

DSN2096	Engineering Design	LT	2
Prerequisite:	To be registered from 3 <sup>rd</sup> Semester of Study		
Objectives:			
<ul style="list-style-type: none"><li>● To enhance the creative design knowledge and procedural plan.</li><li>● To understand the iterative engineering design process.</li><li>● To understand reliability, safety and regulation concerns in the product design.</li><li>● To develop written and oral communication skills.</li><li>● To develop professional behavior, teamwork and leadership skills.</li><li>● To understand the importance of sustainable design solutions.</li></ul>			
Expected Outcomes:			
Students will be able to:			
<ul style="list-style-type: none"><li>● Apply the process of engineering design</li><li>● Approach the engineering design problems in a systematic way</li><li>● Work as a team</li><li>● Effectively articulate ideas</li><li>● Manage the design schedule effectively</li><li>● Apply the design knowledge in real-time and societal context</li></ul>			
SOs:		c, d, e, g, k	
Module No	Module Content	No. of hours	SOs
1	<b>Introduction to Engineering design process:</b> Design History; Dieter Rams Principles of Good Design; Overview of Engineering Design Process: Problem Formulation, Concept generation, Project Planning and Design Making; Human Centered Design (HCD);	4	e
2	<b>Design Thinking for Innovation:</b> Design Thinking as Mindset, Process and Toolbox., Enhancing Design Thinking Through, Empathy, Interviewing, Questioning & Brainstorming Tools for Design Thinking: Mind Mapping, Innovation Flowchart - Question ladder - SCAMPER(for products) Journey Mapping, Task analysis grid (for services )	4	c
3	<b>Engineering Design Approaches:</b> Professional and societal Context of Design; Different types of design – Conceptual, Embodiment designs and Detailed designs - Identification and Specifications, Standards and codes, Design Features - Design for Aesthetics, Production, Standards, Minimum risk, Ease of maintenance, Quality, Minimum cost and Optimum Design. Service Design - People - Asserts - policies - culture. Iterative process - Exploration - Creation - Reflection - Implementation.	6	c, d
4	<b>Usability &amp; Reliability:</b> Usability - User requirement; User experience; Usability testing ; Customer Co-creation <b>Reliability &amp; Safety</b> – Human and equipment, safety, Risk analysis, and security, System reliability. <b>Use of e-engineering</b> – Modeling, Simulation and Verification.	3	e
5	<b>Prototyping and Visualization:</b> Design Cycle Model, Metaphor method: Theory and methodology of concept generation, Blend method & Thematic Method. Conceptual Design & Design capability and sociality. Prototyping & Visualization Design Tools – E-tools	5	d, g

6	<b>Sustainable Design:</b> Concepts of sustainable development, Sustainable design principles - Design for Environment; Life Cycle Assessment; Models of sustainable design- Biomimicry, Eco Design, Recycling; Social Innovation.	3	c
7	<b>Communication</b> Articulating design ideas: Storytelling; Sketching & Dynamic Diagrams; K Scripts	3	g
8	<b>Guest Lecture on Contemporary Topics</b>	2	k
	<b>Total Lecture:</b>	<b>30</b>	
<b>Tutorials:</b> <ul style="list-style-type: none"><li>Design Project Progress Report #1 (Oral): Design for the Environment &amp; Future Challenges - Draft engineering action plan.</li><li>Design Project Report #2 (Written): Draft engineering action plan and Project Management.</li></ul>			g, k
<b>Mode of Teaching and Learning:</b> Flipped Classroom, One Lecture to be videotaped, Digital/Computer based models to augment lecture for practice/tutorial, 2 hours lectures by industry experts on contemporary topics			
<b>Mode of Evaluation and assessment:</b> <ul style="list-style-type: none"><li>Design Project Progress Report #1 (Oral): 15 %</li><li>Design Project Report #2 (Written): 20%</li><li>Continuous Assessment Tests: 30%</li><li>Final Examinations: 30%</li><li>Attendance: 5%</li></ul>			
<b>Text Books:</b>			
1.	Huge Jack, “Engineering Design, Planning, and Management” Academic Press, 2013.		
2.	Gerhard Pahl, Wolfgang Beitz “Engineering Design: A Systematic Approach” 2014.		
<b>Reference Books:</b>			
1.	Barry Hyman, “Fundamentals of Engineering Design”, 2 <sup>nd</sup> edition, Pearson Education, 2003.		
2.	William C. Oakes and Les L. Leone, “Engineering Your Future: A Comprehensive Introduction to Engineering”, 8 <sup>th</sup> Edition, Oxford University Press, 2014.		
3.	Crispin Hales, Shayne Gooch, “Managing Engineering Design”, II Edition, Springer, 2004.		
4.	Tracy Bhamra, Vicky Lofthouse, “Design for Sustainability: A Practical Approach”, Taylor and Francis, 2017.		
5.	Walter Brenner, Falk Uebernickel, “Design Thinking for Innovation: Research and Practice”, Springer, 2016.		
<b>Recommendation by the Board of Studies on</b>			
<b>Approval by Academic council on</b>			
<b>Compiled by:</b>		<b>Dr.Vetrivelan.P</b>	