COURSE DESCRIPTION CARD - SYLLABUS

Course name

Building Physics - Acoustics

Course

Field of study

ARCHITECTURE

Year/Semester

I/1

Area of study (specialization)

-

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish/english

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

0

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

30

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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31-131 Poznań

tel. 61 665 32 60

Responsible for the course/lecturer:

dr inż. arch. Anna Sygulska

Prerequisites

1 Knowledge:

- basic knowledge of physics at high school level

- basic knowledge of architectural and urban design

- basic knowledge of the history of architecture

2. Skills:

- the student is able to creatively use the available English-language literature

3. Social competences:

- the student is aware of the need to educate in fields related to architecture

- the student can creatively cooperate in a group

Course objective

The aim of the lecture is to familiarize students with the issues of architectural acoustics for rooms with increased acoustic requirements. Students learn about design issues for interiors with so called qualified acoustics, gain knowledge about designing in order to have such rooms as functional as possible.

Course-related learning outcomes

Knowledge

B.W4. mathematics, space geometry, statics, material strength, shaping, construction and dimensioning of structures, to the extent necessary to formulate and solve tasks in the field of architectural and urban design;

B.W9. principles of occupational health and safety.

Skills

B.U3. use properly selected computer simulations, analyzes and information technologies, supporting architectural and urban design;

B.U4. develop solutions for individual building systems and elements in terms of technology, construction and materials;

B.U5. make a preliminary economic analysis of planned engineering activities;

B.U6. properly apply standards and legal regulations in the field of architectural and urban design.

Social competences

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The basis for the credit is a final test, which ends a series of lectures on the subject of Building Physics - Acoustics. The test is in the form of a single-choice test, which checks the knowledge of basic acoustic parameters and understanding of design tasks in architectural acoustics.

Formative assessment: test grade

Assessment scale: 2,0; 3.0; 3.5; 4.0; 4.5; 5.0

Summative assessment: the grade obtained during the written test.

Assessment scale: 2,0; 3.0; 3.5; 4.0; 4.5; 5.0

Programme content

- Introduction to the architectural acoustics of rooms with increased acoustic requirements

- Rooms with so called qualified acoustics. Function, volume, and the required reverberation time. The shape of the room.

- Profile of the ceiling and walls. Audience layout. A method of determining the delay time of the first reflection. The choice of chairs depending on the interior function.

- Arrangement of sound reflecting materials. Influence of balconies on room acoustics.

- Architectural acoustics of concert halls, opera and drama theaters. Stage shaping issues.

- Shaping the orchestra pit, concert hall stage, concert hall organ. Multifunctional halls with adjustable acoustics.

- Rehearsal rooms. Technical rooms. Adaptation of the room to the sound system.

- Acoustic quality of the halls. Berank's method, Ando's method.

- Acoustic guidelines for the design of churches. Finishing materials, sound absorption by air, acoustic criteria for organ and choir location. The volume of the room and the size of the instrument, the location of the instrument - liturgical, acoustic and thermal influences, the location of church bells.

Teaching methods

1. Lecture with multimedia presentation.

2. Demonstration of acoustic research.

3. Presentation of acoustic materials.

4. eLearning Moodle (a system supporting the teaching process and distance learning).

Bibliography

Basic

1. Egan D., Architectural acoustics, J. Ross Publishing, 2007

2. Ermann, M., Architectural Acoustics Illustrated. Wiley 2015

3. PN-B-02151-4 - Building Acoustics - Protection against Noise in Buildings (Polish standard)

Additional

1. Beranek L. Concert Halls and Opera Houses: Music, Acoustics and Architecture. Springer 2004, Second Edition Newhouse Victoria. Site and Sound, Monacelli Press 2012

2. Sygulska A., “The adaptation of the stage in opera house for concert” 58th Open Seminar on Acoustics, 13-16 September 2011, Gdańsk – Jurata, Tom II, s. 297-308.

3. Sygulska A., Spatial modifications of the stage of the opera house for the needs of a concert, 3(39) Architectus 2014, s. 75-83, doi:10.5277/ARCHITECTUS

4. Sygulska A., Brawata K., „The study of the proscenium area in an opera house", Archives of Acoustics, Vol. 42, No. 3, pp. 515-526, 2017

5. Sygulska A., The study of the influence of the ceiling structure on acoustics in contemporary churches, Archives of Acoustics, Vol. 44, No. 1, pp. 169-184, 2019

6. Sygulska A., Contemporary two-storey churches – acoustic investigations, Journal of Architecture and Urbanism, Volume 39, Issue 2, 2015, Taylor&Francis, str.140-148,

7. Sygulska A., Arts of opera singing, acoustics and architecture in opera house development, 7th Forum Acusticum 2014, Krakow 7-12.09. 2014.

Breakdown of average student's workload

	Hours	ECTS
Total workload	15	1,0
Classes requiring direct contact with the teacher	15	1
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]		

[1] delete or add other activities as appropriate