

### Skill Enhancement Courses (SEC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CE043	Building Planning & Computer Aided Drawing	FC			2	2	50	50	100	-
241CE017	3D Modelling of Building	FC			2	2	50	50	100	EG
241CE018	Geospatial AI	IC			1	1	100	-	100	-
241CE019	GeoStudio for Geotechnical Applications	AC			2	2	50	50	100	GT-1, GT-2
241CE020	Computer-Aided Structural Analysis & Design	AC			2	2	50	50	100	SA
<b>Total</b>					<b>9</b>	<b>9</b>				

## BUILDING PLANNING & COMPUTER AIDED DRAWING

Course Code:241CE043

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

### Course Outcomes:

At the end of the course, student will be able to:

- CO1:** Study the CAD software and basic functions.
- CO2:** Plan different types of buildings as per NBC regulations and building laws
- CO3:** Sketch the various building components
- CO4:** Evaluate plans of Single storied building & multistoried buildings
- CO5:** Develop different sections at different elevations
- CO6:** Detailing of building components like doors, windows and roof trusses etc.

### Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
<b>CO1</b>	3				3	3	2	2	2	2	2
<b>CO2</b>	3				2	3	2	2	2	2	1
<b>CO3</b>	3				2	2	2	2	2	2	2
<b>CO4</b>	2				3	3	2	2	2	2	2
<b>CO5</b>	2				3	3	2	2	2	2	2
<b>CO6</b>	2				3	3	2	2	2	2	2

### Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
<b>CO1</b>	3	
<b>CO2</b>	3	
<b>CO3</b>	3	
<b>CO4</b>	3	
<b>CO5</b>	3	
<b>CO6</b>	3	

### Practice:

1. Introduction to various CAD commands with simple examples
2. To understand about Principals of building planning and building bye-laws.
3. To draw the foundation details for the buildings.
4. To draw the stretcher and header bond.
5. To draw the English and Flemish bond.

6. To draw the plan section and elevation of different types of staircases
7. To draw the plan section & elevation of buildings using software a) Single storeyed b) Multi storeyed residential buildings
8. To draw the developed plan, elevation, section and site plan of public buildings (Hospital & or School buildings).
9. Detailing of building components like doors and windows.
10. To draw the elevation of roof structures like king post and queen post truss.

**Additional Practice:**

1. To draw the plan, elevation, section and site plan of Industrial buildings
2. To draw the plan and elevation of different types staircases.
3. To draw the plan, elevation, and section of commercial building.

**Text Books:**

1. Building Planning and Drawing, Dr. N. Kumara Swamy, A. Kameswara Rao, Charotar Publishing House Pvt. Ltd. 2019, 9<sup>th</sup> edition. (ISBN:13. 978-9385039386).
2. Building Planning and Drawing by S.S. Bhavikatti, Dreamtech Press India Pvt. Ltd, 1 Edition 2019. (ISBN: 13. 978-9389307085)

**Reference Books:**

1. Building, Planning and Drawing - Tech Knowledge Publications by Nishant A. Upadhye (ISBN: 978-93-89684-17-9)
2. Model Building Bye-laws 2016, Young Global Publications (ISBN-13:978-8188274475)
3. Planning, Designing and scheduling, Girescharan Singh & Jagadish Singh, Published by Standard Publishers Distributors. (ISBN:13. 978-8180140051 ).

**Web Links:**

1. <http://www.bsiet.org/notes/BPD%20Theory.pdf>
2. <https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2050>
3. <http://www.cadmatesoftware.com/>

## 3D-Modelling of Building

Course Code:241CE017

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

### Course Outcomes:

At the end of the course, student will be able to:

- CO1:** Acquire knowledge of BIM techniques.
- CO2:** Explain the detailing of structure in Revit software.
- CO3:** Sketch the 3D drawing (steel structures and RCC structures).
- CO4:** Find quantities of material, and bar bending schedules.
- CO5:** Sketch the duplication, elevation, and sections of a given 3D plan.

### Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
<b>CO1</b>	1				3			1			1
<b>CO2</b>	1				3			1			1
<b>CO3</b>	1				3		2	1			1
<b>CO4</b>	1				3			1			1
<b>CO5</b>	1				3			1			1

### Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
<b>CO1</b>	2	
<b>CO2</b>	2	
<b>CO3</b>	2	
<b>CO4</b>	2	
<b>CO5</b>	2	

### Practice:

1. Create levels, grids, and sections
2. Modify and edit tools
3. Creation of wall and its types, Wall articulation with materials
4. Draw the structural views (plan, elevation, isometric views).
5. Create a Virtual walk-through
6. Draw the RCC drawing detailing (Beams, columns, slabs, footing, etc.,).
7. Determining the rebar quantities from Revit software and placed inside the created model and 3D views and detail views can be generated.

8. Determine the quantities regarding the volume of concrete required for beams, columns, slabs and other structural elements, and costs related to the same can be calculated
9. Determining the bar bending schedules through Revit software.

**Text Books:**

1. Building Information Modelling, Karen M. Kensek, Taylor and Francis. (ISBN:9781315797076)
2. Building Information Modelling (BIM) in Design, Construction and Operations, C. A. Brebbia, L.Mahdjoubi, R. Laing, WIT Press, Wiley Publishers. (ISBN:978-1-84564-914-2)

**Reference Books:**

1. Heritage Building Information Modelling, Gehan Ahmed Nagy, John Counsell, CRC Press.(ISBN:9781315628011)
2. Building Information Modelling Technology Foundations and Industry Practice, André Borrmann, Christian Koch, Jakob Beetz, Markus Konig, Springer International Publishing, 2018.(ISBN:13-978-3319928616)

**Web Links:**

1. <https://www.autodesk.com/industry/aec/bim>
2. <https://www.sciencedirect.com/topics/engineering/building-information-modeling>

## Geospatial AI

**Course Code:**241CE018

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>

### Course Outcomes:

At the end of the course, student will be able to:

- CO1: Study the interaction of electromagnetic radiation with atmosphere and earth material.
- CO2: Gain knowledge about the concepts of interpretation of satellite imagery and civil engineering applications.
- CO3: Explain the fundamentals of maps, their characteristics and GIS, its components
- CO4: Apply various spatial analysis tools for deriving GIS based outcome
- CO5: Create a error free GIS database for civil engineering applications

### Mapping of course outcomes with program outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
<b>CO1</b>	3	-	-	-	2	-	-	-	2	-	-
<b>CO2</b>	2	-	-	-	-	-	-	-	-	-	-
<b>CO3</b>	2	2	2		2	1	-	-	2	-	-
<b>CO4</b>	2	3	-	-	3	-	-	-	-	2	-
<b>CO5</b>	2	-	2	-	2	-	-	-	-	2	-

### Mapping of course outcomes with program Specific Outcomes:

CO/PSO	PSO1	PSO2
<b>CO1</b>	-	1
<b>CO2</b>	-	2
<b>CO3</b>	-	2
<b>CO4</b>	-	2
<b>CO5</b>	-	2

### Practice:

1. Introducing to the interface and tools of ArcGIS/ERDAS Imagine.

2. Downloading, storing and uploading of remotely sensed data from open-source websites into GIS software's.
3. Perform Subset/clip, Composite/Layer staking and creating mosaic of satellite images.
4. Creating shape/AOI files and perform Geo-referencing.
5. Perform LULC supervised image classification using Landsat 8.
6. Perform LULC unsupervised image classification using Landsat 8.
7. Generate thematic and Choropleth maps on any one theme using GIS software.
8. Perform change detection analysis on urban sprawl for a given area.
9. Perform morphometric analysis and extract DEM for drainage basin for a given area.
10. Simple exercises on AI in GIS.

**TextBooks:**

1. Remote Sensing and GIS, Basudev Bhatta, Oxford Publishers. (ISBN: 978-0849330520)
2. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning. (ISBN: 978-8131510995)

**Reference Books:**

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage, 2018. (ISBN: 978-1337560092)
2. R Cookbook, Paul Teetor, Oreilly. (ISBN: 978-1449307264)

**WebLinks:**

1. <https://www.usgs.gov/centers/eros/science/usgs-eros-archive-landsat-archives-landsat-collection-2-us-analysis-ready-data>
2. <https://glovis.usgs.gov/app>
3. <https://earthexplorer.usgs.gov/>

## Geostudio for Geotechnical Applications

Course Code:241CE019 **L**  
**0** **T**  
**0** **P**  
**2** **C**  
**2**

### Course Outcomes:

At the end of the course, student will be able to:

- CO1:** Acquire proficiency in using GeoStudio software for geotechnical applications.
- CO2:** Perform slope stability analysis using GeoStudio and interpret the results.
- CO3:** Conduct seepage analysis using GeoStudio and interpret the flow patterns.
- CO4:** Perform consolidation analysis using GeoStudio and understand settlement behaviour.
- CO5:** Apply numerical methods to solve geotechnical engineering problems.

### Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
<b>CO1</b>	1	1		3	3						
<b>CO2</b>	2	3	2	3	3						
<b>CO3</b>	2	3	1	3	3						
<b>CO4</b>	2	3	1	3	3						
<b>CO5</b>	2	3	2	3	3						

### Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
<b>CO1</b>	3	
<b>CO2</b>	3	
<b>CO3</b>	3	
<b>CO4</b>	3	
<b>CO5</b>	2	

### Practice:

1. Introduction to GeoStudio software suite
2. Basics of slope stability analysis using GeoStudio
3. Seepage analysis using GeoStudio (Finite Element Method)
4. Consolidation analysis using GeoStudio (Finite Difference Method)
5. Application of numerical methods in geotechnical engineering
6. Case studies and hands-on exercises using GeoStudio.

**Text Books:**

1. Practical Geotechnical Design with Gestudio, G.R.Siegel, wiley.

**Reference Books:**

1. Geotechnical Engineering: A Practical Problem Solving Approach., N. Sivakugan and B. M. Das,

**Web Links:**

1. [https://www.seequent.com/community/on-demand-videos/?tx\\_category=geostudio](https://www.seequent.com/community/on-demand-videos/?tx_category=geostudio)Geotechnical Engineering Portal

## Computer-Aided Structural Analysis & Design

**Course Code:**241CE020

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

**Course Outcomes: At the end of the course, student will be able to:**

- CO1:** Solve Matrix Problems using MATLAB software
- CO2:** Analyse beams and frames using various design software
- CO3:** Analyse and design structures for dead and live loads
- CO4:** Analyse and design structures subjected to wind and earthquake loads.
- CO5:** Model simple beams and frames using finite element software

**Mapping of Course Outcomes with Program Outcomes:**

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
<b>CO1</b>	2	2			3	2		2			1
<b>CO2</b>	2	2	1		3	1		2			1
<b>CO3</b>	3	3	2		3	1		2			1
<b>CO4</b>	3	3	2		3	1		2			1
<b>CO5</b>	3	3	1		3	1		2			1

**Mapping of Course Outcomes with Program Specific Outcomes:**

CO/PSO	PSO1	PSO2
<b>CO1</b>	1	
<b>CO2</b>	1	
<b>CO3</b>	2	
<b>CO4</b>	2	
<b>CO5</b>	2	

**Practice:**

1. Solving Matrix Problems using MATLAB.
2. Introduction to STAAD Pro software and basic beam analysis.
3. Analysis of beams and portal frames using SAP, ETABS, and Staad Pro. V8i.
4. Analysis and design of structures for dead and live loads.
5. Analysis and design of structures subjected to wind and earthquake loads. (Minimum five storey).
6. Introduction to finite element packages (ANSYS & ABAQUS).

**Text Books:**

1. Matrix methods of Structural Analysis: Theory and Problems, C. Natarajan and P. Revathi, PHI Pvt Ltd, India. (ISBN: 978-8120349001)
2. Advanced methods of Structural Analysis, Igor A. Karnovsky and Olga Lebed, Springer New York. (ISBN: 978-1441910462)

**Reference Books:**

1. Design of Steel structures, Subramanian, N, Oxford University press, New Delhi.(ISBN: 978-0199460915)
2. Advanced Reinforced Concrete Design, Varghese, P.C, Prentice-Hall of India, New Delhi.(ISBN: 9788120327870)

**Web Links:**

1. [https://onlinecourses.nptel.ac.in/noc20\\_ce37/preview](https://onlinecourses.nptel.ac.in/noc20_ce37/preview)
2. <https://nptel.ac.in/courses/112104031>