City University of Hong Kong
Course Syllabus

offered by
Department of Mechanical Engineering
with effect from Semester B 2019 / 2020

Part I Course Overview

Course Title:	Sustainable Green Manufacturing
Course Code:	MNE6051
Course Duration:	1 semester
Credit Units:	3 credits
Level:	P6
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites : *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	MBE6051/MNE8119 Sustainable Green Manufacturing
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

This course aims to introduce and explain the design concepts, methods, tools and some technologies, and operations of sustainable lean and green manufacturing systems and processes. It also covers the assessment, audit, design and maintenance of sustainable green manufacturing products, processes, service systems, and leads towards the entire greening process of multi-lifecycle manufacturing operations, factories and their supply chains.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	**Explain** the design concepts, methods, tools, the key technologies and the operation of sustainable green manufacturing.		✓	✓	
2.	**Apply** the principles, techniques and methods to customize the learned generic concepts to meet the needs of a particular industry/enterprise.			✓	✓
3.	**Identify** the strategies for the purpose of satisfying a set of given sustainable green manufacturing requirements.			✓	
4.	**Design** the rules and processes to meet the market need and the green manufacturing requirements by selecting and evaluating suitable technical, managerial / project management and supply chain management schemes.			✓	✓
		N.A.			

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Lecture	Large class activities: Lectures on the topics of the keyword syllabus.	✓	✓			2 hrs/week
Tutorial	Group work activities Group projects are given to students for the investigation in relation to the CILOs. Students will discuss the projects during the tutorial period. The group assessment is based on the group presentation and the group report.	✓	✓	✓	✓	1 hr/week
Self study	Individual work activities Students are required to carry out self study on webs and search appropriate technical and managerial information/data in conjunction with the lecturing materials to accomplish a set of given requirements. The work of the self study will be presented as an individual report for assessment.	✓	✓	✓	✓	(20 hours)

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.				Weighting	Remarks
	1	2	3	4		
Continuous Assessment: 50%						
Group presentation & report	✓	✓	✓	✓	25%	5% of the marks is based on the presentation and 20% is based on the report of the softcopy of PPT.
Individual report	✓	✓	✓	✓	25%	20% of the marks is based on the accomplishment of satisfying the given requirements and 5% is based on the write-up of peer Assessment.
Examination: 50% (duration: 2 hours)						
Examination	✓	✓	✓	✓	50%	
					100%	

For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	1.1 Ability to explain in detail the design concepts and the operations of the sustainable green manufacturing systems 1.2 Ability to identify the strategies in satisfying a set of given requirements to a green manufacturing enterprise 1.3 Capacity for applying accuracy methods to design and manufacture green products.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Group presentation & report	Ability to explain in detail and with accuracy methods of inquiry useful in analysing to develop sustainable green strategy and the design of a manufacturing enterprise for greener environment.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Individual report	3.1 Capacity for self-directed learning on webs and search appropriate information/data in conjunction with the lecturing materials to accomplish a set of given requirements 3.2 Ability to assess the teamwork.	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Challenges of green manufacturing. Drivers of green manufacturing. Introduction to lean sustainable green manufacturing. Design for Environment. Eco-design. WEEE & RoSH. Recycling and Remanufacturing. Life Cycle Assessment. Environmental Impact Assessment. Industrial Ecology. Industrial Symbiosis. Sustainable Engineering. Humanity and Technology. Analytical methods and computational assessment and design tools for evaluating and designing green manufacturing sustainability processes, requirements, and risks. The sustainable lean and green audit process. International green manufacturing standards and compliance. Green rapid prototyping and rapid manufacturing. Green flexible automation. Green collaboration processes via the Internet. Alternative energy resources. Globally green manufacturing supply chains and logistic networks. Sustainable green manufacturing system design and project management. International industrial and research case studies from the USA, Europe, Japan, Hong Kong, China and elsewhere.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

Nil

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Edited by: David Dornfeld. “Green Manufacturing: Fundamentals and Applications” Springer. 2013.
2.	Nand K. Jha: “Green Design and Manufacturing for Sustainability”. CRC Press. 2015
3.	Edited by: J. Paulo Davim “Green manufacturing processes and systems”. Springer. 2013.
4.	T.E. Graedel & B.R. Allenby “Industrial Ecology and sustainable engineering” Pearson Education, Inc. 2010.
5.	David T. Allen & David R. Shonnard “Sustainable Engineering: Concepts, Design and Case Studies” Prentice Hall; 1st Edition. 2012.
6.	Gerald Jonker & Jan Harmsen “Engineering for Sustainability: A Practical Guide for Sustainable Design”. Elsevier. 2012.