



Subject card

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| Subject name and code | , PG_00070565 | | | | | | |
| Field of study | Civil Engineering | | | | | | |
| Date of commencement of studies | October 2022 | Academic year of realisation of subject | | | 2025/2026 | | |
| Education level | first-cycle studies | Subject group | | | 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 | 8 | ECTS credits | | | 2.0 | | |
| Learning profile | general academic profile | Assessment form | | | assessment | | |
| Conducting unit | Department of Building Structures and Material Engineering -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Karol Rejowski | | | | | |
| | Teachers | | | | | | |
| Lesson types | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 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 | | 0.0 | | 0.0 | 30 |
| Subject objectives | <p>The aim of the course is to familiarize students with the principles of shaping, designing, and constructing selected industrial and special structures. During the classes, students acquire fundamental knowledge concerning the structural systems, static behaviour, and loads acting on industrial chimneys, steel and reinforced concrete silos, and industrial floors.</p> <p>The course presents the specific characteristics of designing structures operating in industrial conditions, taking into account technological loads, environmental effects, and operational requirements. Students learn the basic principles of structural dimensioning, material solutions, as well as typical design and construction problems occurring in this type of structures.</p> <p>An additional objective of the course is to develop students ability to analyse structural solutions and to properly select structural schemes and material solutions for selected industrial and special structures.</p> | | | | | | |

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
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| | [K6_K04] Engages in independent lifelong learning and individually follows the development of science and technology in the field of civil engineering. | The student understands the need for continuous improvement of knowledge and skills in the design and construction of industrial structures, such as industrial chimneys, steel and reinforced concrete silos, and industrial floors. They are aware of the necessity to independently expand their knowledge, monitor changes in standards and regulations, and keep up with the development of technologies and materials used in industrial construction. | [SK5] Assessment of ability to solve problems that arise in practice |
| | [K6_K03] Can effectively, clearly and unambiguously convey information, describe activities and communicate their results/ outcomes to engineers or a wider audience using appropriate communication methods and tools. | The student is able to clearly and comprehensibly present structural solutions for selected industrial facilities, such as industrial chimneys, steel and reinforced concrete silos, and industrial floors. The student can describe the adopted design assumptions, the course of structural analysis, and interpret the obtained calculation results, communicating them in a clear manner to both construction specialists and non-specialist audiences. | [SK5] Assessment of ability to solve problems that arise in practice |
| | [K6_W03] Demonstrate knowledge and understanding of the processes, established standards and design methods in the civil engineering subject area and of their limitations. | The student has knowledge of the principles of designing selected industrial structures, such as industrial chimneys, steel and reinforced concrete silos, and industrial floors. They are familiar with basic standards, calculation methods, and design principles for these structures, and they understand the limitations of the applied computational models and design solutions in engineering practice. | [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects |
| | [K6_U05] Conducts research (obtaining information, simulations, experimental methods) in the field of construction in order to solve specific tasks and report research results. | The student is able to collect and analyze information regarding industrial structures, such as industrial chimneys, steel and reinforced concrete silos, and industrial floors, in order to solve specific engineering problems. They use available source materials, standards, and basic analytical and calculation methods to assess the performance of structures and are able to present and interpret the obtained results in the form of a technical report. | [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools |
| | [K6_K01] Is aware of the key aspects of professional, ethical and social responsibility related to management, business operation, decision making and opinion formulation in civil engineering. | The student is aware of the professional responsibility associated with the design and construction of industrial structures, such as industrial chimneys, steel and reinforced concrete silos, and industrial floors. They understand the importance of structural safety, the durability of facilities, and the impact of design and construction decisions on the safety of users, the environment, and the operation of industrial facilities. The student also recognizes the importance of adhering to professional ethics in engineering practice. | [SK5] Assessment of ability to solve problems that arise in practice |

| Subject contents | <p>Course content – lecture The course Industrial and Special Structures covers topics related to the design, construction, and operation of selected industrial facilities, such as industrial chimneys, steel and reinforced concrete silos, and industrial floors. During the lectures, students gain knowledge about the classification and functions of industrial structures, basic permanent, service, and technological loads, as well as environmental effects, including wind, temperature, and aggressive conditions. The course addresses types of steel and reinforced concrete chimneys, design principles, stability, reinforcement, foundations, and resistance to vibrations. In the area of silos, topics include the effects of bulk materials, dynamic and environmental loads, cylindrical and conical structures, selection of materials and reinforcement, as well as operational issues such as uneven emptying and blockages. The program also covers industrial floors, including material selection and thickness, analysis of service loads, expansion joints, distributed reinforcement, and technological and operational requirements. Additionally, the course addresses construction execution, prefabrication, assembly, quality control, technical acceptance, and the safety and durability of structures. Students become familiar with applicable national and international standards, calculation methods, and innovative material and technological solutions, developing the ability to analyze structural solutions and select appropriate structural schemes and materials for industrial facilities.</p> <p>Course content – laboratory Laboratory and design exercises in the course Industrial and Special Structures focus on the practical solution of design problems related to industrial chimneys, steel and reinforced concrete silos, and industrial floors. Students learn to collect and analyze design data, interpret technological and environmental loads, and apply basic standards and calculation methods. During the design exercises, example projects of selected industrial facilities are developed, including the selection of structural schemes, static analysis, and dimensioning of structural elements. Students also learn to consider practical issues such as uneven silo emptying, expansion joints and floor reinforcement, or chimney vibrations, and to prepare technical project documentation. The exercises aim to develop students ability to critically analyze structural solutions, make independent design decisions, and communicate results in the form of technical reports, working drawings, and presentations. Laboratory sessions also allow students to follow modern material and technological solutions, enhancing their ability to independently improve knowledge in the design and construction of industrial structures.</p> | | | | | | | | |
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| Prerequisites and co-requisites | | | | | | | | | |
| Assessment methods and criteria | <table border="1"> <thead> <tr> <th data-bbox="453 848 794 875">Subject passing criteria</th> <th data-bbox="799 848 1141 875">Passing threshold</th> <th data-bbox="1145 848 1490 875">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 882 794 907">Midterm test</td> <td data-bbox="799 882 1141 907">60.0%</td> <td data-bbox="1145 882 1490 907">100.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Midterm test | 60.0% | 100.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | |
| Midterm test | 60.0% | 100.0% | | | | | | | |
| Recommended reading | Basic literature | <p>Eurocodes for the design of building structures, in particular standards related to concrete structures, steel structures, and actions on structures. Standards and guidelines for the design of silos and structures for bulk materials. Standards and guidelines for the design of industrial chimneys. Standards and guidelines for the design and construction of industrial floors. Polish and international textbooks and technical publications concerning the design of industrial structures, silos, chimneys, and industrial floors. Technical materials and guidelines provided by manufacturers of structural systems and materials used in industrial construction.</p> | | | | | | | |
| | Supplementary literature | <p>Articles published in the scientific and technical journal Inżynieria i Budownictwo. Scientific articles published in international journals available in the Elsevier database, in particular in the journals Thin-Walled Structures and Engineering Failure Analysis. Selected scientific articles related to industrial structures, silos, industrial chimneys, and industrial floors. Conference materials, technical reports, and professional publications related to the design and operation of industrial structures.</p> | | | | | | | |
| | eResources addresses | | | | | | | | |
| Example issues/ example questions/ tasks being completed | <p>Classification and characteristics of industrial structures. Types of industrial chimneys and their basic structural elements. Actions acting on industrial chimneys (wind, temperature, operational loads). Principles of designing steel and reinforced concrete chimneys. Types of silos and their applications in industrial construction. Effects of bulk materials on silo walls. Basic principles of designing steel and reinforced concrete silos. Operational problems of silos (e.g., blockages, uneven discharge). Types of industrial floors and their functional requirements. Loads acting on industrial floors (forklifts, storage racks). Principles of designing industrial floors (slab thickness, expansion joints, reinforcement). Basic standards and guidelines used in the design of industrial structures.</p> | | | | | | | | |

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| Practical activities within the subject | Not applicable |
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