

Course Code	ME 220
Course Title	Engineering Design and Innovation
No. of Credits	3
Pre-requisites	None
Compulsory/Optional	Compulsory for Mechanical Engineering stream
Aim(s):	
To provide a thorough exposure to the process of systematic design methodology from a systems engineering perspective with a high emphasis on multi-disciplinary design aspects so that the students will be able to create innovative and realistic customer-driven engineered products.	
Intended Learning Outcomes:	
On successful completion of the course, the students should be able to;	
<ul style="list-style-type: none"> • extract necessary information of a customer-driven engineered product to represent it using free hand sketches, 2D multi-view drawings, 3D solid models for recreation, • apply systematic techniques to develop innovative design concepts by considering a broad spectrum of design alternatives, • use system design methodologies and tools to incorporate multi-disciplinary aspects in the engineering design, • demonstrate the ability to contribute to the output of a self-managed team, • defend the total design of the customer-driven engineered product orally and in writing. 	
Time Allocation (Hours) : Lectures 11, Assignment 68	
(Notional Hours : 150)	
Course content / Course description :	
<ul style="list-style-type: none"> • Introduction to Reverse Engineering: Information extraction, Development of part models, Assemblies and drawings. • Introduction to Product Design: Types of design, Influence of design on cost and quality; Life cycle assessment. Practices in generating creative design solutions, Technology and innovative engineering solutions. • Problem Definition: Problem statement; Customer needs and market analysis, Competitive product study (Benchmarking), Literature review, Product design specifications, Quality function deployment, Financial model and business plan, Design review. • Concept Generation and Evaluation: Functional decomposition, Brainstorming, Preliminary concept evaluations, Feasibility analysis, Technology readiness assessment, Decision matrix, Concept selection, Design review. • Ergonomics in Mechanical Design: Human factors, Principles of user-friendly designs. • Design for Sustainability: Environmental impact, Green design, Life cycle analysis, Design for zero waste, Design for re-use. • Product Design: Selection of a design, Assembly/Parts CAD modeling, Bill of materials, Performance analyses, Assembly analysis, Economic analysis, Final design presentation. • Intellectual Property: Intellectual property and patents. 	

Recommended Texts (if any) :

- Ullman, D. G. (2010). *The Mechanical Design Process* (4th Edition). McGraw-Hill, New York, USA.
- Budynas–Nisbett (2008). *Shigley’s Mechanical Engineering Design* (8th Edition). McGraw Hill, New York, USA.
- Hassan, M.H. (2016). *Systems Engineering Innovation and Design* (1st Edition). CreateSpace Independent Publishing Platform, North Charleston, South Carolina, USA.
- Singhose, W. & Donnell, J. (2012). *Introductory Mechanical Design Tools* (1st Edition). Lulu Press, Inc, Morrisville, North Carolina, USA.
- Cleghorn, W. & Dechev, N. (2014). *Mechanics of Machines* (2nd Edition). Oxford University Press, Oxford , UK.

Assessment	Percentage Mark
In-course	
Tutorials/ <u>Assignments</u> / <u>Quizzes</u> /Practicals	70
Mid Semester Examination	-
End-semester Examination: Report and Presentations	30