Subject Description Form

Subject Code	ME42006
Subject Title	Product Modeling and Prototyping
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ME42005 CAD/CAE Technologies for Product Development
Objectives	To teach students the virtual prototyping, product data management (PDM), reverse engineering (RE) and rapid prototyping (RP) technologies and their applications in product development.
Intended Learning Outcomes	Upon completion of the subject, students will be: a. Provided with the principle and knowledge of product structure modeling and its application in product design and development. b. Able to employ the computer-aided design (CAD) and computer-aided engineering (CAE) related technologies for virtual prototyping of design concepts. c. Equipped with the basic concepts and knowledge of PDM and familiar with at least one commercial PDM software system. d. Able to use the techniques of reverse engineering and apply them in new product development, including product creation, revision and how to use it in rapid modeling. e. Able to use the rapid prototyping techniques for development of product prototypes for function, fit and form testing in product design and development.
Subject Synopsis/ Indicative Syllabus	***Product Structure Modeling*** - Product structure concepts. - The modeling process. - Process date model - Plastic Processing. - case studies ***Product Data Management*** - Background and basic concepts - PDM systems - Applications and case studies ***Virtual Prototyping*** - Background ground, business drivers and basic concepts. - Enabling technologies - Applications and case studies.

Reverse Engineering
- Background ground, business drivers and basic concepts.
- Enabling technologies
- Applications (Application filed and prospect of RE, steps in RE, technologies applied in RE, 3D scanning and digitizing).

Rapid Prototyping Technology
- Rapid Prototyping Processes and Interfacing.
- Rapid Tooling.
- Safety and Environmental Control in RP.

Laboratory Experiment:
Using RP technology to make real parts

Tutorials:
Using related software systems to illustrate the applications of the related technologies.

Teaching/Learning Methodology

Lectures are used to deliver the fundamental knowledge related to advanced manufacturing processes and rapid prototyping technology. (Outcomes a to c)

Tutorials and case studies are used to illustrate the application of fundamental knowledge to practical situations. (Outcomes a to d)

Experiments are used to relate the concepts to practical applications and students are exposed to hand-on experience, proper use of equipment and application of analytical skills on interpreting experimental results. (Outcomes d and e)

Mini-project/study report is used to enhance the understanding and use of the learned knowledge. (Outcomes a to e)

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lecture	√	√	√		
Tutorials and case study	√	√	√	√	
Experiment				√	√
Mini-project / study report	√	√	√	√	√

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. Test	20%	√	√	√	√	√
2. Homework/assignment	20%	√	√	√	√	√
3. Laboratory report	10%				√	√
4. Examination	50%	√	√	√	√	√
Total	100%					

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Overall Assessment: 0.50 × End of Subject Examination + 0.50 × 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.	
Student Study Effort Expected	Class contact:	
	▪ Lecture and seminar	30 Hrs.
	▪ Tutorial	7 Hrs.
	▪ Laboratory work and workshop	2 Hrs.
	Other student study effort:	
	▪ Performing mini-project/study report	20 Hrs.
	▪ Course work	23 Hrs.
	▪ Literature search and private study	22 Hrs.
	Total student study effort	104 Hrs.
Reading List and References	1. R. Budde, Prototyping: An Approach to Evolutionary System Development, Springer-Verlag, Berlin, New York, latest edition. 2. Rapid Prototyping, CK Chua, KF Leung, SC Lim, World Scientific, latest edition. 3. B. Benhabib, Manufacturing: Design, Production, Automation and Integration, Marcel Dekker, latest edition. 4. P.N. Rao, CAD/CAM Principles and Applications, McGraw Hill, latest edition. 5. S. Kalpakjian, S. Schmid, Manufacturing engineering and technology, Prentice Hall, latest edition.	

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