Subject description

Faculty of Architecture, WUT 2020, **Architecture** studies

Architecture for Society of Knowledge speciality

INFORMATION PROCESSES IN ARCHITECTURAL HERITAGE		ASK2-KW-Cd	MSc level	semester 2
Classes: **lecture** **project**	Hours per semester **15** **60**	Student's own workload hours: **63**	Status: **compulsory** Level: **Advanced Specialty design**	ECTS: **6** Exam: **no**

Unit delivering this subject: Katedra Projektowania Architektonicznego, Pracownia Projektowania Architektonicznego Wspomaganego Komputerem

Subject coordinator: dr hab. inż. arch. Krzysztof Koszewski

Learning outcomes and teaching methods

Objective of the course:

To familiarize students with the use of modern modelling and knowledge management methods in the protection of architectural heritage and conservation, modernization and supplementation of historic structures, taking into account the protection of their historic values and adaptation to new functions. Preparation of a graduate of the Faculty of Architecture to work in an environment of digital information flow and cooperation with specialists in the context of Digital Humanities.

General description of the course:

The role of new information management techniques in protecting and transforming historical objects, complexes and cities is growing. New tools used every day in the architect's workshop find application in this area. This work also requires a specific interdisciplinary dialogue between architects, historians, art historians, conservators and IT specialists. A special role in the designing process is played by the study phase, consisting in collecting and properly ordering information about the historical values of the object / objects, with particular emphasis on the detailed valorisation carried out for the needs of a specific design task.

The course is conducted in the form of lectures and project exercises. Design classes conducted in the workshop mode ensure the constant participation of the entire training group in the reviews of work progress, discussions and critical assessments of subsequent project task sequences performed by students. The main part of the task is to create a model of the object, which is a carrier of information about its valorisation and a design tool. During these activities, basic reconstructions are made, which are confronted with the proposed additions and adaptations, as small as possible. The simulation potential of the digital model is explored in the context of assessing the value of the concept of additions / adaptations and the need to preserve / highlight the cultural values of the object.

Learning outcomes

No. of the outcome/ area	Description
Knowledge	
W_01	Knows and understands advanced methods of analysis, digital tools, techniques and materials necessary to prepare design concepts in the field of conservation design, with particular emphasis on cooperation with specialists in the field of history and history of art;
W_02	Knows and understands the basic methods and techniques of conservation, modernization and supplementation of historic structures;
W_03	Knows and understands the interdisciplinary nature of architectural and urban

	design, and the need to integrate knowledge from other fields, as well as its application in the design process in cooperation with specialists from these fields, with particular emphasis on cooperation with specialists in the field of history and history art
W_04	Knows and understands modern methods of gathering information and managing knowledge about architectural heritage, with particular emphasis on issues of Digital Humanities;
Skills	
U_01	Is able to make a critical analysis of the existing state and collect and interpret information about the object of cultural value;
U_02	Is able to develop a design concept for transformations of an architectural and urban structure with cultural values, including protection of these values using a digital object model as a tool for gathering knowledge and creating concepts;
U_03	Is able to make a critical analysis and assessment of the project and its implementation in the field of complementing architectural structures with cultural values in a digital design environment;
U_04	Can use digital tools to integrate advanced knowledge in various fields of science, including history, history of architecture, history of art, archeology, protection of cultural goods while solving complex engineering tasks; can use the possibilities offered by the digital modeling environment
U_05	can see the importance of non-technical aspects and effects of the architect's design activities
Social competence	
KS_01	He is ready to take responsibility for shaping the natural environment and cultural landscape, including preserving the heritage of the region, the country and Europe.
KS_02	Is ready to accept constructive criticism and take it into account in design activities, is aware of the importance and impact of the tools used, including the digital modeling environment, on the project evaluation process

Learning contents:

lecture / 15 hours covers the following topics:

Concepts and definitions: monument and heritage, contemporary cultural goods; categories of conservation and handling of monuments; evolution of conservation theory in Europe and Poland; social and economic conditions of protection, changes in the monument paradigm and the latest trends in dealing with monuments,

Sources of knowledge about monuments; historical and architectural-conservation research, with particular emphasis on the use of digital techniques in knowledge recording and the possibility of obtaining information from digital sources;

The importance of digital modeling techniques and information recording in archeology, issues of Virtual Archaeology;

The role and possibilities of digital tools in structural valuation of architectural heritage, the role of the virtual model as an information carrier and tools for formulating conclusions regarding the admissible interference limits and the scope of modernization and adaptation transformations,

Virtual reconstructions in architectural heritage as research, design and dissemination tools. Problems of visual communication as a way of coding information about heritage. Good practices in restorative activities (London Charter)

Advanced management of heritage information: standards, ontologies, information interchangeability.

Recording information about historic values and possibilities of conservation valorization in BIM systems. The issues of Historic-BIM (H-BIM) as a tool for inter-branch cooperation and a way of recording information about monuments.

Problems of using digital technologies in interdisciplinary cooperation, with particular emphasis on humanities disciplines - Digital Humanities.

design studio / 60 hours

The subject of the design exercises are small additions / adaptations of the historic building, including its modernization and adaptation to modern technical standards and utility needs while maintaining historic values. The basis for the removable actions - reconstruction of possible phases and evaluation of the proposed design solutions is a properly configured digital environment of activities, the central element of which is the digital model of the object constituting a set of information about its spatial

values, enriched by information about historical, cultural and artistic values, constituting about its historic character. Exercises are carried out in subsequent problem sequences including:

Historical research (including querying sources and creating a basic knowledge base about the object); analysis of the existing state: degree of authenticity and integrity, cultural values, technical condition of the building;

Collecting spatial data and building a digital model of the object as an environment for design activities, saturating the model with information, including conservation valorization, building possible reconstructions, if needed in the design process

Formulating the idea of the concept of minor interference / supplementation and initial assumptions for the project integrating the protection of cultural values with architectural features and functional needs corresponding to contemporary requirements; acceptable limits and forms of transformations together with their visualization using a built model;

Visualization and evaluation of the proposed solutions prepared in groups, discussion on the selection of the optimal transformation method;

Development of the selected target transformation method, construction of the ultimate digital model being a tool for project evaluation, including assessment of the scope of protection of historic values.

Teaching methods and forms:
extended own studies on lecture issues as the theoretical basis for design exercises;
query available information;
making a digital model of the object using available technologies (laser scanning, SfM, mixed techniques Flexijet)
design corrections in the digital environment
presentations of the results of subsequent problem sequences and their evaluation using the built-in digital environment;
discussion of the results of the work of the whole group in the form of a model of the selected concept;

Method of testing the learning outcomes

Outcome number	Way of testing
knowledge	
W_01 - W_04	Written test of lecture knowledge
skills	
U_01	Studio presentation
U_02, U_03	presentation and project evaluation
U_04	evaluation of design concepts, group project evaluation
U_05	Studio presentation
social competence	
KS_01, 02	assessment of activity during project classes

Literature
– Fitch James Marston, Historic preservation. Curatorial Management of the Built World, The University Press of Virginia, 1998.
– Modern questions of conservatory theory in Poland, collective work edited by B. Szmygin, Warsaw-Lublin 2009.
– Bentkowska-Kafel, Anna, and Lindsay W. MacDonald. Digital Techniques for Documenting and Preserving Cultural Heritage. Kalamazoo: Arc Humanities Press, 2017.
– MacDonald, Lindsay W. Digital Heritage: Applying Digital Imaging to Cultural Heritage. 2006.
– Bentkowska-Kafel, Anna, Hugh Denard, and Drew Baker. Paradata and Transparency in Virtual Heritage. 2016.
– Kuroczyński, Piotr, Mieke Pfarr-Harfst, and Sander Münster. Der Modelle Tugend 2.0 Digitale 3D-Rekonstruktion Als Virtueller Raum Der Architekturhistorischen Forschung. 2019.

– ICOMOS, "International Charters for the Conservation and Restoration of Monuments and Sites - Summary," no. 0, p. 53, 2004.
– M. Saldan, "An Integrated Approach to the Procedural Modeling of Ancient Cities and Buildings," vol. 30, no. June, 2015.
– J. Słyk and S. Wrona, Eds., Informacyjne środowisko rekonstrukcji - przedlokacyjna struktura osadnicza w Pułtusku w XIII-XIV wieku. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej, 2015.
– S. Haegler, P. Müller, and L. Van Gool, "Procedural Modeling for Digital Cultural Heritage," EURASIP J. Image Video Process., vol. 2009, no. January 2009, pp. 1–11, 2009.
– A. Ippolito, "Handbook of Research on Emerging Technologies for Architectural and Archaeological Heritage," IGI Glob., vol. i, p. 5225, 2017.
– S. Dritsas and K. Shua Yeo, "Undrawable Architecture: Heritage Buildings and Digital Tectonic," Archit. Des. - Comput., vol. 83, no. 2, pp. 114–117, 2011.
– Nick Crofts, S. Stead, M. Stiff, and Martin Doerr, "Definition of the CIDOC Conceptual Reference Model Version 4.2," no. June, 2005.