

GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2023 (COGC-2023)
Semester - V

CourseTitle: Furniture Design
(Course Code: 4355005)

Diploma Programme in which this course is offered	Semester in which offered
Diploma in Architectural Assistantship	5 th Semester

1. RATIONALE

Furniture design is a multi-layered process which requires recall and application of knowledge of previously covered parameters of anthropometrics, basic design, materials, construction technology, aesthetics, space, climate and its inter relationships. Through this subject, the learner can take on the role of a furniture designer. Understand today's need, digital tools, material properties, working methods and assembly processes. Designing indoor/outdoor furniture object from concept stage to design development employing visual composition, graphics and model making. This course places a strong emphasis on the design process, and combines creative ability with technical skills.

With the change of time, space and culture, new design evolves in the society, which inter linked with human need. Furniture design focuses on production of useful items that result in tactile experiences. Designing furniture relies on inspiration, a concept or idea, judgment, design skills, engineering principles, knowledge and the commitment to give pleasure to those who use it. The designed object should use eco-friendly materials, sustainable, aesthetic appeal, functional and user friendly. This course is designed in view of above outlook and for developing the competency mentioned below, accordingly.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competency:

- **Will be able to design an innovative furniture product with a high degree of creativity and quality, considering human scale and basic ergonomics**

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 course outcomes in cognitive, psychomotor and affective domains:

- Comprehend the history of furniture design.
- Review the importance and need of ergonomics, human scale, functionality and comfort with relation to furniture design.
- Explore various material combinations for the designed furniture.
- Prepare a prototype of the designed furniture.

4. TEACHING AND EXAMINATION SCHEME

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

(*): For this practical/studio only course, 25 marks under the practical CA should be done by assessment of process of designing a product with all design parameters. This is designed to facilitate attainment of COs holistically. Thus, this course should be considered as an **Applied 'Theory' Course** where the theory portion has to be taught during the practical/studio hours.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; S – Studio; 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	Collect Furniture Data: Collect data for desired furniture unit from evolution to an existing design like plan, section, views, joinery details and analyze design transformation. Materials and technology: Collect data of Materials and technology used in furniture and analyze design transformation.	I	8
2	Develop Concept: Prepare conceptual sketch designs, block model for desired furniture unit considering different design parameters	II	8
3	Ergonomics and Anthropometry: Analyze design with aspects like ergonomics, functionality and Anthropocentric with help of sketches and design software. Elementary Anatomy and Physiology of Human Body: Analyze design on Anatomy and Physiology principles, relationship between human feelings, culture and design by group discussion, survey and questionnaires.	II	8
4	Materials Used for Furniture: Compare and analyse different suitable materials for designed furniture unit consideration of environmental and energy efficiency parameters. Finishes Used for Furniture: Compare and analyse different suitable finishes for designed furniture unit consideration of human Physiology, environmental, coast, spatial context etc.	III	8
5	Furniture Detailing: Prepare sets of final presentation drawings including all joineries, materials, finishes, dimensions and approximate coast. Preparing shop drawings of furniture: Prepare sets of detail drawings from top down to the last detail, specifying	IV	16

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
	materials, construction process and including pre & post construction precautions.		
6	Prototype of the designed furniture: Prepare a model of the designed project to scale or create virtual 3D model in any 3D design software and Prepare rendered views of the designed furniture.	V	8

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..

Sr. No.	Sample Performance Indicators for the PrOs	Weightage in %
Assessment should be done on the basis of demonstration of,		
1	Skills	40
2	Learning Process	20
3	Communication	20
4	Learning Attitude	20
Total		100

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 practical in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Measuring Tape, Laser measure tape, etc.	1-6
2	Drawing Board (A1 size @ 23"X32") with other Instruments like Parallel, Set squares (45° and 30°-60°), Adjustable set square, Triangular scale, Tracing papers, Drawing Sheets, Model making set, etc.	1-6
3	Interactive board with LCD overhead projector	1-6
4	Desktop PCs with latest configuration (64-bit Intel, AMD or Equivalent multi-core processor, Minimum 8 GB RAM, Minimum 6 GB Dedicated Graphics Card)	1-6
5	Sheets, Cutter, thermocol sheets, clay etc	2 & 6
6	Latest Digital Single-Lens Reflex (DSLR) Camera	1-6

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 competency.

- a) Work as a leader/a team member.
- b) Follow ethical practices.
- c) Social and Functional Competence of design
- d) Participates in class discussions and present the design effectively, Generate new ideals.
- e) Practice environmentally friendly materials, methods and design processes.

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

Only the major Underpinning Theory is formulated as higher level UOs of *Revised Bloom's taxonomy* in order development of the COs and competency is not missed out by the students and teachers. If required, more such higher level UOs could be included by the course teacher to focus on attainment of COs and competency.

Note: The UOs need to be formulated at the 'Application Level' and above of Revised Bloom's Taxonomy' to accelerate the attainment of the COs and the competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at Application and above level)	Topics and Sub-topics
<p>UNIT- I</p> <p>History of Furniture Styles and Evolution of Design</p>	<p>1a. Introduction and evolution of furniture styles</p> <p>1b. Transformation of furniture styles</p> <p>1c. Development of conceptual design</p>	<p>1.1 Concise understanding of evolution from ancient to modern, post-modern ideologies to contemporary (Egyptian, Greek, Roman, Gothic, Baroque, Renaissance, Arts and Crafts Movement, Art Nouveau, De Stijl, Modernism, Post Modernism and Contemporary)</p> <p>1.2 Understanding role of materials and technology in their transformation and various theories associated in their evolution</p> <p>1.3 Sketches for various periods of furniture</p>
<p>UNIT- II</p> <p>Design developments with respect to Ergonomics and Anthropometry</p>	<p>2a. Develop conceptual design</p> <p>2b. Application of Principles of Ergonomics and Anthropometry</p> <p>2c. Application of elementary Anatomy and Physiology of Human Body</p>	<p>Design and Development of Drawings</p> <p>2.1 Develop conceptual design through Logical and Creative Thinking for residential/office use considering design aspects like function, utility, visual beauty, principles of design, ergonomics, environmental design matters, the surrounding spatial context and express through various mediums</p> <p>2.2 Development of furniture unit with respect to Principles of Ergonomics and Anthropometry express with architectural sketching, rendering techniques or use software</p>

		2.3 Conducting and analyzing the user surveys to justify Anatomy and Physiology for designed furniture unit and modify to be well suited to human needs
UNIT- III Materials and finishes for Furniture	3a. Analysis and Identify best suitable materials 3b. Analysis and Identify best suitable finish	3.1 Selection of materials like wood, processed wood (block boards, laminates, veneers, particle board), metals, cane, plastics, fiber glass etc with considering factors like availability, strength, flexibility, durability, climate, furnishing climate needs and environmental and energy efficiency, cost, etc 3.2 Selection of finishes like Varnish, polish, lacquer, melamine, paints, staining etc with considering factors like functionality, material used, workability, aesthetics, human Physiology, environmental, coast, spatial context, etc
UNIT- IV Development Drawings of Design unit	4a. Prepare Furniture Detail drawings 4b. Prepare execution/shop drawings	4.1 Furniture Detailing: Development of final presentation drawings including all joineries, materials, finishes, dimensions and approximate coast. 4.2 Execution/shop drawings of furniture: development of construction detail drawings from start to end, specifying materials, construction process and including pre & post construction precautions.
UNIT-V Prototype of the designed furniture	5a. Producing a prototype of the finalized product 5b. Survey analysis	5.1 Conducting user surveys of the product Prepare a model of the designed project to scale or create virtual 3D model in any 3D design software and Prepare rendered views of the designed furniture. 5.2 Conducting user surveys of the final designed unit and analyze

9. SUGGESTED SPECIFICATION TABLE FOR QUESTIONPAPER DESIGN

	Unit Title	Distribution of Theory Marks
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Unit No.		Teaching Hours	R Level	U Level	A Level	Total Marks
I	Primary and Secondary Data collection	Not Applicable				
II	Development of Concept and Site layout					
III	Preparing Sketch Design					
IV	Design & Development of Drawings					
V	Final Presentation of Drawings and Models					
Total						

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

Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions 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 vary slightly 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) Students should survey the market for latest available materials, finishing materials, collect data and samples of different materials used in furniture design understand their fixture details and analyze them by survey/interactive group discussion. These could be done individually or in a group.
- b) Visits to design degree/diploma institutes for studying and knowledge-sharing on documented/on-going students' 'Furniture design' works.
- c) Visits to under construction interior sites, furniture workshops to study 'Furniture' designs as well as for data collection.
- d) Visits furniture museum/gallery to understand evolution in design, material, joinery and technology

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills (Course Outcomes in psychomotor and affective domain) so that learners are able to acquire the competencies (Programme Outcomes). Following is the list of practical exercises for guidance.

Note: Here only Course Outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of Programme Outcomes/Course Outcomes in affective domain as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that learners also acquire those Programme Outcomes/Course Outcomes related to affective domain

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 student(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**.
- f) Guide learners on how to address issues on sketching, model making, etc.
- g) Use relevant video/animation films to explain various concepts, transformation and processes related to indoor/outdoor furniture design themes.
- h) Use different instructional strategies in classroom teaching.
- i) Use the relevant design assignments in the given situation.
- j) Guide learners on form, functions utility, method of construction, etc. to facilitate them to prepare actual measured drawings.
- k) Use the technique of tabletop discussions, presentation along with design jury sessions to teach the relevant content to the learners.
- l) Adopt various strategies to enhance each learner's individual creative ability especially with reference to concept and form

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. However, in the fifth and sixth semesters, it should be preferably be **individually** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, 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 total duration of the micro-project should not be less than 12 (Twelve) student engagement hours during the course. The student 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. Design a functional and comfortable furniture unit for physically challenged person.
- b. Design a furniture unit by using waste materials and express with help of sketches.
- c. Justify existing furniture unit on green and sustainable concepts or explain ways to modify unit to fit in given criterions.

Time Problem:

The duration of the time problem should be about one or two days.

A suggestive list of time problem is given here. This has to match the competency and the CO. Similar time problem could be added by the concerned course teacher:

- a. Justify best material and technology for given furniture prototype.
- b. Transform historical unit to contemporary design

13. SUGGESTED LEARNING RESOURCES

S. No	Title of Book	Author	Publication with place, year and ISBN
1	Constructing Medieval Furniture: Plans and Instructions with Historical Notes	Daniel Diehl	Stackpole Books (1 December 1996) ISBN-10 : 0811727955 ISBN-13 : 0811727952-978
2	Furniture Design Second edition	James Christopher Postell	John Wiley & Sons Inc (7 December 2012) ISBN-10 :1118090780
3	The Encyclopedia of Furniture	Joseph Aronson	Potter Style; 3rd edition (14 December 1961) ISBN-10 : 0517037351 ISBN-13 : 0517037355-978
4	Mid-Century Modern	Bradley Quinn	Conran; Illustrated edition (15 October 2004) ISBN-10 : 1840914068 ISBN-13 : 1840914061-978
5	The Interior Design Handbook	Frida Ramstedt	Particular Books (29 October 2020) ISBN-10 : X024143811 ISBN-13 : 978-0241438114
6	History of Interior Design and Furniture: From Ancient Egypt to Nineteenth–Century Europe: From Ancient Egypt to 19th-century Europe	Robbie G. Blakemore	John Wiley & Sons (18 December 1996) ISBN-10 : 0471286761 ISBN-13 : 978-0471286769

14. SOFTWARE/LEARNING WEBSITES

- www.architecturalrecord.com
- www.archdaily.com
- www.dezeen.com
- www.archpaper.com
- www.architectmagazine.com
- www.archello.com

Suggestive list of 3D Design Software:

- SketchUp
- AutoCAD
- ArchiCAD

- Dynamo
- Rhinoceros 3D: Rhino+ Grasshopper
- Revit Architecture

15. PO-COMPETENCY-CO MAPPING

Semester V	Furniture Design (Course Code: 4355005)								
	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	* PSO1	# PSO2
	<ul style="list-style-type: none"> • Will be able to design an innovative furniture product with a high degree of creativity and quality, considering human scale and basic ergonomics 								
a) Comprehend the history of furniture design.	2	2	2	2	2	2	3	2	2
b) Review the importance and need of ergonomics, human scale, functionality and comfort with relation to furniture design.	3	3	3	3	3	3	3	2	2
c) Explore various material combinations for the designed furniture.	3	1	1	2	3	2	2	3	3
d) Prepare a prototype of the designed furniture.	3	3	3	3	3	3	3	3	2

Legend: '3' for high, '2' for medium, '1' for low or '-' for the relevant correlation of each competency, CO, with PO

***PSO1: Planning & Design:** Prepare architectural designs and all types of drawings with appropriate material specifications and application techniques as per specific project requirements.

#PSO2: Execution: Suggest appropriate building materials as per the requirement.

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

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