

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                            |                                                          |                                         |                                     |         |                                                                                                                      |     |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------|-----|
| Subject name and code                       | Chemical business design, PG_00080784                                                                                                                                                                                                                                                                                      |                                                          |                                         |                                     |         |                                                                                                                      |     |
| 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                            |                                     |         | 1.0                                                                                                                  |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                                                   |                                                          | Assessment form                         |                                     |         | exam                                                                                                                 |     |
| 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                                                                                                                                                                                                                                                                                                      | 15.0                                                     | 0.0                                     | 0.0                                 | 0.0     | 0.0                                                                                                                  | 15  |
|                                             | 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                                                                                                                                                                                                                                                                                                      | 15                                                       |                                         | 2.0                                 |         | 8.0                                                                                                                  | 25  |
| 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_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_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_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                                           |
|                                 | [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_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_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 |
| Subject contents                | <ul style="list-style-type: none"> <li>• Designing enterprise organization.</li> <li>• Designing innovative technologies.</li> <li>• Managerial roles and activities.</li> <li>• Elements of process design - mass balance.</li> <li>• Energy balance of the technological process.</li> <li>• Analysis of the energy balance of the process unit.</li> <li>• Corrosion issues and material selection. Process quality control. Measurements and automation. Sewage, waste and gases. Security issues.</li> <li>• Financial plan of the enterprise.</li> <li>• The effectiveness of a business venture and justification of its purposefulness</li> <li>• Enterprise operational plan</li> <li>• Selection of technological devices - technological diagram.</li> <li>• Enterprise marketing plan</li> </ul> |                                                                                                                                                             |                                                                                                                        |
| Prerequisites and co-requisites | Prerequisites:<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                                                                                          |
|                                 | oral exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 51.0%                                                                                                                                                       | 100.0%                                                                                                                 |

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|---------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recommended reading | Basic literature                                               | <ol style="list-style-type: none"> <li>1. S. Bretsznajder, Podstawy ogólne technologii Chemicznej, WNT Warszawa 1973.</li> <li>2. K.Schmidt-Szałowski, M.Szafran, E. Bobryk, J. Sentek, Technologia Chemiczna przemysł nieorganiczny, PWN, Warszawa 2013.</li> <li>3. L. Synoradzki, J.Wasilewski, Projektowanie procesów technologicznych. Od laboratorium do instalacji przemysłowej. OWPW, Warszawa 2006.</li> <li>4. L. Synoradzki, J.Wasilewski, Projektowanie procesów technologicznych bezpieczeństwo procesów chemicznych. OWPW, Warszawa 2012.</li> <li>5. E.Pawłowski, K. Pawłowski, J. Trzcielinska, S. Trzcielinski, Projektowanie biznesu i ocena przedsięwzięć inwestycyjnych, Wydawnictwo Politechniki Poznańskiej</li> <li>6. Modele biznesowe budowy i rozwoju firm spin off na podbudowie szkoły wyższej, praca zbiorowa pod redakcją: Mieczysława Baka i Przemysława Kulawczuka, IBnDiPP, Warszawa 2010</li> </ol> |
|                     | Supplementary literature                                       | brak                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                     | eResources addresses                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                     | Example issues/<br>example questions/<br>tasks being completed | 1. Discuss the forms of mass balance presentation2. Elements of the technological diagram.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Work placement      | Not applicable                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

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