

**Name of Institute: Institute of Technology and Engineering**

**Faculty: Prof. Marnish Modi**

**Course code: AU0314**

**Course name: Design Thinking (OE-1)**

Credit points: 03

Offered Semester: 3rd

**Course coordinator :**

Full name: Marnish Modi

Department with sitting location: RAC LAB Ground Floor, Bhanwar building

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times: 9.00am to 5:00pm (Saturday)

Students will be contacted throughout the session via mail with important information relating to this course.

**Course Objectives**

1. To excite the student on creative design and its significance
2. To make the student aware of the processes involved in design
3. To make the student understand the interesting interaction of various segments of humanities, sciences and engineering in the evolution of a design
4. To get an exposure as to how to engineer a design

**Course Outcomes (CO)**

By participating in and understanding all facets of this course a student will be:

1. Able to appreciate the different elements involved in good designs and to apply them in practice when called for.
2. Aware of the product oriented and user oriented aspects that make the design a success.
3. Will be capable to think of innovative designs incorporating different segments of knowledge gained in the course
4. Students will have a broader perspective of design covering function, cost, environmental sensitivity, safety and other factors other than engineering analysis

## Course Outline:

<b>UNIT-I</b>	<b>[14]</b>
<b>Introduction to Design Thinking</b> Design and its objectives; Design constraints, Design functions, Role of Science, Engineering and Technology in design; Engineering as a business proposition; Functional and Strength Designs. How to initiate creative designs? Initiating the thinking process for designing a product of daily use. Need identification; Problem Statement; Market survey- customer requirements; Design attributes and objectives; Ideation; Brain storming approaches; arriving at solutions; Closing on to the Design needs.	
<b>UNIT-II</b>	<b>[12]</b>
<b>Design process</b> Different stages in design and their significance; Defining the design space; Analogies and “thinking outside of the box”; Quality function deployment-meeting what the customer wants; Evaluation and choosing of a design. Design Communication; Realization of the concept into a configuration, drawing and model. Concept of “Complex is Simple”. Design for function and strength. Design detailing- Material selection	
<b>UNIT-III</b>	<b>[10]</b>
<b>Prototyping</b> Rapid prototyping; testing and evaluation of design; Design modifications; Freezing the design; Cost analysis. Engineering the design, From prototype to product. Planning; Scheduling; Supply chains; inventory; handling manufacturing/ construction operations; storage; packaging; shipping; marketing; feed-back on design.	
<b>UNIT-IV</b>	<b>[12]</b>
<b>Modular design</b> Design optimization; Design as a marketing tool; Intellectual Property rights –Trade secret; patent; copy-right; trademarks.	

## Method of delivery

Online lectures, Case studies, Hands on exercise.

## Study time

03 Hrs / week for lectures.

### CO-PO Mapping (PO: Program Outcomes)

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	1	–	–	–	2	–			3		
CO-2	–		1	2	–				2		1	
CO-3	–	2			3			1				
CO-4	1		3									

## Blooms Taxonomy and Knowledge retention :



Figure 1: Blooms Taxonomy

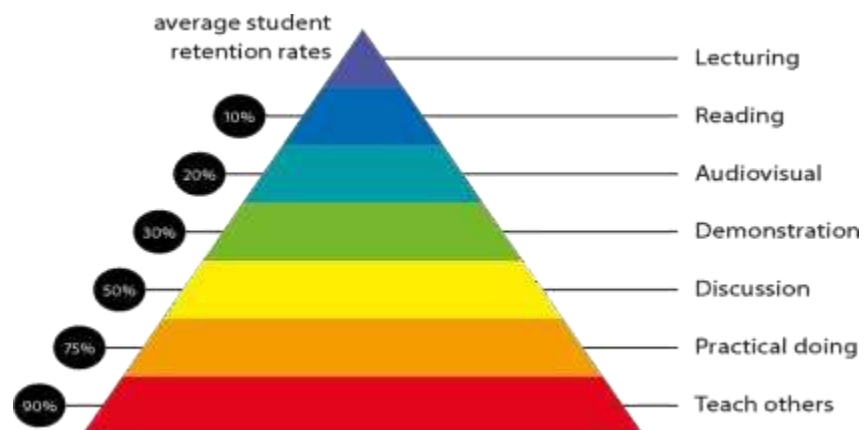


Figure 2: Knowledge retention

## Graduate Qualities and Capabilities covered

General Graduate Qualities	Graduate Capabilities
<b>Informed</b> Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	<b>1 Professional knowledge, grounding &amp; awareness</b>
<b>Independent learners</b> Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	<b>2 Information literacy, gathering &amp; processing</b>
<b>Problem solvers</b> Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	<b>4 Problem solving skills</b>
<b>Effective communicators</b> Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	<b>5 Written communication</b>
	<b>6 Oral communication</b>
	<b>7 Teamwork</b>
<b>Responsible</b> Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	<b>10 Sustainability, societal &amp; environmental impact</b>

**Practical work:**

This subject doesn't have lab sessions.

Lecture : 2 per week

### Marks distribution

Mid sem exam	40 marks
Canvas (Mind mapping+Empathy)	10 marks
Canvas(Ideation+PDC) :Active Participation	05 marks
attendance	05 marks

### Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

## Details of referencing system to be used in

### written work Text books

1. Balmer, R. T., Keat, W. D., Wise, G., and Kosky, P., Exploring Engineering, Third Edition: An Introduction to Engineering and Design - [Part 3 - Chapters 17 to 27]
2. Dym, C. L., Little, P. and Orwin, E. J., Engineering Design - A Project based introduction Wiley.
3. Pahl, G., Beitz, W., Feldhusen, J. and Grote, K. H., Engineering Design: A Systematic Approach, 3rd ed. 2007. Additional Materials

Lecture materials are available with concern faculties

## ASSESSMENT GUIDELINES

**Your final course mark will be calculated from the following:**

## SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e. internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.



### **Late Work**

Late assignments will not be accepted without supporting documentation. Late work of the reports will result in a deduction of 10% of the maximum mark per calendar day.

### **Format**

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

### **Retention of Written Work**

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

### **University and Faculty Policies**


Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

**Plagiarism** - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

***Do not copy the work of other students.***

***Do not share your work with other students (except where required for a group activity or assessment)***

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Design and its objectives; Design constraints, Design functions, Role of Science, Engineering and Technology in design	CO 1	PPT, Case studies
	Weeks 2	Engineering as a business proposition; Functional and Strength Designs. How to initiate creative designs? Initiating the	CO 1	Case studies, Board & Chalk
		thinking process for designing a product of daily use.		
	Week 3	Need identification; Problem Statement; Market survey- customer requirements; Design attributes and objectives; Ideation; Brain storming approaches; arriving at solutions; Closing on to the Design needs.	CO 2	Hands on exercise
	Week 4	<b>Design process</b> Different stages in design their and significance; Defining the design space; Analogies and “thinking outside of the box”	CO 3	Poster preparation
	Week 5	Quality function deployment- meeting what the customer wants; Evaluation and choosing of a design. Design Communication	CO 2	PPT, & Chalk Talk
	Week 6	Realization of the concept into a configuration, drawing and model. Concept of “Complex is Simple”. Design for function and strength. Design detailing- Material selection	CO 3	Brain storming through examples
	Week 7	Group Presentation 1	CO 4	
	Week 8	Rapid prototyping; testing and evaluation of design; Design modifications; Freezing the design; Cost analysis.	CO 2	PPT, Video

		Engineering the design, From prototype to product. Planning;	CO 2	 <b>INDUS UNIVERSITY</b>
	Week 9	Scheduling; Supply chains; inventory;		Case studies
		handling manufacturing/construction		
		operations; storage; packaging; shipping; marketing; feed-back on design.		
	Week 10	Design Canvas		
	Week 11	<b>Modular design</b> Design optimization; Design as a marketing too	CO-4	PPT. Case studies
	Week 12	Intellectual Property rights – Trade secret; patent; copy-right; trademarks.	C O 4	PPT, Case studies
	Week 13	Design Canvas		