

GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)**Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)**

Semester - I

Course Title: **Basic Architectural Drawing**

(Course Code: C4315002)

Diploma programme in which this course is offered	Semester in which offered
Architectural Assistantship	First

1. RATIONALE

The subject, architectural drawing is designed to impart fundamental knowledge of using drawing instruments, essential for all the drawing-oriented subjects. It also helps in imparting knowledge and skill of using various types of Architectural letters, Gothic letters and different types of lines. This skill can be developed by drawing geometrical constructions used at various levels in drawing plans, elevations and sections of the building. The topic, Orthographic projection will help students to understand various architectural terminology like plan, elevation, side elevation including drawing in first angle method and of projection by drawing plans, elevations and side elevations of plane, geometrical and complex objects. It is essential for the students to prepare presentation drawings of a building. The course is also intended to develop the sense of drawing sequence and imagination in the students and to use computer aided software to create specific 2D entities of buildings and their components.

2. COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Prepare basic architectural drawing of different buildings as observed from various angles**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

- Draw various geometrical shapes with dimensions using different drafting tools
- Prepare basic architectural drawings with appropriate lettering, graphics and dimensioning.
- Draw orthographic views from a given isometric/axonometric views of simple objects and vice versa.
- Draw 2D entities using computer aided drafting software.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	CA	ESE	CA	ESE	
3	0	2	3	30*	70	25	25	150

(*): Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P -Practical; C – Credit, CA - Continuous Assessment; ESE -End Semester Examination.

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) that are the sub-components of the COs. Some of the PrOs marked '*' are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Draw various drafting instruments used in drawings	I	2
2	Construct perpendicular and parallel lines, Divide a straight line into any number of equal parts, Trisect a right angle	II	1
3	Construct different types of regular polygons	II	2
4	Construct an ellipse by different methods	II	1
5	Draw different types of lines	III	1
6	Draft single stroke lettering (straight and inclined)	III	1
7	Draft Gothic lettering	III	2
8	Draw projection of points, lines and planes when placed in different positions with respect to HP and VP	IV	4
9	Draw the orthographic projections given the isometric view	IV	2
10	Draw the isometric view given the orthographic projections	V	4
11	Draw the axonometric view given the orthographic projections	V	2
12	Draw 2D entities of building components like staircase, doors, windows, etc.	VI	4
13	Plot/Print 2D entities of building components like staircase, doors, windows, etc.	VI	2
Total			28

Note

- i. More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.
- ii. The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course required which are embedded in the COs and ultimately the competency.

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Drawing planning and layout – overall composition (for optimum use of drawing sheet)	10
2	Use of appropriate instruments, lines, dimensioning & annotations	20
3	Completing given practice problems	30
4	Accuracy of drawing	10
5	Neatness of drawing	10
6	Timely submission of completed drawing sheet	10
7	Answering viva voce questions	10
Total		100

Note: Use above sample assessment scheme for practical exercises 1 to 11

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Selecting relevant set up parameters	10
2	Creating given drawing using relevant Commands	40
3	Dimensioning the given drawing and writing text using blocks and layers effectively.	40
4	Submission of digital drawing file/plot in time	10
Total		100

Note: Use above sample assessment scheme for practical exercises 12 to 13

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

These major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practicals in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO.No.
1	Drawing instruments for class room teaching (Large Size).	1-11
2	Drawing Board (A1 : 23"x32" Size)	1-11
3	Other Instruments: Parallel, Set squares (45° and 30°-60°), Roller Scale, Protractor, Drawing Compass, Dividers, Drawing Pencils, Circle Master, French Curves, Stencils (8-6-4 mm, All in One), Eraser, Drawing sheets, Drawing Pins/Clips, Sheet Container and Drawing instrument box.	1-11
4	Interactive board with LCD overhead projector	1-13
5	CAD Workstation: i7, 2 GB RAM, 320 GB HDD, 17" Screen, 1 GHz. (Minimum requirement)	12-13
6	Plotter: Print resolution Up to 1200 x 600 dpi, 16 MB Memory	12-13
7	Licensed latest network version of AutoCAD software	12-13

7. AFFECTIVE DOMAIN OUTCOMES

The following **sample** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs and PrOs. More could be added to fulfil the development of this course competency.

- a) Work as a leader/a team member.
- b) Follow ethical practices.
- c) Shutdown the CAD workstation when not in use.
- d) Also turn off all electrical devices when not in use.

The ADOs are best developed through the laboratory/field based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- i. 'Valuing Level' in 1st year
- ii. 'Organization Level' in 2nd year.
- iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of Revised Bloom's taxonomy that are formulated for development of the COs and competency. If required, more such UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit – I Practice of Drafting Techniques	1a. Use various types of drafting instruments associated with the drafting techniques	1.1 Practice drafting techniques by using the drafting instruments like drawing board, parallel scale, adjustable setsquares, compass, different grade of pencils, rubber, clips, clutch pencils, scales, stencils, inking pens, circle templates, French curves etc.
Unit: II Geometrical Constructions	2a. Carryout geometrical constructions using drafting tools and techniques.	2.1 Draw a perpendicular to a given line with different conditions. 2.2 Draw a line through a given point parallel to a given straight line. 2.3 Divide a given straight line into any number of equal parts by various methods. 2.4 Trisect the given right angle. 2.5 Construction of different types of regular polygons given the length of a side. 2.6 Construct an ellipse by concentric method, arcs of

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
		circles method, oblong method, and loop & thread method.
Unit: III Lines, lettering and dimensioning	3a. Use different types and intensities of lines in a given drawings. 3b. Use different lettering styles in a given drawings. 3c. Use relevant techniques for the dimensions in a given drawings	3.1 Types of lines and intensities of lines. 3.2 Lettering including single stroke letters and Gothic letters 3.3 Dimensioning terms and annotations, placing of dimension and unit of dimensions in drawings.
Unit: IV Orthographic Projections	4a. Draw the projection of points, lines in various positions with respect to H.P & V.P. 4b. Draw the projection of planes placed in various position with respect to H.P. & V.P 4c. Draw the orthographic projections using the first angle method from the given pictorial (isometric) view	4.1. Theory of projections such as object projectors, planes of projections (views), direction of vision 4.2. Identify the quadrant in which the object is located 4.3. Projection of points, lines when placed in various positions with respect to H.P & V.P. 4.4. Projection of planes when placed in various position with respect to H.P. & V.P 4.5. Orthographic Projection of objects , given a pictorial (isometric) view in the first angle method
Unit-V Isometric and axonometric views	5a. Draw Isometric and Axonometric views of geometrical forms, building components and furniture.	5.1 Concept of pictorial drawing 5.2 Isometric and Axonometric views of geometrical forms, building components and furniture.
Unit-VI Basic computer Aided Drafting	6a. Use basics of 2D commands to develop architectural drawings in CAD.	6.1 Importance of AutoCAD 6.2 Screen layout of AutoCAD 6.3 Function keys & drawing commands 6.4 Drafting aid (layers & layouts) 6.5 Editing of drawing (modify commands) 6.6 Symbol library 6.7 Two dimensional drawings using 2d commands

9. SUGGESTED SPECIFICATION TABLE FOR QUESTIONPAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A	Total Marks
I	Practice of drafting Techniques	4	2	2	2	6
II	Geometrical Constructions	8	2	4	8	14
III	Lines, lettering and dimensioning	4	2	2	2	6
IV	Orthographic Projections	8	2	4	8	14
V	Isometric and axonometric views	10	2	6	8	16
VI	Basic computer Aided Drafting	8	2	4	8	14
Total		42	12	22	36	70

Legends: R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)

Note: This specification table provides general guidelines to assist students for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions to assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may slightly vary from above table.

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related **co-curricular** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

- Solve all problems for all sheets number 1 to 11 in A2 size cartridge sheets (with complete data and dimensions) after practicing in sketch book.
- Take two simple objects in your vicinity and sketch 3D isometric of them. Also draw 2D orthographic projections of them (all views).
- Download the soft copy of plan, section and elevation of any building. Read and interpret this drawing.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- Guide student(s) in undertaking micro-projects.
- 'L' in section No. 4** means different types of teaching methods that are to be employed by teachers to develop the outcomes.
- About **20% of the topics/sub-topics** which are relatively simpler or descriptive in nature is to be given to the students for **self-learning**, but to be assessed using different assessment methods.
- With respect to **section No.10**, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The duration of the microproject should be about **14-16 (fourteen to sixteen) student engagement hours** during the course. The students ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

- a) Prepare existing building architectural drawings in CAD
- b) Create a digital portfolio
- c) Prepare models of different forms and shapes
- d) List the symbols, annotations and dimensions used in drawings
- e) List the type of scales used by comparing the size of component on drawing sheet with the actual component.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Engineering Drawing	N.D.Bhatt	Charotar Publishing House;Anand, 2014. ISBN : 9789380358963
2	Textbook of Engineering Drawing	P.J. Shah	S.Chand, New Delhi. 2013 ISBN : 9788121941822
3	Engineering Drawing	M.B. Shah, B.C. Rana	Pearsons. 2009 ISBN: 9788131759714
4	Engineering Drawing	BasantAgrawal, C. M. Agrawal	McGraw-Hill, 2019 ISBN : 9789353167448
5	AutoCAD 2020: A ProblemSolving Approach, Basic and Intermediate	Sham Tickoo	26th Edition, CADCIM Technologies, 2019
6	AutoCAD 2013, Command Reference Guide	Autodesk Inc.	Autodesk Inc.

14. SOFTWARE/LEARNING WEBSITES

- https://www.youtube.com/results?search_query=engineering+drawing
- <https://youtu.be/MT1T31GtGpg>
- <https://youtu.be/WEwkepkv6mg>
- <https://youtu.be/trJQlvatIpl>

- <https://nptel.ac.in/courses/112/103/112103019>
- <https://nptel.ac.in/courses/112/105/112105294>
- https://en.wikipedia.org/wiki/Engineering_drawing
- <https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing>
- https://www.scribd.com/search?content_type=tops&pa

15. PO-COMPETENCY-CO MAPPING

Semester I	Basic Architectural Drawing (Course Code: C4315002)								
	POs and PSOs								
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/development of solutions	PO 4 Engineering Tools, Experimentation & Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life-long learning	* PSO 1 Planning & Design	#PSO 2 Execution
Competency	Prepare basic architectural drawing of different buildings as observed from various angles								
Course Outcomes									
CO a) Draw various geometrical shapes with dimensions using different drafting tools	2	-	2	2	-	-	2	-	1
CO b) Prepare basic architectural drawings with appropriate lettering, graphics and dimensioning	3	-	2	1	-	-	2	-	1
COc) Draw orthographic views from a given isometric/axonometric views of simple objects and vice versa.	3	2	2	2	-	-	2	-	1
CO d) Draw 2D entities using computer aided drafting software	3	1	2	2	1	-	2	2	2

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

***PSO 1: Planning and Design:** Prepare architectural designs and all types of drawings with appropriate material specifications and application techniques as per specific requirements of the project.

#PSO 2: Execution: Work competently as assistants in architectural firms so as to contribute and coordinate both office work and execution on site

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

S. No	Name and Designation	Institute	Contact No.	Email
1	Shri Bhaskar J. Iyer, HOD, Coordinator & Associate Dean	Government Polytechnic for Girls, Ahmedabad	9879474833	bhaskariyer2004 @gmail.com
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NITTR Resource Persons

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