GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester - III

CourseTitle: Computer Studio
(Course Code: 4335005)

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

1. RATIONALE

Drafting and development of drawings are essential skills for a learner of architectural assistantship and due to availability of the software the task of drafting has become simplified and easy. Learner shall prepare architectural basic drawings, presentation drawings on a computer with CAD as drafting tool. In this course, the learner acquires knowledge of CAD - 2D, the basic knowledge of 3D drawing software such as Sketch Up and Revit Architecture. This knowledge is very helpful in inculcating essential 3D visualization ability in the learner. It is mandatory for the learners to possess the above-mentioned skills adding to their proficiency so that they are able to draw 2D drawings using computers as well as create new designs using 3D software.

2. COMPETENCY

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

- **Prepare 2D and 3D drawings using CAD software and take print outs using appropriate scale.**

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 learner for the achievement of the following COs:

a) Draw plan, sections and elevations of a given building in CAD using 2D commands
b) Plot the drawing to an appropriate scale
c) Use appropriate 3D toolbars and commands to create different 3D drawings.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
0	0	4	2	0	0	25	25	50

***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) 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	Prepare Plan, Section and Elevation of the character bungalow or any other bungalow using 2D entity command, modification and others commands	1	12
2	Adding Text and Dimensions to all the drawings	2	08
3	Create presentation drawings in computer : Layout Plans, All Floor Plans, Sections and Elevations	2	12
4	Plot all the drawings to a suitable scale	3	08
5	Create a 3D views of the character bungalow or any other bungalow with any 3D software e.g.- AutoCAD 3D, SketchUp, Revit, etc.	4	16
	Total		**56**

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.*

Note: *Use above sample assessment scheme for practical exercises 1 to 7*

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.	20
4	Plotting the drawing to appropriate scale	20
5	Submission of digital drawing file/plot in time	10
Total		**100**

Note: *Use above sample assessment scheme for practical exercises 1-6*

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	Interactive board with LCD overhead projector	1-5
2	CAD Workstation: 64-bit Operating System,2.5-2.9 GHz processor(3+ GHz Recommended), 8 GB RAM (16 GB Recommended), 10 GB Disk Space, 17" FHD Screen, 1 GB GPU, Dedicated Graphics Card	1-5
3	A1 Size color Plotter: Print resolution Up to 1200 x 600 dpi, 16 MB Memory	1-5
4	Licensed latest network version of CAD software and related necessary 3D software like 3D CAD, Revit, SketchUp etc.	1-5

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 fulfill 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 **CAD 2D**	**1a.** Use 2D commands to draw building components such as wall, door window. **1b**. Use modification commands to alter the existing drawing.	**1.1** Simple drawing creation and saving it as a new drawing. **1.2** Replication of drawn objects using blocks. **1.3** Draw plans, sections and elevations of the character bungalow designed in the previous semester.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit: II **Adding text and dimensions**	**2a.** Multi line text and single line text. **2b.** Dimensioning using appropriate commands.	**2.1** Writing text, formatting text style. **2.2** Formatting Dimension style, editing Dimension style. **2.3** Applying components from CAD Libraries (Design Centre) to drawing.
Unit: III **Plot/Print**	**3a.** Print/plot the prepared drawing to appropriate scale.	**3.1** Plot Dialogue box. **3.2** Plot style manager – creating plot styles. **3.3** Printing and saving drawing as PDF.
Unit: IV **CAD 3D**	**4a.** Use appropriate 3D toolbars and commands to create different views in 3D CAD or similar software and plot the same.	**4.1** Prepare a 3D view of the character bungalow designed in the previous semester using 3D commands like, • 3D Basics – Axes, Planes and Faces • 3D Modification – Rotate, Mirror, Array and Scale • 3D Boolean operations – Union, Subtract, Intersect 3D Primitive objects – Box, Wedge, Cone, Sphere, Cylinder, Torus and Pyramids

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	CAD 2D	**Not Applicable**				
II	Adding Text and Dimensions					
III	Plot/Print					
IV	CAD 3D					
Total						

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

Note*: This specification table provides general guidelines to assist learners 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 LEARNER ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested learner-related **co-curricular** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Learners 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 (learner's) portfolio which may be useful for their placement interviews:

a) Draw plans, sections and elevations of different types of buildings using 2D commands.
b) Prepare 3D views of designed buildings given the necessary plans, sections and elevations using related software.
c) Plot a given drawing to different scales using self-created plot styles through plot style manager.
d) Render 3D views using basic rendering tools.

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:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) Guide learner(s) in undertaking micro-projects.
c) ***'L' in section No. 4***means different types of teaching methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature is to be given to the learners for ***self-learning***, but to be assessed using different assessment methods.
e) 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 learner that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of learners 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 learner 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 micro-project should be about **14-16 (fourteen to sixteen) learner engagement hours** during the course. The learners 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 with rendering.
b) List the impact of ability of manual drafting on computer aided drafting.
c) Prepare a report of usage of 2D and 3D commands.
d) Prepare a digital portfolio of all drawings.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Practical Autodesk AutoCAD 2021 and AutoCAD LT 2021: A no-nonsense, beginner's guide to drafting and 3D modeling with Autodesk AutoCAD	Yasser Shoukry, Jaiprakash Pandey	Packt Publishing Limited; Illustrated edition (15 May 2020) ISBN-10 : 1789809150 ISBN-13 : 1789809152-978
2	AutoCAD 2021: A Problem-Solving Approach, Basic and Intermediate, 27th Edition	Prof. Sham Tickoo of urdue University, CADCIM Technologies	CADCIM Technologies; 27th edition (14 June 2020) ASIN : B08B79LTW1
3	The Sketch Up Workflow for Architecture: Modeling Buildings, Visualizing Design, and Creating Construction Documents with SketchUp Pro and LayOut	Michael Brightman	Wiley; 2nd edition (7 September 2018) ISBN-10 : 9781119383635 ISBN-13 : 1119383635-978
4	Mastering Autodesk Revit 2020	Robert Yori, Marcus Kim, Lance Kirby	Sybex; 1st edition (2 January 2020) ISBN-10 : 1119570123 ISBN-13 : 1119570127-978
5	Photographic Rendering with VRay for SketchUp	Brian Bradley	Packt Publishing Limited (19 March 2014) ISBN-10 : 1849693226 ISBN-13 : 1849693226-978

14. SOFTWARE/LEARNING WEBSITES

- https://youtu.be/MT1T31GtGpg
- https://youtu.be/WEwkepkv6mg
- https://youtu.be/trJQlvatIpI
- https://nptel.ac.in/courses/112/103/112103019
- https://nptel.ac.in/courses/112/105/112105294
- https://www.scribd.com/search?content_type=tops&pa
- https://www.visualizingarchitecture.com
- http://sketchucation.com
- https://www.youtube.com/channel/UCdv_VnYKlu_gaZa7rpXifEg (Sketchup School)

15. PO-COMPETENCY-CO MAPPING

Semester I	Computer Studio (Course Code: 4335005)								
	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 2D and 3D drawings using CAD software and take print outs using appropriate scale.								
Course Outcomes CO a) Draw plan, sections and elevations development of a given building in CAD using 2D commands.	2	1	-	-	-	-	2	1	1
CO b) Use appropriate 3D toolbars and commands to create different views.	2	-	-	1	-	1	2	1	1
CO c) Plot the drawing to an appropriate scale.	3	-	1	-	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

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