Subject Description Form

Subject Code	ME32003
Subject Title	Design and Manufacturing
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide students in-depth knowledge and skills on the product analysis and simulation, use of CAD/CAE, manufacturing and prototyping techniques of products. 2. To introduce students advanced computer modelling and finite element modelling and analysis techniques during the product design process. 3. To enhance students knowledge on environmental impact and marketing skills during the design of products and engineering components.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Formulate and solve problems related to multi-body mechanical systems by applying knowledge in mathematics and engineering. b. Determine forces and moments acting on any simple structure by applying knowledge in mathematics and engineering. c. Complete a given task on design and optimization of any product using CAD/CAE tools necessary for engineering practice. d. Complete a product related task involving manufacturing process, competitiveness, environmental impact and product management. e. Analyze and optimize any design/structure of a self-chosen design project with the help of CAE tools and present effectively by writing reports.
Subject Synopsis/ Indicative Syllabus	***Computer-aided Analysis in Product Design*** Fundamentals in Computer-aided Engineering (CAE), 3-D Product Analysis, Design Optimisation Technique, CAD and CAM integration ***Integrated Products and Process Design*** Concurrent Engineering, Reverse Engineering, Documenting of Design Process Knowledge, Environmental Impact, Computer-aided Manufacturing (CAM), Internet Applications in Product Design and Manufacture, Process Development and DFX Strategies ***Product Management and Manufacturing Competitiveness*** Product Master Platform, Manufacturing and Supply Chain Planning, Six Sigma Technique of Quality Improvement, Product Life-cycle Management (PLM)

Teaching/Learning Methodology

Lectures are used to deliver the required knowledge of engineering design and manufacturing (outcomes a to d).

Tutorials and computer workshops are used for training of using CAE tools for design analysis (outcome c).

Project and case studies are useful for the study and solving real-life engineering problems (outcomes c to e).

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lecture	√	√	√	√	
Tutorial / computer workshop			√		
Project / case study			√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
1. Assignment	10 %	√	√	√	√	
2. Test	15 %	√	√		√	
3. Training report	5 %			√		
3. Project report	20 %			√	√	√
3. Examination	50 %	√	√		√	
Total	100 %					

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Overall Assessment:

0.5 × End of Subject Examination + 0.5 × Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by the tests, assignments and laboratory reports which provide timely feedbacks to both lecturers and students on various topics of the syllabus. Written report and oral presentation on a specific project or case study is used to assess students' on the application of their knowledge and computer tools learnt in this subject to solve a real-life design problem.

Student Study Effort Expected	Class contact:	
	▪ Lecture and seminar	33 Hrs.
	▪ Tutorial	4 Hrs.
	▪ Workshop	2 Hrs.
	Other student study effort:	
	▪ Case study / Mini project	20 Hrs.
	▪ Assignment	12 Hrs.
	▪ Self-study	42 Hrs.
	Total student study effort	113 Hrs.
Reading List and References	1. Parviz E.N. Computer-aided analysis of mechanical systems. Prentice-Hall, latest edition. 2. George E. Dieter. Engineering Design. 3rd Ed. McGraw-Hill International Editions, Singapore, latest edition. 3. Kunwoo Lee. Principles of CAD/CAM/CAE Systems. Addison Wesley Longman, USA, latest edition. 4. Magrab. An engineer's guide to MATLAB. 2nd ed. Prentice Hall, latest edition. 5. Tirupathi R. Chandrupatla, Ashok D. Belegundu. Introduction to finite elements in engineering. Prentice Hall, latest edition. 6. Vince Adams and Abraham Askenazi. Building Better Products with Finite Element Analysis. Onword Press, USA, latest edition. 7. D.H. Stamatis. Six Sigma fundamentals : a complete guide to the system, methods and tools**.** Productivity Press, latest edition.	

Revised July 2014