-books, academic and scientific publications<br>Supplementary<br><a href="https://bg.ug.edu.pl/">https://bg.ug.edu.pl/</a> - books, e-books, academic and scientific publications                                                                                                                                                                                                                                                                                                                                                                                                   |                                   |

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| Example issues/<br>example questions/<br>tasks being completed |                |
| Work placement                                                 | Not applicable |

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