Tárgytematika / Course Description

BIM in Structural Engineering

EKNB_SETA029

Tárgyfelelős neve / Teacher's name: dr. Szép János

Félév / Semester: 2022/23/1

Beszámolási forma / Assesment: Vizsga

Tárgy heti óraszáma / Teaching hours(week): 3/0/0

Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The goal of the course is to aquire the basics of Building Information Modeling, in particular of its application in structural design. The studens are working on their own projects, which involve the 3D modeling of the building including the main architectural and structural elements, the determination of the model's information content, the structural analysis of the selected elements and the model-based documentation of the building. Students aquire knowledge in the application of the BIM method through case studies and completion of personal tasks.

TANTÁRGY TARTALMA / DESCRIPTION

Week	Date	Topic
1.	06. 09. 2022.	Introduction into BIM, building selection, modeling rules
2.	13. 09. 2022.	Modeling in Allplan (practice), consultation
3.	20. 09. 2022.	-
4.	27. 09. 2022.	**1. presentation** **(LOD 200 model, architecture + structure)**
5.	04. 10. 2022.	Data exchange between programmes
6.	11. 10. 2022.	Documentation, consultation
7.	18. 10. 2022.	BIM applications, case studies

8.	25. 10. 2022.	Detailed structural design (reinforcement, documentation)
9.	01. 11. 2022.	-
10.	08. 11. 2022.	**2. presentation** **Structural analysis**
11.	15. 11. 2022.	Discussion of BIM tasks according to the project
12.	22. 11. 2022.	3D coordination, collision detection, cost estimation, quantity takeoff - techniques
13.	29. 11. 2022.	Consultation
14.	06. 12. 2022.	**3. presentation** **(LOD 300 model and entire documentation of the project)**

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

Requirements of the course

Three internal presentations of the projects will be organized (according to the schedule) to ensure the continuous work during the semester. The participation is compulsory; its substitution can be made in the following week in case of absence or not accepted previous submission. The accepted submissions are the necessary conditions of the signature. Based on the results of the three submissions a mark will be offered at the end of the semester.

The submission of the files should be uploaded to the SzeLearning until the deadlines included in the schedule.

Requirements of the internal submissions

1. presentation - 20 points

Architectural and structural model of the building (LOD 200) – *Software: Nemetschek Allplan*

Students have to present the 3D model and the (model-based) documentation of the building according to the followings:

1) The model should be uploaded in native format (.inf and .zip files), where the modeling requirements are the followings:

- appropriate building structure
- architectural elements (at least LOD200)
- structural elements (at least LOD300)
- information content of the model elements has to be defined (at least the trade, structural function and material property)

1) The following plans should be uploaded automatically generated from the 3D model:

- every different floor plan - M=1:100
- at least two sections - M=1:100
- every facade - M=1:200
- 3D view of the structural model

1) The structural model should be exported in IFC format and submitted

It should be noted, that the use of 2D elements (lines, fills, etc.) for hiding the mistakes of the model-based plans is not allowed during the entire semester!

2. presentation - 30 points

Structual analysis of the building and its documentation – *Software: AxisVM*

Students have to present the structural model of the building, the documentation of the analysis and its results according to the followings:

1) The structural model should be uploaded in native format (.axs)

2) The documentation of the structural analysis should be uploaded in .pdf format, which includes the followings:

    - Geometry, material properties and applied cross sections/profiles
    - Determination of the loads and load groups

- Results of the analysis – enhancing the relevant values
- Checking the cross sections and dimensions – documentation of the required modifications
- Selection of the structural elements for detailed analysis

presentation - 50 points

BIM model and documentation of the entire project

Students have to present the entire model and the structural model of the building, the model-based documentation of the building and the entire documentation of each part of the project according to the followings:

1) The model should be uploaded in native format (.zip and .inf) and in .ifc format, considering the followings:
   - the entire model (incl. the architectural and structural elements) reaches the LOD300
   - the model was updated based on the results of the structural analysis
2) The following plans should be uploaded automatically generated from the 3D model:

- every different floor plan - M=1:100
- at least two sections - M=1:100
- every façade - M=1:200

1) The adequate structural model should be uploaded in native format (.axs)
2) The documentation of the structural analysis should be uploaded in .pdf format, which includes the followings:
   - Geometry, material properties and applied cross sections/profiles
   - Determination of the loads and load groups
   - Results of the analysis – enhancing the relevant values

- Checking the cross sections and dimensions – documentation of the performed modifications
- structural plans of the selected elements (M=1:50, 1:25, 1:10)

3) The personal BIM-tasks should be uploaded according to the previous discussion, for example:

- quantity takeoff
- collision detection

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

The subject mark is determined on the basis of the sum of the points obtained for the mid-term presentations and the points obtained in the exam, as follows:

0-51 points: insufficient (1)

52-65 points: sufficient (2)

66-80 points: medium (3)

81-90 points: good (4)

91-100 points: excellent (5)