Name of Institute: Institute of Technology and EngineeringName of

Faculty: Prof. Dharmendra Sapariya

Course code: ME0020

Course name: Design Thinking (Open Elective)

Credit points: 03

Offered Semester: 2nd

Course coordinator :

Full name: Dharmendra Sapariya
Department with sitting location: Drawing Hall 4, 3rd Floor, Bhanwar building

Telephone: 8866245022

Email: dharmendrasapariya.me@indusuni.ac.in

Consultation times: 9.00am to 5:00pm

Course lecturer :

Full name: Dharmendra Sapariya
Department with sitting location: Drawing Hall 4, 3rd Floor, Bhanwar building

Telephone: 8866245022

Email: dharmendrasapariya.me@indusuni.ac.in

Consultation times: 9.00am to 5:00pm

Full name: Zankar Yadav
Department with sitting location: Mechanical workshop, Bhanwar building

Telephone: 8511225519

Email: zankaryadav.me@indusuni.ac.in

Consultation times: 9.00am to 5:00pm

Students will be contacted throughout the session via mail with importantinformation 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 toapply them in practice when called for.
2. Aware of the product oriented and user oriented aspects that make the design asuccess.
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:

UNIT-I [14]

Introduction to Design Thinking

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.

UNIT-II [12]

Design process

Different stages in design and their significance; Defining the design space; Analogies and "thinking outside of the box"; Quality function deployment-meetingwhat 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 forfunction and strength. Design detailing- Material selection

UNIT-III [10]

Prototyping

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.

UNIT-IV [12]

Modular design

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: BloomsTaxonomy

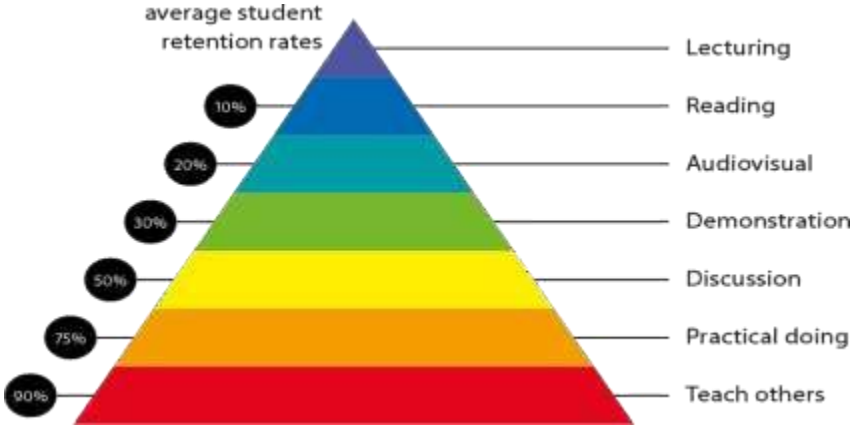

Figure 2: Knowledgeretention

Graduate Qualities and Capabilities covered

General Graduate Qualities	Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locallyand internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners 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.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logicaland critical thinking skills to respondeffectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators 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.	**5 Written communication** **6 Oral communication** **7 Teamwork**
Responsible 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.	**10 Sustainability, societal & environmental impact**

Practical work:

This subject doesn't have lab sessions.

Lecture/tutorial times

2nd IT A	
Lecture	Tuesday (10.00 to 11.00)
	Wednesday (10.00 to 11.00)
	Thursday (11.10 to 12.10)
2ndIT B	
Lecture	Wednesday (11.10 to 12.10)
	Thursday (10.00 to 11:00)
	Friday (11.10 to 12.10)

Marks distribution

Mid Semester Exam	40 marks
Canvas (Mind Mapping+Empathy)	10 marks
Canvas(Ideation+PDC) :Active Participation	05 marks
Attendance	05 marks
End Semester Exam (ESE Theory)	40 marks
Total	100 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 whererequired for a group activity or assessment)

Course schedule:

	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 thinking process for designing a product of daily use.	CO 1	Case studies, Board & Chalk
	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	**Design process** Different stages in designtheir and the significance; Defining 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, & Chal k 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 stormi ng 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

Week 9	Engineering the design, From prototype to product. Planning; Scheduling; Supply chains; inventory; handling manufacturing/construction, operations;storage; packaging; shipping;marketing; feed-back on design.	CO 2	Case studies
	Design Canvas	CO 3	
Week 10			
Week 11	**Modular design** Design optimization; Design as a marketing too	CO 4	PPT. Case studies
Week 12	Intellectual Property rights, Trade secret; patent; copy-right; trademarks.	CO 4	PPT, Case studies
Week 13	Design Canvas	CO 4	
Week 14	Submission work		