



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

BIM Technology

### Course

Field of study

Civil Engineering

Area of study (specialization)

Construction Engineering and Management

Level of study

II level

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic  
education

Course offered in

English

Requirements

obligatory

### Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

0

Projects/seminars

0

**Number of credit points 4**

### Lecturers

Responsible for the course/lecturer:

dr hab. inż Adam Glema, prof. nadzw.

email: adam.glema@put.poznan.pl

tel. +48 61 665 2104

Wydział Inżynierii Lądowej i Transportu

ul. Piotrowo 5 60-965 Poznań

Responsible for the course/lecturer:

### Prerequisites - Student

- knows principles of design, construction and operation of construction structures,
- can formulate and analyze elements of constructional investment



- is aware of the necessity to advance professional and personal competences uses tools and solves problems on design and construction in civil engineering

### Course objective

Introduction to technology of digitalization of data flow in construction industry and its application in multidisciplinary collaboration within construction investment project. Foundation of openBIM formation with ISO/CEN/PKN standards.

### Course-related learning outcomes

Knowledge - Student has knowledge of:

- advances in effectiveness, costs and time of construction projects realization
- data flow for management in the full life cycle of buildings
- standards for building information modeling
- Skills
  - makes use of dedicated tools to find useful information communication and offer computer aided design and management
- can define a computer model and carry out analysis of buildings
- can select analytical or use numerical tools to get and exchange building data

Social competences

- complements knowledge of modern technologies in civil engineering
- recognizes individual and team work of a problem and team management, improves professional and personal competence;

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Results of exercises for creation of building information model, application of viewers for model and its data information operations. elaboration of model in open standard IFC, elaboration of documents and communication methods.

### Programme content

Introduction to Building Information Technology, history, definition. For whom BIM ? Owner, Owner Representative, Operator and Facility Manager, Facility End-User, Designer, Construction Contractor, Subcontractors, Specialist suppliers, Manufactures of construction materials and products. BIM in life-cycle stages of building. Data flow. Interoperability. openBIM. BuildingSmart. Open data model requirements. BIM implementation in the world. BIM levels 0-3. LOD Level of Detail. Level of Development. BIM standards. Industry Foundation Classes. Legal regulations in Poland. ISO, EN, PN. BIM case study for good practices. Formulation of BIM requirements. BIM Execution Plan. Roles and specializations in BIM.. BIM Manager and his



responsibilities. Skills and experience in BIM. Competence criteria. Roles and specializations in BIM. Professional qualifications certification. BIM software. BIM model viewers. BIM software certification by BuildingSmart organization. Examples of certificates and performance tests for import and export of IFC data. Visualization, laser scanning. BIM efficiency factors . Change of costs distribution for BIM workflow. BIM implementation in design company.

- Exercise 1. BIMvision- present architectural model
- Exercise 2. Trimble Connect - present structural model
- Exercise 3. Solibri Viewer - present building model
- Exercise 4. Native and .ifc 3D model - present your START
- Exercise 5. SIP - Poznan Geoportal Information System
- Exercise 6 BIM OBJECTS - information&data in 3D model
- Exercise 7 MORE BIM MODELS -merge and split
- Exercise 8. PRODUCT - products warehouse
- Exercise 9. CLASHES
- Exercise 10. BCF
- Exercise 11. BEP BXP
- Exercise 12. SCHEDULE
- Exercise 13. ESTIMATE
- Exercise 14. ARCH&STRUC
- Exercise 15. Describe your 3D model - how did you improved
- Exercise 16. Native and .ifc 3D model - how did you improved

### Teaching methods

Lecture with multimedia presentation, laboratory exercise by the use of educational or free software in demo versions. Individual assignments with the e-Learning LDS systems to upload, consult and grade organization.

### Bibliography

Basic

- C. Eastman, P. Teicholz, R. Sacks, K. Liston, BIM Handbook. A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors, Wiley, New Jersey, (2011).
- Richard Garber (Editor) Closing the Gap: Information Models in Contemporary Design Practice Architectural Design, Wiley, (2009).
- Richard Garber, BIM Design: Realising the Creative Potential of Building Information Modelling Wiley, (2014).
- Karen Kensek, Building Information Modeling Series: Pocket Architecture, Routledge, (2014).
- Karen Kensek, Douglas Noble, Building Information Modeling: BIM in Current and Future Practice, Wiley, (2014).
- Brad Hardin, Dave McCool, BIM and Construction Management: Proven Tools, Methods, and Workflows, 2nd Edition, Wiley, (2015 ).



- Andre Borrmann, Markus König, Christian Koch, Jakob Beetz, Building Information Modeling. Technologische Grundlagen und industrielle Praxis, VDI, Springer, Wiesbaden, (2015).

Additional

- Stefan Mordue, Paul Swaddle, David Philp, Building Information Modeling For Dummies, Wiley, (2015).
- Government Construction Strategy, Cabinet Office, London, (2011).
- Digital Built Britain, Level 3 Building Information Modeling - Strategic Plan, UK Government. (2015). [https://doi.org/URN BIS/15/155](https://doi.org/URN%20BIS/15/155).
- Centre for Digital Built Britain at University of Cambridge, (2019). <https://www.cdbb.cam.ac.uk/>
- NIBS, National BIM Guide for Owners, NIBS. (2017).
- EUBIM Task Group, Handbook for the introduction of Building Information Modelling by the European Public Sector, EUBIM Task Group. (2016).
- AIA, Integrated Project Delivery: A Guide, American Institute of Architects. (2007). <https://doi.org/10.1016/j.autcon.2010.09.002>. <https://www.aiacontracts.org/resources/64146-integrated-project-delivery-a-guide>
- ISO 16739:2013. Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries, (2013).
- IFC4 Document, (2016). <http://www.buildingsmart-tech.org/ifc/IFC4/Add2/html/>
- ISO 29481-1:2016 Building information models -- Information delivery manual Part 1: Methodology and format, (2016).
- BuildingSMART, (2019). <https://www.buildingsmart.org/> .

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	<b>110</b>	<b>4,0</b>
Classes requiring direct contact with the teacher	<b>45</b>	<b>2,0</b>
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)	<b>65</b>	<b>2,0</b>