Wrocław University of Science and Technology
Doctoral School

COURSE CARD

1. Basic information

Course name in English:	**Scan to BIM**	
Course name in Polish:	**Zaawansowane metody inwentaryzacji w BIM**	
Number of hours:	30	
Type of course:	Elective course	
Form of course:	laboratory	
Code of course:		
Course leader:	Arch. Anna Kubicka-Sowińska, PhD	
Faculty of the course leader:	W1 Faculty of Architecture	
Email address of the course leader:	anna. Kubicka-sowinska@pwr.edu.pl	
Scientific discipline(s) assigned to the course (doctoral students representing the marked disciplines can participate in the course):	Architecture and urban planning	☒
	Automation, electronic, electrical engineering and space technologies	☐
	Information and communication technology	☐
	Biomedical engineering	☐
	Chemical engineering	☐
	Civil engineering, geodesy and transport	☒
	Materials engineering	☐
	Mechanical engineering	☐
	Environmental engineering, mining, and energy	☐
	Mathematics	☐
	Chemical sciences	☐
	Physical sciences	☐
	Management and quality studies	☐

2. Objectives

The primary objective of this course is to equip participants with specialized, hands-on skills in using Leica CloudWorx and Leica Cyclone software for effective processing and management of 3D point clouds within the context of Building Information Modelling (BIM). Through structured training and practical exercises, participants will gain a deep understanding of how to seamlessly integrate point cloud data into BIM workflows to support accurate, data-rich modelling and decision-making in architecture, engineering, geodesy and transport.

A key focus of the course is the development of competencies in Scan to BIM processes. Learners will acquire the ability to transform raw laser scan data into detailed, parametric 3D models, laying the foundation for renovation, facility management, and other critical BIM applications. Emphasis will be placed on interpreting point cloud data, applying modelling best practices, and using software tools to create geometry that is both accurate and BIM-compliant.

3. Content

Detailed information about the course content, including topics and form of classes.

No.	Topic	Number of hours	Form of classes
1	Introduction: From 3D point cloud to BIM Methods and principles of acquiring images for photogrammetry	2	lecture
2	Discussion of individual and group work topics. Practical exercises in close-range digital photogrammetry – data acquisition. Development of 3D models based on close-range digital photogrammetry (Agisoft Metashape) and their use in 3D visualization	2	laboratory
3	Continuation: Development of 3D models based on close-range digital photogrammetry (Agisoft Metashape) and preparation of a 3D point cloud.	2	laboratory
4	Continuation: Development of 3D models based on close-range digital photogrammetry (Agisoft Metashape) and preparation of a 3D point cloud.	2	laboratory
5	Preparation of a 3D point cloud and working with the cloud using Leica CloudWorx plugins.	2	laboratory
6	3D modelling of architectural heritage or existing civil engineering object based on a 3D Point Cloud. Individual Work and Consultations.	2	laboratory
7	Practical survey using 3D Laser Scanning – acquiring data for 3D modeling. Discussion of the second topic for individual and group work.	2	laboratory
8	Methods of registering and orienting 3D point clouds in the Leica Cyclone environment. Individual work.	2	laboratory
9	Registering, orienting and possibilities of exporting of 3D point clouds in the Leica Cyclone environment. Individual work.	2	laboratory
10	Creation and editing of parametric heritage architecture elements or civil engineering object using BIM technology based on a 3D point cloud. Individual work and consultations.	2	laboratory
11	Creation and editing of parametric heritage architecture elements or civil engineering object using BIM technology based on a 3D point cloud. Individual work and consultations	2	laboratory
12	Creation and editing of parametric heritage architecture elements or civil engineering object using BIM technology based on a 3D point cloud. Individual work and consultations.	2	laboratory
13	Creation and editing of parametric heritage architecture elements or civil engineering object using BIM technology based on a 3D point cloud. Individual work and consultations.	2	laboratory

14	Creation and editing of parametric heritage architecture elements or civil engineering object using BIM technology based on a 3D point cloud. Individual work and consultations.	2	laboratory
15	Individual work –consultations. Summary: the possibilities of using a 3D point cloud – Scan to BIM	2	laboratory

4. Prerequisites

List of prerequisites relating to knowledge, skills and other competences for course participants.

No prerequisites.

5. Learning outcomes

List of learning outcomes at level 8 of the Polish Qualifications Framework assigned to the course (mark the learning outcomes in the last column).

Symbol	Learning outcome	
	KNOWLEDGE. Doctoral student knows and understands:	
SzD_W3	the main trends in the development of the scientific or artistic disciplines covered in the curricula;	☒
SzD_W4	research methodology;	☒
SzD_W5	the rules for the dissemination of scientific results, including in open access mode;	☐
SzD_W6	the fundamental dilemmas of modern civilization;	☐
SzD_W7	the legal and ethical conditions of scientific activity;	☐
SzD_W8	the economic and other relevant conditions of scientific activity;	☐
SzD_W9	basic principles of knowledge transfer to the economic and social spheres and commercialisation of results of scientific activity and know-how related to these results.	☒
	SKILLS. Doctoral student is able to:	
SzD_U2	use knowledge from different fields of science or art to creatively identify, formulate and innovatively solve complex problems or perform research tasks, in particular: - define the purpose and subject of scientific research, formulate a research hypothesis, - develop research methods, techniques and tools, and use them creatively, - draw conclusions on the basis of scientific research; critically analyse and evaluate the results of scientific research, expertise and other creative work and their contribution to knowledge development; transfer the results of scientific activities to the economic and social spheres;	☒
SzD_U3	communicate on specialised topics to the extent that they enable an active participation in the international scientific community;	☒
SzD_U4	disseminate research results, including in popular forms;	☒
SzD_U5	initiate debates and participate in a scientific discourse;	☐

SzD_U6	be able to speak a foreign language at B2 level of the Common European Framework of Reference for Languages to a level that enables them to participate in the international scientific and professional environment;	☒
SzD_U7	plan and implement an individual or collective research or creative activity, including in an international environment;	☐
SzD_U8	independently plan and act for one's own development and inspire and organize the development of others;	☐
SzD_U9	plan classes or groups of classes and implement them using modern methods and tools.	☐
	SOCIAL COMPETENCES. Doctoral student is ready to:	
SzD_K3	fulfilling the social obligations of researchers and creators, initiate public interest activities, thinking and acting in an entrepreneurial way;	☒
SzD_K4	maintaining and developing the ethos of research and creative environments, including: - carrying out scientific activities in an independent manner, - respecting the principle of public ownership of research results, taking into account the principles of intellectual property protection.	☒

6. Evaluation

Short description of the method(s) used to evaluate the learning outcomes assigned to the course, e.g., exam, test, report, presentation, etc.

Final project Scan to BIM - assessment of the accuracy of inventory documentation using close-range digital photogrammetry and the accuracy of a BIM model of an architectural heritage or civil engineering object chosen by course participant

7. Teaching methods

Short description of the teaching methods used during the course, e.g., multimedia presentation, discussion, literature studies, developing written documents, own work, etc.

Multimedia presentations, survey and reference research, analysis and discussion, group consultations, individual consultations, 3D modelling, competitive exercise.

8. Literature

List of primary and secondary literature used to prepare the course and including additional knowledge for participants, e.g., books, textbooks, research papers, standards, web pages, etc.

BASIC LITERATURE:

[1] Dobelis M., Zemitis J., 3D scanning data use for modular building renovation based on BIM model, ,,MATEC Web of Conferences", No 251 (3), 2018, s. 1-11.

[2] Kościuk J., Modern 3D scanning in modelling, documentation and conservation of architectural heritage. W: Structural analysis of historical constructions : proceedings of the International Conference on Structural Analysis of Historical Constructions, SAHC 2012, 15-17 October 2012, Jasieńko J. (red.), vol. 1, Wrocław,2012, s. 64-76.

[3] Barber, D.M., Dallas, R.W., Mills, J.P., Laser scanning for architectural conservation, ,,Journal of. Architectural. Conservation", 12, 2006, s. 35–52.

[4] Remondino, F., Campana, S., 3D Recording and modelling in archaeology and cultural heritage theory and best practices, BAR International Series 2598 ,2014.

[5] Wang Q., Guo J., Kim M., An Application Oriented Scan-to-BIM Framework, ,,Remote Sensing", No 11, 2019, s. 1-27.
https://www.mdpi.com/2072-4292/11/3/365

ADDITIONAL LITERATURE:

[6] ArchiCAD 21. Kurs video. Poziom drugi. Nowe funkcje programu, autor :Rafał Ślęk
[7] Video: Use Point Cloud Data in Revit:
https://knowledge.autodesk.com/support/revitproducts/learn-explore/caas/CloudHelp/cloudhelp/2020/ENU/Revit-Model/files/GUID-875AD6F7-B9CC-4963-8526-D73C1B6A309E-htm.html

9. Other remarks

Additional remarks, comments, (e.g., language of the course)

The course will be basically run in class, with two classes outside during surveying.
The basic language will be English. Software will be provided.