



## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                                |                                                          |                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                                                                                      |            |     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Acoustics project, PG_00061217                                                                                                                                                                                                                                                                                                 |                                                          |                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                                                                                      |            |     |
| Field of study                              | Architecture                                                                                                                                                                                                                                                                                                                   |                                                          |                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                                                                                      |            |     |
| Date of commencement of studies             | October 2024                                                                                                                                                                                                                                                                                                                   |                                                          | Academic year of realisation of subject                                                                                                                                                                                                                                                                                                                       |                                     | 2026/2027                                                                                                            |            |     |
| Education level                             | first-cycle 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                            | general academic profile                                                                                                                                                                                                                                                                                                       |                                                          | Assessment form                                                                                                                                                                                                                                                                                                                                               |                                     | assessment                                                                                                           |            |     |
| Conducting unit                             | Department of Technical Fundamentals of Architectural Design -> Faculty of Architecture -> Faculties of Gdańsk University of Technology                                                                                                                                                                                        |                                                          |                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                                                                                      |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                                             |                                                          | prof. dr hab. inż. Andrzej Kulowski                                                                                                                                                                                                                                                                                                                           |                                     |                                                                                                                      |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                                       |                                                          |                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                                                                                      |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                                                    | Lecture                                                  | Tutorial                                                                                                                                                                                                                                                                                                                                                      | Laboratory                          | Project                                                                                                              | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                                          | 10.0                                                     | 0.0                                                                                                                                                                                                                                                                                                                                                           | 15.0                                | 0.0                                                                                                                  | 0.0        | 25  |
|                                             | E-learning hours included: 0.0                                                                                                                                                                                                                                                                                                 |                                                          |                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                                                                                      |            |     |
|                                             | eNauczanie source address: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43143">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43143</a>                                                                                                                                                             |                                                          |                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                                                                                      |            |     |
| Learning activity and number of study hours | Learning activity                                                                                                                                                                                                                                                                                                              | Participation in didactic classes included in study plan |                                                                                                                                                                                                                                                                                                                                                               | Participation in consultation hours |                                                                                                                      | Self-study | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                                          | 25                                                       |                                                                                                                                                                                                                                                                                                                                                               | 1.0                                 |                                                                                                                      | 4.0        | 30  |
| Subject objectives                          | To acquaint the student with the mechanism of sound and vibration transmission in building structures and the propagation of noise in the environment. Acquainting the student with the principles of anti-sound and anti-vibration protection of the building and the environment, as well as shaping the acoustics of rooms. |                                                          |                                                                                                                                                                                                                                                                                                                                                               |                                     |                                                                                                                      |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                                                                                                                                 |                                                          | Subject outcome                                                                                                                                                                                                                                                                                                                                               |                                     | Method of verification                                                                                               |            |     |
|                                             | [K6_U03] is able to prepare a graphic, written and oral presentation of your own design concepts in the field of architecture and urban planning, meeting the requirements of a professional record appropriate for architectural and urban design                                                                             |                                                          | the object and learns the possibilities of influencing its acoustic properties.                                                                                                                                                                                                                                                                               |                                     | [SU3] Assessment of ability to use knowledge gained from the subject                                                 |            |     |
|                                             | [K6_W01] knows and understands construction problems, building and engineering issues related to building design; principles, solutions, constructions and building materials used in simple engineering tasks in the field of architectural and urban design                                                                  |                                                          | The student has knowledge of the ways and mechanism of sound and vibration transmission in building structures and the propagation of noise in the field. The student knows the mechanism of sound propagation in rooms. of zerowaste architecture; knows how to integrate information obtained from various sources, interpret it and critically analyze it; |                                     | [SW1] Assessment of factual knowledge                                                                                |            |     |

|                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Subject contents                                               | Course content – lecture<br>The physical foundations of sound and vibration transmission in building structures and the propagation of noise in the environment. Principles of sound and vibration protection for buildings and the environment, and the development of room acoustics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
|                                                                | Course content – laboratory <ul style="list-style-type: none"><li>• Types of acoustics halls</li><li>• Familiarization with the basic regulations for the design of auditoriums.</li><li>• Familiarization with the operation of the SABINE computer program</li><li>• Getting acquainted with the acoustic properties of building and finishing materials stored in the database</li><li>• Case study: study of an exemplary room, execution of exemplary calculations</li><li>• Selection of the room, development of the proportions and shape of the interior, the profile of the ceiling and walls, the layout of the auditorium, escape routes.</li><li>• Development of the layout of finishing materials. Calculation of acoustic parameters taking into account design recommendations.</li><li>• Preparation of a report on Acoustic guidelines for interior design.</li></ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
| Prerequisites and co-requisites                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Percentage of the final grade |
|                                                                | Report "Acoustic guidelines for the interior design of hall"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 40.0%                         |
|                                                                | Exercise "Examples of halls"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 40.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5.0%                          |
|                                                                | attendance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 30.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 15.0%                         |
|                                                                | Colloquium from the theoretical part of the lectures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 55.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 40.0%                         |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <ol style="list-style-type: none"><li>1. Kulowski A.: Akustyka sal - zalecenia projektowe dla architektów. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2011</li><li>2. Nurzyński J.: Akustyka w budownictwie. PWN, 2021</li><li>3. Suder-Dębska K, i in.: Wprowadzenie do akustyki użytkowej, Wyd.AGH, 2018</li><li>4. Sadowski J.: Akustyka architektoniczna. PWN, Warszawa 1976</li><li>5. Rusiński A.: Przestrzenie akustyki. Professional Acoustics, Wyd WAM 2021, 2023</li><li>6. Instrukcja ITB 369/2002: Właściwości dźwiękoizolacyjne przegród budowlanych i ich elementów. Wyd. Instytut Techniki Budowlanej, Warszawa 2002</li><li>7. Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie</li><li>8. Rozporządzenie Ministra Środowiska z dnia 1 października 2012 r. w sprawie dopuszczalnych poziomów hałasu w środowisku</li></ol>                                                                                                              |                               |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <ol style="list-style-type: none"><li>1. Kulowski A.: Ćwiczenia projektowe z akustyki pomieszczeń z wykorzystaniem programu komputerowego "Sabine" (instrukcja laboratoryjna), Gdańsk 2014</li><li>2. Ozimek E.: Dźwięk i jego percepcja, PWN, Warszawa 2018</li><li>3. Everest A.: Podręcznik akustyki. PWN, Katowice 2004</li><li>4. PN-B-02151-2:2018-01 Akustyka budowlana. Ochrona przed hałasem pomieszczeń w budynkach. Część 2: Wymagania dotyczące dopuszczalnego poziomu dźwięku w pomieszczeniach</li><li>5. PN-B-02151-3:2015-10 Akustyka budowlana - Ochrona przed hałasem w budynkach. Wymagania dotyczące izolacyjności akustycznej przegród w budynkach i elementów budowlanych</li><li>6. PN-B-02151-4:2015 Akustyka budowlana - Ochrona przed hałasem w budynkach. Wymagania dotyczące warunków pogłosowych i zrozumiałości mowy w pomieszczeniach oraz wytyczne prowadzenia badań</li><li>7. Ciesielski, J. Kawecki, E. Maciąg: Ocena wpływu wibracji na budowę i ludzi w budynkach. Instytut Techniki Budowlanej, Warszawa 1993</li></ol> |                               |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
| Example issues/<br>example questions/<br>tasks being completed | Finding examples of different acoustic halls.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
|                                                                | Selection of the room to be developed, determination of the shape and proportions of the room, selection and arrangement of finishing materials, preparation of the final study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |
| Practical activities within the subject                        | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                               |

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