

Domain Track Title: Architectural and Structural Design (SDCU 2120)

Track Total Credits (0-15-5)

Courses Divisions:

DOMAIN: Aerial Surveying and Remote Sensing Applications (4-10-4)					
Sl. No	Code	Subject Name	T-P-P	Credits	Hrs.
1.	CUSD 2120	Critical thinking and presenting it with digital platform (AutoCAD leads to 3D base)	0-3-0	3	38
2.	CUSD 2121	Scope to enrich by exposing them to BIM modelling	0-5-0	5	62
3.	CUSD 2122	Design and failure analysis of structure	0-5-0	5	62
4.	CUSD 2123	Amalgamation of architecture and civil requirements using Generative Apps	0-2-0	2	25
5.	CUSD 2124	Project	0-0-5	5	
Total				20	

Domain Track Objectives:

1. To teach the Principles of architectural building design.
2. To familiarise the student with practicing life in construction industry and orient their learnings towards practical application in the field
3. Make a difference with cutting edge technology

Domain Track Course outcomes:

1. Strong understanding of architectural design and scope for innovative ideas
2. Case study based practical solution with actual site visits/live buildings

3. Modelling of structural elements and failure analysis
4. Time saving estimations/structural calculations using digital tool

Domain Syllabus

1. Critical thinking and presenting it with digital platform (38 Hrs)

- 1.1 Introduction to Architectural Design
- 1.2 The need and scope of with basics of Design Principles
- 1.3 Ergonomic data and its application
- 1.4 Hands-on experience with designing their own house or hostel
- 1.5 The need of digital drive for 2D design expressions
- 1.6 Basics of AutoCAD, Conceptualization of Design: Own House drafting/Hostel
- 1.7 Addition of Creativity and modifying the design
- 1.8 Study the impact of Geological data, climatological data on design
- 1.9 Modification of design based on hydrology, soil, site conditions
- 1.10 Carving out a meaningful design in terms of architecture and structure both
- 1.11 Application of 2D design/ welcoming them in the world of 3D design
- 1.12 Basics of 3D concepts and commands
- 1.13 Practical techniques for saving area/cost
- 1.14 Presenting a wholesome idea before moving to BIM

2. Scope to enrich by exposing them to BIM modelling (62 Hrs)

- 2.1 Introduction to BIM modelling
- 2.2 The need and scope of with live examples
- 2.3 Ergonomic data and its application
- 2.4 Applying learnings to a bigger scale hotel/flat scheme/hostels
- 2.5 Incorporation of site factors
- 2.6 Realistic approach road and building bye-laws

- 2.7 The magic of *Importing previous plans & reorient them to achieve larger scale in no time*
- 2.8 Prepare specifications in BIM
- 2.9 Estimating all the quantities in a very short time
- 2.10 Concepts of CATIA
- 2.11 Layer wise calculation for pipelines, electrical ducts, AC units etc
- 2.12 Introducing structural layers for design
- 2.13 Cross check with grid formation, foundation calculation & column orientation
- 2.14 Data and record for 3D design of individual aspects for the next level

3. Design and Failure Analysis of Structure (62 Hrs)

- 3.1 Introduction to steel structures. Modeling, Analysis and design of steel truss in as per AISC 360
- 3.2 Linear buckling analysis of structures
- 3.3 Introduction to PEB, Modelling PEB and assigning properties, load cases, design parameters, Analysis and extracting results.
- 3.4 Introduction to lattice steel structures. Modelling, Analysis and design of lattice steel structures.
- 3.5 Reading design results and optimising the steel structure.
- 3.6 Modelling, Analysis and design of portal frame as per AISC 360 and ASCE 07-16
- 3.7 Introduction to nonlinear static analysis. Perform pushover analysis.
- 3.8 Introduction and modelling of composite deck platform
- 3.9 Modelling of deck slab and assigning section properties with releases
- 3.10 Assigning specifications and diaphragm to the structures
- 3.11 Define and calculate seismic and wind loads as per ASCE 07 and ATC hazards

- 3.12 Define load cases and load combinations, Deflection check concept, floor vibration analysis.
- 3.13 Analyse composite structure and extract results.
- 3.14 How to import CAD MODEL, Design and analysis of multi storey residential building based on different loading criteria (based Code on IS456:2000), Creating plate elements and shear walls.
- 3.15 Design and analysis of frame structures based on different loading criteria (based Code on IS456:2000)
- 3.16 Design, analysis of Foundations (Isolated footing and Combined footing based on code IS456:2000)
- 3.17 Design, analysis of structural elements e.g. Beam, column, Slab (one way and Two way) (based Code on IS456:2000 and BS8007)
- 3.18 Error and warning analysis, Report generation

4. Amalgamation of Architecture and Civil Requirements using Generative Apps or *Derivatives of Parametric Design* (25 Hrs)

- 4.1 Optimisation of steel cost- using permutation & combination of steel/foundation type or small changes in architectural design
- 4.2 Segregated services
- 4.3 Revising PERT/CPM paths
- 4.4 Addition of storage spaces
- 4.5 Façade treatment/modification
- 4.6 Inclusion of basement/parking areas/bunkers
- 4.7 Reduction of construction cost
- 4.8 Site development and slope calculation (in brief)
- 4.9 Mitigating hydrological impacts on difficult sites

5. PROJECT

List of Projects:

1. Small scale (initial) with interior
 - 1.a. Hostel room
 - 1.b. Individual home
 - 1.c. Duplex bungalow
 - 1.d. Shop
 2. Live/ ongoing Project/Turn key basis
 - 2.a. Multi storey building
 - 2.b. Hospital
 - 2c. Hostel
 - 2.d. Office Building
 3. Highway geometry design
 4. Design and analysis industrial ware house
 5. Design and analysis of auditorium with proper load calculation, load cases, load combination based on code (IS 456:2000 and BS 8007).
 6. Design of bridge deck slab
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1. Gate Process for Project
 1. Gate 0: Project Identification
 2. Gate 1: Planning
 3. Gate 2: Modelling
 4. Gate 3: Design and simulation
 5. Gate 4: Documentation