Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME552</td></tr>
<tr><td>Subject Title</td><td>Integrated Engineering Design</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 a good foundation in mechanical sciences.</td></tr>
<tr><td>Objectives</td><td>To provide the students with practical experiences in the consecutive stages in design, analysis and development of a new product; to introduce various important considerations in product design and development, and their integration with critical engineering analysis in producing a new product; to introduce project management techniques in producing a new product.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of engineering design and product development process;
b. be able to apply their knowledge and contribute to professional competence, including ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability;
c. work as an effect team member and have the readiness in assuming a leadership role in a design project;
d. think holistically, critically, strategically and creatively in dealing with complex problems and situations pertinent to a design project.
e. have a good mastery of critical and creative thinking skills and generate practical and innovative solutions to novel problems; and
f. have an ability to recognize the need and engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Conceptual Product Design: Customer needs and market situation; technical and business concerns; environmental issues; cultural and social issues; aesthetic and semantic issues; establish product function; visualization skills and CAD.
Engineering Analysis of Design: Benchmarking and establishing engineering specifications of the product; design concept selection; product embodiment: design refining and system modeling; analytical and numerical model solutions; design for manufacture and assembly; CAE and optimization.
Product Development Techniques: Goals of prototyping; types and uses of prototypes; rapid prototyping techniques; physical models and experimentation.</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 integrated engineering design.
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="6">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr>
<tr><td>1. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</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><td>√</td><td>√</td></tr>
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</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	e	f
1. Homework assignment	20%	√	√	√	√	√	√
2. Test	20%	√	√		√	√	√
3. Case study report and presentation	20%	√	√	√	√	√	√
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 case study 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	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Pahl G. and Beitz W., *Engineering Design*, Springer-Verlag, latest edition.
2. Ulrich K. and Eppinger S., *Product Design and Development*, McGraw-Hill, latest edition.
3. Otto K. and Wood K., Product Design: *Techniques in Reverse Engineering and New Product Development*, Prentice Hall, latest edition.
4. Clausing D., *Quality Function Deployment*, MIT Press, latest edition.
5. Crawford C. M. and Di Benedetto C.A., *New Product Management*, McGraw-Hill, latest edition.
6. Cooper R. G., Winning at *New Products: Accelerating the Process from Idea to Launch*, Perseus Books, latest edition.
7. Buchanan R. et al., *The Idea of Design*, MIT Press, latest edition.
8. Adams J. L., *Conceptual Blockbusting: a Guide to Better Ideas*, Addison-Wesley, latest edition.