

Building Information Modeling

Course objectives

The learner will be able to:

- Learn the concept of Building Information Modeling.
- Create Structural Model for buildings from conceptual stage to design stage as per the industrial workflow.
- Understand Quantity take off Schedule extraction.
- Extract 2D Drawing sheets from the model.

Course Content

Module 1: Introduction to BIM and Design Authoring

Evolution of Engineering from 2D drawings to BIM Model, Building Information Modeling – Introduction & Process, Design Authoring – Concepts and workflow

Revit Software - User Interface, Creation and Modifying of Grids and Levels,

Creating Structural columns, Creating foundations – Isolated foundations, Wall foundations, Stepped foundations. Creation of walls – Exterior and core building walls, wall openings, Creation of Beams, Creation of Floors and Roofs – by sketching, shape editing and create openings.

Module 2: Revit Families

Placing of Windows and Doors – modifying doors and window properties, modeling curtain wall with door

Creating and modifying Stairs - by component, sketching the run, sketching boundaries and spiral runs. Creating Spiral stairs, Creating Ramps, modeling of Stairs and Ramps finishes, Creating and placing railings

Load Revit family, Revit annotations, Element Tagging

Module 3: Interoperability

Stages of BIM Modeling process as per ISO 19650, Importing and managing Image file, Linking - CAD files, Revit files, IFC files, PDF files, managing links, Importing – CAD files, Image, PDF files

Exporting to CAD, views to image files, Checking for Interferences

Module 4: Drawing Extraction

2D drawings generation from BIM Model, Documentation and CDE (Common Data Environment), Drawing extraction including generation of Plan – Elevation – Section views. Sheet creation, Creating Custom title blocks, Managing Sheet issues and revisions, creating revision clouds and adding revision schedules.

Module 5: Reports & Export.

Creating Schedule and specifying fields, Modifying Schedule, placing schedule on sheet, Material Takeoff schedules, Importing and exporting Schedule views, Exporting Room and area reports.

Course Outcomes

On completion of the course, the students will be able to

- **Comprehend** the concept of BIM in lifecycle of a project
- **Create** Structural Model for buildings from conceptual stage to design stage as per the industrial workflow.
- **Extract** the Quantity Takeoff Schedule Sheets
- **Create** 2D drawings from the models.

For further reading

1. Level of development (LOD) specification for building information models part I, guide, & commentary December 2021
2. ISO 19650 – Part 1 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — “Information management using building information modelling — Concepts and principles”

3. ISO 19650 – Part 2 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — “Information management using building information modelling — Delivery phase of the assets”
4. ISO 19650 – Part 4 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — “Information management using building information modelling — Information exchange”

Online references

1. LMS content of L&T EduTech

Software requirements

1. Autodesk Revit

Hardware requirements

1. PC – Minimum requirements
 - a. 16 – GB RAM
 - b. 2GB - Dedicated GPU
 - c. 500 GB HDD

Industry Scope

As a part of design authoring, creation of architectural design BIM model is one of the most important steps in the project BIM life cycle. Structural model is created in all the Architectural Engineering Construction (AEC) projects such as buildings, factories, commercial buildings, infrastructure projects etc.

Projects – 20 Numbers

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1	Creation of Structural BIM model for 2 BHK Residential Building
2	Creation of Structural BIM model for Old Age Home
3	Creation of Structural BIM model for Office Space
4	Creation of Structural BIM model for Boys Hostel
5	Creation of Structural BIM model for Hotel Building
6	Creation of Structural BIM model for Restaurant
7	Creation of Structural BIM model for Girls Hostel
8	Creation of Structural BIM model for Duplex House
9	Creation of Structural BIM model for 3BHK Residential Building
10	Creation of Structural BIM model for Commercial Building
11	Creation of Structural BIM model for Residential Building

12	Creation of Structural BIM model for Home
13	Creation of Structural BIM model for Office Space
14	Creation of Structural BIM model for Hostel Building
15	Creation of Structural model for Hotel Building
16	Creation of Structural model for Restaurant
17	Creation of Structural model for Clinic
18	Creation of Structural model for Community centre
19	Creation of Structural model for Apartment
20	Creation of Structural model for Office Building

Task for Projects:

Task 1: Create a 3D Structural model of the building

Task 2: Place Doors, Windows, Stairs and Railing in the building

Task 3: Interoperability

Task 4: Export Quantity take-off reports

Task 5: Generate 2D Drawings and Rendered Walkthrough**Project 1: Creation of Structural BIM model for 2 BHK Residential Building:**

A residential building is a building made up of one or more rooms used for housing, with the necessary facilities and utilities that satisfy the living requirements of a person or family.

In this use case you need to create a BIM Model in Revit platform with the following specifications:

- Living area 6m x 4m
- Master bedroom 5m x 5m (with attached bathroom)
- Bedroom 4m x 4m
- Kitchen 3m x 3m
- Dining 3m x 3m
- Bathroom
- Pooja room

Tasks for Project:

Task 1: Create a 3D Structural model of the building.

- Foundation
- Structural columns
- Structural Beams
- Slab

Task 2: Place Doors, Windows, Stairs, and Railing in the building

Task 3: Interoperability – Linking and importing CAD files

Task 4: Generate the Quantity take-off

Task 5: Generate 2D drawings from the model for plan, elevation, and section.