

Francis Xavier Engineering College

(An Autonomous Institution)

Tirunelveli - 627 003

Tamil Nadu India

Department of Civil Engineering

Curriculum and Syllabi – 2021-UG
CHOICE BASED CREDIT SYSTEM AND OBE

B.E. –Civil Engineering

(Specialization in Architectural Design)

Vision of the Department

To create competitive and innovative civil engineers and to contribute technology for the sustainable development of the society.

Mission of the Department

- To perpetuate the noble tradition of civil engineering through quality education, research, consultancy and public service.
- To promote innovative and original thinking in the minds of young engineers to face the future challenges.

Programme Educational Outcomes (PEOs)

PEO 1 Engineering basics: To communicate deep knowledge on basic sciences and applications of basic sciences in engineering.

PEO 2 Career Development: To assimilate the knowledge on basic sciences and engineering concepts to address industrial, social and environmental issues and to innovate technologies for betterment.

PEO 3 Leadership responsibilities: To develop interpersonal skills to strengthen team work, leadership quality and to promote awareness about continual learning not limited to higher studies.

PEO 4 Professional qualification: To boost professionalism in problem solving through moral and professional ethics shouldering social task.

Programme Specific Objectives (PSOs)

PSO1 Investigate, Analyze, Plan and Design the problems in multivarious domains of civil engineering.

PSO 2 Work with ethical principles and sound managerial skills in the promotion of civil engineering infrastructure keeping in mind, health, safety and sustainability of the society.

Programme Outcomes (POs)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping with PO Vs PEO, PSO

PO	PEO1	PEO2	PEO3	PEO4	PEO5	PSO1	PSO2
1		3				3	
2		2				3	
3		3	3	2			
4	2	3					3
5				3		2	
6			1	2			
7				3			2
8	3			1			3
9	2					3	
10	3					3	
11	3						2
12	2		3				

FRANCIS XAVIER ENGINEERING COLLEGE

B.E. – CIVIL ENGINEERING

REGULATIONS 2021

Choice Based Credit System and Outcome Based Education

Summary

S. No	Course Code	Course Name	L	T	P	C	H
Theory Course							
1	21CE4S01	Theory of Architecture	3	0	0	3	3
2	21CE5S01	Advanced Visual Representation	3	0	0	3	3
Theory cum Practical Courses							
1	21CE6S01	Digital Drawing, Visualisation And Representation	2	0	4	4	4
2	21CE7S01	Architectural Design Detailing	2	0	4	4	4
Practical Course							
1.	21CE8S01	Project work	0	0	8	4	8
Total			10	0	16	18	22

21CE4S01	Theory of Architecture	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To give understanding of architecture as an outcome of the act of design by human society across history and region.
- To give an introduction to the discipline of architecture and its various facets.
- To introduce importance of form and its relation to design through study of nature and manmade environment.
- To introduce the vocabulary of form and space in terms of elements, principles, attributes and organisation as giving cognitive experience in the realm of architecture.

Unit I	ARCHITECTURE - ITS ELEMENTS	9
Origin and definitions of architecture as need based, cultural, environmental, social, psychological response of human society. Architecture as phenomenological mediation of nature. Components of architecture: use, means, site, shelter, relation to nature, structure, skin, materials, services, circulation, typology, aesthetics, expression, character, symbolism, experience, etc., History and types of design in architecture.		
Unit II	FORM IN NATURE AND MANMADE ENVIRONMENT	9
Understanding form in all its attributes as the basis of creating architecture. Characteristics of form and its relationship with use/function/evolution as manifested in first hand examples from nature and everyday manmade environment including artefacts, objects buildings, cityscapes. Cognitive experience of form- ideas of Gestalt, visual perception, proxemics.		
Unit III	FORM AS GEOMETRIC ELEMENTS	9
Form as embodied in and/or constituted by geometric elements such as point, line, plane, volumes. Attributes, generation and interrelationships among elements. Perceptual effects and use of specific manifestations of the elements- planes as shapes and volumes as geometric forms - sphere, cube, pyramid, cylinder, cone and their sections/ derivatives. Architectural use of elements. Exercises and architectural case studies.		
Unit IV	ATTRIBUTES AND PRINCIPLES OF FORM	9
Form as manifesting attributes - pattern, light, colour, surface, texture. Effects of these attributes. Form in its basic state, in combinations, composite organisations and configurations as manifesting characteristics - proportion, scale, balance, symmetry, asymmetry, rhythm, axis, hierarchy, datum, unity, harmony, dominance, climax, and focus. Characteristics acting as principles to generate architectural design. Exercises and architectural case studies.		
Unit V	ORGANISATION OF FORM AND SPACE	9

Form and space in architecture – enclosure, internal and external spaces, continuous spaces, hierarchy of spaces, spatial organisation, built form- open space relationships. Relationship of movement/ circulation/ path with reference to architectural form and space. Exercises and architectural case studies.

Total Hours

45

TEXT BOOK(S)

1. Geoffrey Broadbent, 'Design in Architecture - Architecture and the Human Sciences', D.Fulton, 1988.
2. Francis D.K. Ching, 'Architecture-Form, Space and Order', Van Nostrand Reinhold Company, New York, 2007.
3. Simon Unwin, 'Analysing Architecture', Routledge, London, 2003.
4. V.S. Pramar, 'Design Fundamentals in Architecture', Somaiya Publications Private Ltd., NewDelhi, 1973.
5. Yatin Pandya, 'Elements of Space Making', Mapin, 2008.
6. Francis D.K. Ching, James F. Eckler, 'Introduction to Architecture', Wiley, 2012.
7. Robert McCarter, JuhaniPallasmaa, 'Understanding Architecture', Phaidon 2012.
8. Anthony C. Antoniadis, 'Poetics of Architecture: Theory of Design', John Wiley and Sons,1992.

REFERENCE BOOK(S)

1. Pierre von Meiss, 'Elements of Architecture: From Form to Place', Routledge, 1990.
2. Rudolf Arnheim, 'The Dynamics of Architectural Form', University of California Press 2009.
3. NeilsPrak, 'The Language of Architecture', De Gruyter Mouton,2017.
4. Leland M.Roth, 'Understanding Architecture, its Experience, History and Meaning', Routledge, 2018.
5. Hazel Conway, 'Understanding Architecture: An Introduction to Architecture and Architectural History', Routledge, 2005.

WEB RESOURCE(S):

COURSE OUTCOMES (COs):

CO4S01.1	Ability to recognise different facets of architecture
CO4S01.2	Basic understanding of form and design in all aspects and scales
CO4S01.3	Illustrate the geometric elements and their effects
CO4S01.4	Ability to discern the relationship of manifestations of form
CO4S01.5	Cognitive experience of form and space in architecture

PO Vs CO MAPPING:

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3		2			1		1		1		1
2	3		2	1	1				1			1
3	3		2	1		1				1		1
4	3		1	2					1	1		1
5	3				2	1		1		1		1

1 →Low 2→Medium 3→High

21CE5S01	Advanced Visual Representation	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- Introducing students to fundamental techniques of architectural representation and to equip with the basic principles of representation.
- Enhancing the skills in developing a graphical language of architecture.

PRE-REQUISITE:

- Engineering Graphics

Unit I	Learning Sketching, Drawing, and visual thinking	9
Free-hand drawing appropriate to visual & architectural representation, indoor & outdoor sketching, drawing from observation, terminology & abbreviations used in visual representation, Sheet layouts, line & shape, tone & texture, figure & ground, Color & value, lettering & art lettering, dimensioning, shading, symbols & scale.		
Unit II	Isometric and Axonometric Views	9
Introduction to views, types and advantages. Isometric, Axonometric and Oblique view of objects, building components and Interior of the room.		
Unit III	Fundamentals of Perspectives-I	9
Introduction to perspectives, difference between views & perspectives, Types of perspectives: one point, two point & three point, Anatomy of Perspectives - Objects, study of picture plane, station point, vanishing point, Eye level, Ground level.		
Unit IV	Fundamentals of Perspectives-II	9
Perspective drawing of simple and complex objects, one point and two point perspective of interiors and exteriors, sectional perspectives.		
Unit V	Rendering Techniques	9
Representation technique of plan, elevation & section in architectural drawing. Monochromatic & different themes of rendering, architectural rendering techniques using pen & ink, color, values, tones, and general approach to rendering. Architectural representation of trees, hedges, foliage, human figures, cars and symbols.		
Total Hours		45

TEXT BOOK(S)

1. Atkins, B. (1986). Architectural Rendering. California: Walter Foster Art Books.
2. Batley, C. (1973). Indian Architecture. Bombay: D. B. Taraporevale Sons.
3. Narayana, K. L. and Kannaiah, P. (1988). Engineering Graphics. New Delhi: Tata McGraw-Hill.

REFERENCE BOOK(S)

1. Bhatt, N. D. (2003). Engineering Drawing. Anand: Charotar Publishing House.
2. Ching, F. D. K. (2009). Architectural Graphics. 5th Ed. Hoboken: John Wiley & Sons.
3. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. Hoboken: John Wiley & Sons.
4. Dinsmore, G. A. (1968). Analytical Graphics. Canada: D. Van Nostrand, Company Inc.
5. Halse, A. O. (1972). Architectural rendering; the techniques of contemporary presentation. 2nd Ed. New York: McGraw-Hill.
6. Holmes, J. M. (1954). Applied Perspective. London: Sir Isaac, Piotman and Sons Ltd.
7. Martin, L. C. (1970). Architectural Graphics. 2nd Ed. Macmillan Pub Co.
8. Norling, E. (1969). Perspective drawing. California: Walter Foster Art Books.
9. Robert, W. G. (2006). Perspective: From Basic to Creative. 1st Ed. London: Thames and Hudson.

WEB RESOURCE(S):

1. <https://alistapart.com/article/sketching-the-visual-thinking-power-tool/>
2. https://en.wikipedia.org/wiki/Axonometric_projection
3. <https://www.thegnomonworkshop.com/tutorials/fundamentals-of-perspective-1>

COURSE OUTCOMES (COs):

- CO101.1 Develop free hand sketching skills and understand drawing abbreviations.
- CO101. 2 Construct isometric and axonometric projections.
- CO101. 3 Understand the anatomy of perspectives.
- CO101. 4 Draw the perspective view of simple and complex objects.
- CO101. 5 Understand the architectural rendering techniques and its representation.

PO Vs CO MAPPING:

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3		2			1		1		1		1
2	3		2	1	1				1			1
3	3		2	1		1				1		1
4	3		1	2					1	1		1
5	3				2	1		1		1		1

1 →Low 2→Medium 3→High

21CE6S01	Digital Drawing, Visualisation And Representation	L	T	P	C
		2	0	4	3

COURSE OBJECTIVE:

- Ability to express using digital tools in the realm of visual composition, drafting, 3D visualisation and rendering.

PRE-REQUISITE:

- Engineering Graphics

Unit I	Introduction To Computer And Image Editing	9
Technology of small computer system. Computer terminology. Introduction to application software, graphic system, use of plotter, file management, etc. Understanding bitmap images and vector graphics, image size and resolution. Basic tools for editing and creating graphics.		
Unit II	Basics of Building Modelling	9
Definitions, Development Rules – Floor Space Index – Planning Parameters for Non High Rise Buildings and High Rise Buildings, General Building Rules – Habitable and Non Habitable Rooms – Mezzanine Floor – Basement – Lightings and Ventilations.		
Unit III	Viewing The Building Model	9
Creating a basic floor plan. Temporary dimensions. Adding and modifying walls. Working with compound walls. Adding and modifying doors. Adding and modifying windows. Transparent overlays, hatching utilities, line type, line weight and colour. Multiline, polyline, etc. Styles, blocks and symbol library.		
Unit IV	Introduction To 3D Modelling	9
Slide facilities script attributes, V-port, editing session. Introduction to 3D-modelling technique and construction planes, drawing objects, 3D surfaces setting up elevation thickness and use of dynamic projections. Solid modelling with primitive command and Boolean operation.		
Unit V	3D Rendering And Setting	9
Rendering and scene setting to create a photo realistic picture, understanding material mapping, environment setting and image filling.		

List of Experiments

SI No	List of Experiments	CO
1	Hand Sketching a basic building plan under Statutory Rules	CO2
2	2D Drafting exercise of a simple building.	CO3
3	3D sculpture exercise using 3D Softwares (cubes, spheres etc.)	CO4
4	Exercise on visualising a building and exploring the potential of lights and camera.	CO5
Total Hours		45+15
		60

Laboratory Requirements for a batch of 30 Students

1. Desktop Computers with accessories – 30 Nos
2. AutoCAD Software
3. Revit Architecture Software
4. Drawing Table – 30 Nos

TEXT BOOK(S)

1. Deke McClelland, 'Photoshop Version (8) CS', John Wiley and Son, New York, 2004.
2. Aouad, 'Computer Aided Design guide for Architecture, Engineering and construction', Spon Process, 2012.
3. Mohammed Saleh Uddin, 'Digital Architecture – 3D Computer Graphics from 50 Top Designers', 1999.
4. Douglas R. Seidler, 'Digital Drawing for Designers', Bloomsbury, 2014.

REFERENCE BOOK(S)

1. Scott On Stott, 'AutoCAD 2015 and AutoCAD LT 2015 Essentials', Auto Desk Official press, 2014.
2. Fiorello. J. A., 'CAD for Interiors Beyond the Basics', Wiley Publications, 2011.
3. Ryan Duell and Tobias Hathorn, 'Auto Desk Revit Architecture 2016: Essentials', Auto Desk Official Press, Sybex, 2015.
4. Eric Wing, 'Auto Desk Revit Architecture 2017: No Experience Required', Auto Desk Official Press, Sybex, 2016.
5. Alexander C. Schreyer, 'Architectural Design with SketchUp', Wiley, 2012.

WEB RESOURCE(S):

1. <https://nptel.ac.in/courses/109104088>
2. <https://archive.nptel.ac.in/courses/112/102/112102304/>

COURSE OUTCOMES (COs):

CO101.1	Introduce computer operation principles and explore image editing through a graphical composition.
CO101.2	Gain sufficient idea on practice of preparing plan in civil Engineering.
CO101.3	Impart training in computer aided 2D drafting through projects.
CO101.4	Enable the use of computer applications to develop a 3D design from the initial stages to the final outcome.
CO101.5	Enable the rendering of a building so as to create a photo realistic image.

PO Vs CO MAPPING:

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1				2	1						1
2	1			3		2		1				1
3	1		3		2	1					1	1
4	1				3	1					1	1
5	1				3	1					1	1

1 →Low 2→Medium 3→High