

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                            |                                                          |                                         |                                     |         |                                                                                                                      |     |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------|-----|
| Subject name and code                       | Chemical business design, PG_00080785                                                                                                                                                                                                                                                                                      |                                                          |                                         |                                     |         |                                                                                                                      |     |
| Field of study                              | Chemical Business                                                                                                                                                                                                                                                                                                          |                                                          |                                         |                                     |         |                                                                                                                      |     |
| Date of commencement of studies             | October 2026                                                                                                                                                                                                                                                                                                               |                                                          | Academic year of realisation of subject |                                     |         | 2028/2029                                                                                                            |     |
| Education level                             | Bachelor's studies                                                                                                                                                                                                                                                                                                         |                                                          | Subject group                           |                                     |         | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |     |
| 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                            |                                     |         | 2.0                                                                                                                  |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                                                   |                                                          | Assessment form                         |                                     |         | credit                                                                                                               |     |
| Conducting unit                             | Laboratory of Photocatalysis -> Department of Environmental Technology -> Faculty of Chemistry -> Rector                                                                                                                                                                                                                   |                                                          |                                         |                                     |         |                                                                                                                      |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                                         |                                                          | dr inż. Anna Gołębiewska                |                                     |         |                                                                                                                      |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                                   |                                                          |                                         |                                     |         |                                                                                                                      |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                                                | Lecture                                                  | Tutorial                                | Laboratory                          | Project | Seminar                                                                                                              | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                                      | 0.0                                                      | 30.0                                    | 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                          | <ul style="list-style-type: none"><li>Acquainting with the principles of designing of small production enterprises;</li><li>Acquainting with with the elements of process design</li><li>Acquainting with the principles of economical analysis / determining the profitability of a new production installation</li></ul> |                                                          |                                         |                                     |         |                                                                                                                      |     |

| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Correctly presents the technological diagram of the selected process                                                                                        | [SW4] test/exam - oral or written<br>[SW2] presentation/project/paper/report                                           |
|                   | [BCHINŻ_W05] Describes the life cycle of devices, facilities and technical systems as well as modern environment-friendly technical solutions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | It proposes modern, pro-environmental technical solutions                                                                                                   | [SW4] test/exam - oral or written<br>[SW2] presentation/project/paper/report                                           |
|                   | [BCHINŻ_U06] Proposes and makes simple devices, operations or unit processes related to the implementation of the technological process used in the chemical industry, taking into account material and energy balances.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Prepares a process design: chemical and technological concept                                                                                               | [SU2] presentation/project/paper/report<br>[SU4] test/exam - oral or written                                           |
|                   | [BCHINŻ_U07] Performs a preliminary economic analysis of designed and implemented engineering tasks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Przygotowuje biznes plan przedsiębiorstwa<br>Identyfikuje i rozpoznaje potrzeby rynku<br>Projektuje małe instalacje produkcyjne oraz określa ich rentowność | [SU2] presentation/project/paper/report<br>[SU4] test/exam - oral or written                                           |
|                   | [BCHINŻ_U01] On the basis of the acquired knowledge, identifies, analyses and solves engineering tasks and problems in broadly understood chemistry.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Prepares a process design: chemical and technological concept                                                                                               | [SU2] presentation/project/paper/report<br>[SU4] test/exam - oral or written<br>[SU5] implementation of a problem task |
|                   | [BCHINŻ_K05] Is convinced of the importance of behaving in a professional manner in every situation, taking full responsibility in the field of engineering activities and their impact on the natural environment and compliance with the principles of professional ethics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Evaluates the technology readiness level<br>The ability to choose a chemical and technological concept                                                      | [SK2] presentation/project/paper/report<br>[SK4] test/exam - oral or written<br>[SK5] implementation of a problem task |
|                   | [BCHINŻ_W09] Describes the principles of creating and developing forms of individual entrepreneurship using knowledge of economics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Prepares the business plan for the small company                                                                                                            | [SW4] test/exam - oral or written<br>[SW2] presentation/project/paper/report                                           |
|                   | [BCHINŻ_U09] Using the acquired knowledge, skills and various sources of scientific information independently prepares written papers and oral presentations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Distinguishes the patentability of products/ technologies                                                                                                   | [SU2] presentation/project/paper/report<br>[SU4] test/exam - oral or written                                           |
| Subject contents  | <ul style="list-style-type: none"> <li>• Teamwork, team management, strategic decisions, risk management.</li> <li>• Designing an enterprise organization - a practical exercise.</li> <li>• Patents and licenses (methods of preparing patent claims, patent search, patent purity, preparation of applications in Poland and worldwide).</li> <li>• Global directions in production methods and technical solutions.</li> <li>• Characteristics of the selected method. Characteristics of raw materials, main product, side products and waste/sewage along with a discussion of their disposal/management</li> <li>• Schematic diagram of the selected technology</li> <li>• Material balance of the selected technological process.</li> <li>• Energy balance of the technological process</li> <li>• Analysis of the energy balance of a selected process unit</li> <li>• Technological Diagram. Construction materials. List of cameras and devices.</li> <li>• Corrosion issues and material selection. Process quality control. Measurement and automation. Sewage, waste and gases. Security issues. Summary of the chemistry part.</li> <li>• Operational plan practical exercise.</li> <li>• Marketing plan practical exercise.</li> <li>• Financial plan practical exercise.</li> <li>• Effectiveness of the project and justification of its advisability - practical exercise.</li> </ul> |                                                                                                                                                             |                                                                                                                        |

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|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Prerequisites and co-requisites                                | Prerequisites:<br><br>Basic knowledge of English, Basics of chemical technology.Basics of general chemistry, Start-up design |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                     | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Percentage of the final grade |
|                                                                | - completion of final work - project                                                                                         | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 100.0%                        |
| Recommended reading                                            | Basic literature                                                                                                             | 1.<br>S. Bretsznajder, Podstawy ogolne technologii Chemicznej, WNT Warszawa 1973.<br><br>2.<br>K.Schmidt-Szałowski, M.Szafran, E. Bobryk, J. Sentek, Technologia Chemiczna przemysl<br><br>nieorganiczny, PWN, Warszawa 2013.<br><br>3.<br>L. Synoradzki, J.Wasilewski, Projektowanie procesow technologicznych. Od laboratorium do<br><br>instalacji przemysłowej. OWPW, Warszawa 2006.<br><br>4.<br>L. Synoradzki, J.Wasilewski, Projektowanie procesow technologicznych bezpieczenstwo<br><br>procesow chemicznych. OWPW, Warszawa 2012.<br><br>5.<br>E.Pawłowski, K. Pawłowski, J. Trzcielinska, S. Trzcielinski, Projektowanie biznesu i ocena<br><br>przedsiawiez inwestycyjnych, Wydawnictwo Politechniki Poznanskiej<br><br>6.<br>Modele biznesowe budowy i rozwoju firm spin off na podbudowie szkoły wyzszej, praca<br><br>zbiorowa pod redakcja: Mieczysława Baka i Przemysława Kulawczuka, IBnDiPP, Warszawa 2010 |                               |
|                                                                | Supplementary literature                                                                                                     | brak                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |
|                                                                | eResources addresses                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
| Example issues/<br>example questions/<br>tasks being completed | nie dotyczy                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
| Work placement                                                 | Not applicable                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |

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