

Subject Description Form

Subject Code	ME572																									
Subject Title	Design for Sustainable Development																									
Credit Value	3																									
Level	5																									
Pre-requisite/ Co-requisite/ Exclusion	Students should have basic knowledge in engineering and applied sciences.																									
Objectives	To provide students with knowledge of design for sustainable development.																									
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. possess the knowledge of environmental issues in the manufacturing environment, environmental management system and design for environment; b. apply their knowledge, skills and hand-on experience to design for environment; and c. have recognition of the need for, and an ability to engage in life-long learning. 																									
Subject Synopsis/ Indicative Syllabus	<p>Introduction to Environmental Issues in the Manufacturing Environment: Global environmental issues; environmental issues in the manufacturing environment: air quality, water quality and hazardous waste issues; impact on our environment and health hazards; sustainable development.</p> <p>Environmental Management System: Environmental management standards; development of ISO 14000 series; design and implementation of environmental management system; environmental auditing, environmental performance, life cycle assessment, and environmental labels and declarations; environmental products declarations.</p> <p>Design for Environment: Introduction to design for environment; product life cycle; eco-design and traditional design; sustainable product design; integrated product and process design and development; eco-design strategies; packaging and distribution. materials recycling.</p>																									
Teaching/Learning Methodology	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 50%;">Teaching/Learning Methodology</th> <th colspan="3" style="text-align: center;">Intended subject learning outcomes</th> </tr> <tr> <th style="width: 16.6%;">a</th> <th style="width: 16.6%;">b</th> <th style="width: 16.6%;">c</th> </tr> </thead> <tbody> <tr> <td>1. Lecture</td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> </tr> <tr> <td>2. Tutorial</td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> <td></td> </tr> <tr> <td>3. Homework assignment</td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> <td></td> </tr> <tr> <td>4. Case study report and presentation</td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> <td style="text-align: center;">√</td> </tr> </tbody> </table> <ol style="list-style-type: none"> 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 design for sustainable development. 3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions. 			Teaching/Learning Methodology	Intended subject learning outcomes			a	b	c	1. Lecture	√	√	√	2. Tutorial	√	√		3. Homework assignment	√	√		4. Case study report and presentation	√	√	√
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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			
	1. Homework assignment	15%	√	√				
2. Test	20%	√	√					
3. Case study report and presentation	15%	√	√			√		
4. Examination	50%	√	√					
Total	100%							
<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Overall Assessment:</p> <p style="text-align: center;">$0.50 \times \text{End of Subject Examination} + 0.50 \times \text{Continuous Assessment}$</p> <p>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.</p> <p>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.</p>								
Student Study Effort Expected	Class contact:							
	▪ Lecture		24 Hrs.					
	▪ Tutorial/Case study		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	<ol style="list-style-type: none"> Allen D.T. and Shonnard D.R., <i>Green Engineering- Environmentally Conscious Design of Chemical Processes</i>, Prentice Hall, latest edition. Azapagic A. and Perdan S., <i>Sustainable Development in Practice</i>. John Wiley, latest edition. Block M.R., <i>Effective Implementation of ISO 14001</i>, ASQ Quality Press, latest edition. Fiksel J., <i>Design for Environment: Creating Eco-Efficient Products and Processes</i>, McGraw Hill, latest edition. Giudice F., Rosa G.L. and Risitano A., <i>Product Design for the Environment: A Life Cycle Approach</i>, CRC Press, latest edition. Goosen M.F.A., Schaffner, F.C., Laboy-Nieves, E.N. and Abdelhadi, A.H., <i>Environmental Management, Sustainable Development and Human Health</i>, CRC Press, latest edition. Kinsella J. and McCully, A.D., <i>Handbook for Implementing an ISO 14001 Environmental Management System: a Practical Approach</i>, Shaw Environmental, latest edition. Morris A.S., <i>ISO14000 Environmental Management Standards- Engineering and Financial Aspects</i>, John Wiley & Sons Ltd., latest edition. Piper L., Ryding S.O. and Henricson C., <i>Continual Improvement with ISO14000</i>, IOS Press, latest edition. Sheldon C. and Yoxon M., <i>Environmental Management Systems: a Step-by-Step Guide to Implementation and Maintenance</i>, Earthscan, latest edition. Wright R.T., <i>Environmental Science: Toward a Sustainable Future</i>, Pearson/Prentice Hall, latest edition. <p>Journals:</p> <ul style="list-style-type: none"> International Journal of Sustainable Development and Planning, WIT Press. International Journal of Sustainable Engineering, Taylor & Francis. Sustainable Development, Wiley InterScience. The Journal of Sustainable Product Design, Springer. 							