COURSE DESCRIPTION CARD - SYLLABUS

Course name
Architectural Design - Acoustics [S1Arch1E>PAA]

Course

Field of study
Architecture

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

1,00

Coordinators

Lecturers

Prerequisites

1 Knowledge: • basic knowledge of physics at the high school level • basic knowledge of architectural and urban design • basic knowledge of the history of architecture 2. Skills: • the student can obtain information from literature, databases and other, properly selected sources, can integrate information, interpret it, as well as draw conclusions and formulate and justify opinions 3. Social competences • the student understands the need for lifelong learning, • the student understands the need to expand competences,

Course objective

• Acquiring the ability to design acoustic interiors with so called non-qualified acoustics in accordance with the requirements of the obligatory standard PN-B-02151-4 - Building Acoustics - Protection against Noise in Buildings (Polish standard) • Getting to know acoustic materials on the basis of material samples and catalogs of acoustic products. • Acquiring the ability to calculate the acoustic absorption for a selected room of so called non-qualified acoustics • Acquiring the ability to calculate the RT reverberation time using the Sabin formula and the Eyring formula

Course-related learning outcomes

Knowledge
Student knows and understands:
A.W1. architectural design for the implementation of simple tasks, in particular: simple facilities taking into

account the basic needs of users, single- and multi-family housing, service facilities in residential complexes, public facilities in an open landscape or in an urban environment;
A.W2. urban design in the scope of implementation of simple tasks, in particular: small building complexes, local spatial development plans, taking into account local conditions and connections, as well as forecasting transformation processes in the settlement structure of towns and villages;
A.W4. principles of universal design, including the idea of designing spaces and buildings accessible to all users, in particular for people with disabilities, in architecture, urban planning and spatial planning, and ergonomic principles, including ergonomic parameters necessary to ensure full functionality of the designed space and facilities for all users, especially for people with disabilities

Skills
Student can:
A.U1. design an architectural object by creating and transforming space so as to give it new value - in accordance with a given program that takes into account the requirements and needs of all users;
A.U4. make a critical analysis of the conditions, including the valorization of the land development and building conditions;
A.U5. think and act creatively, using the workshop skills necessary to maintain and expand the ability to implement artistic concepts in architectural and urban design;
A.U6. integrate information obtained from various sources, formulate their interpretation and critical analysis;
A.U7. communicate using various techniques and tools in a professional environment appropriate for architectural and urban design;
A.U8. prepare architectural and construction documentation in appropriate scales in relation to the conceptual architectural design;

Social competences
Student is capable of:
A.S1. independent thinking to solve simple design problems;
A.S2. taking responsibility for shaping the natural environment and cultural landscape, including the preservation of the heritage of the region, country and Europe.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

ACOUSTIC DESIGN:
Credit is based on the completion of a colloquium and the development of a board.
Formative assessment -
- Evaluation of engagement in design and calculation work
- Evaluation of effectiveness of design activities leading to an interior compliant with the requirements of PN-B-02151-4 "Building acoustics - Protection against noise in buildings".
- Class attendance
- Final design board - made individually by each student - assessment of the quality of the boards and design solutions
Summative assessment -.
Grade obtained for the project board, and attendance in class.
Project board, individually prepared by each student, developed according to the guidelines, format 50×70 cm. The board should include: - description - the description should briefly characterise the function of the room and the design problem, provide guidelines from PN-B-02151-4 "Building acoustics - Protection against noise in buildings" for the designed function and volume of the room, provide the value of the RT reverberation time before and after the application of acoustic corrections, together with the material solutions. A scale showing the room's scale, a cross-section and a projection showing the dimensions and the scale or graduation should be included. - Comparative graph of the reverberation time RT as a function of frequency for the cases considered. - table - the value of the sound absorption coefficient α for octave bands should be provided in table form for all finishing materials used.
Adopted rating scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0

Programme content

Calculation of RT reverberation time using a statistical method.
Design of so called non-qualified interior acoustics according to the requirements of the mandatory standard PN-B-02151-4 "Building acoustics - Protection against noise in buildings".

Course topics

- Introduction to the subject, discussion of current issues. StandardPN-B-02151-4 "Building acoustics - Protection against noise in buildings", calculation of acoustic absorption, introduction to acoustic absorption calculators.
- Acoustic materials and their properties. Familiarisation with material samples from the Acoustics Laboratory material library. Creating a catalogue of acoustic materials and selecting three acoustic materials for the ceiling, walls and floor, which will later be used in the project. Evaluating the best of the material solutions.
Learning reverberation time calculation methods, calculating the reverberation time according to Sabin's formula, reviewing reverberation time calculators available on the Internet, and practical exercises.
- Determining the dimensions of a teaching room or sports hall for acoustic design. Calculating the reverberation time of a selected room model.
- Adaptation of the room - calculating the RT for the proposed materials, evaluating the acoustic functionality of the used finishing materials and the correctness of the obtained results in relation to the standard requirements.
- Graphical elaboration of the chart, calculations and results.

Teaching methods

1. Design
2. Case study
3. eLearning Moodle
4. Working in groups
5. Discussion
6. Computer programs

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50