Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME548</td></tr>
<tr><td>Subject Title</td><td>Computer Aided Product Analysis</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>5</td></tr>
<tr><td>Pre-requisite/
Co-requisite/
Exclusion</td><td>Students should have basic knowledge in Mechanical Engineering; Building Service Engineering; Civil & Structural Engineering; Manufacturing Engineering; Product Design & Engineering.</td></tr>
<tr><td>Objectives</td><td>To provide students with good understanding of the CAD and CAE technologies. The subject covers computer aided analysis, integration of CAD and CAE, and virtual engineering.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess knowledge in the area of principle and formulations of finite element method, computer aided design and engineering;
b. analyze static and dynamic stress and strain behaviors of structures and products using CAD and CAE techniques;
c. apply their knowledge and skills to design and develop new products; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Geometric Modeling Systems: Wireframe modeling systems; surface modeling systems; solid modeling systems.
Computer Aided Analysis: Introduction to finite element analysis; finite element software; automatic mesh generation; node connection approach; topology decomposition approach; geometry decomposition approaches; grid-based approach; mapped element approach; improvement of mesh quality; case study.
Finite Element Models of Aircraft Structure: Truss elements; Beam elements; Plate elements; and Shell elements.
Structural Optimization: Sizing optimization; shape optimization; topology optimization; case study.
Virtual Engineering: Definition of virtual engineering; components of virtual engineering; virtual design; digital simulation; virtual prototyping; product lifecycle management.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for computer aided analysis.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
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Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignment	25%	√	√	√	√
2. Test	10%	√	√	√	√
3. Project report and presentation	25%	√	√	√	√
4. Examination	40%	√	√	√	√
Total	100%				

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

Overall Assessment:

$0.40 \times$ End of Subject Examination + $0.60 \times$ Continuous Assessment

The continuous assessment consists of three components: homework assignments, test, and project report & presentation. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

The examination is used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case Study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	42 Hrs.
▪ Case study report preparation and presentation	24 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Lee K., *Principles of CAD/CAM/CAE Systems*, Addison Wesley, latest edition.
2. Law A. M. and Kelton D. W., *Simulation Modeling and Analysis*, McGraw-Hill, latest edition.
3. Przemieniecki, J. S., Finite Element Structural Analysis, New Concepts, AIAA, latest edition.
4. Donaldson, B. K., Analysis of Aircraft Structures, An Introduction, Cambridge University Press. Latest edition.