

MSE4101: MATERIALS ENGINEERS IN SOCIETY

Effective Term

Semester A 2023/24

Part I Course Overview

Course Title

Materials Engineers in Society

Subject Code

MSE - Materials Science and Engineering

Course Number

4101

Academic Unit

Materials Science and Engineering (MSE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

For Nominative 4-year Degree Students

At least 60 CUs have been completed

For Advanced Standing Students

At least 45CUs (for Advanced Standing I) / 39CUs (for Advanced Standing II) have been completed (Credits of exempted courses are counted regardless of the completion time of replacement courses)

Precursors

Nil

Equivalent Courses

MSE2066 Materials Engineers in Society

Part II Course Details

Abstract

The course aims to provide students with knowledge in the obligations, roles and professional conduct of a materials engineer in a modern society. It stimulates students to have a basic awareness of the legal, environmental and socio-economic factors (economic, ethics, etc.) which have a significant impact on the choice of engineering solution. Eminent professionals are invited to deliver some of the lectures, aiming to provide students with an element of social analysis adequate to the society in which they will work in.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Recognise the professional and ethical responsibilities of materials engineers, with special emphasis on regional development.	20	x		
2	Communicate effectively with professionals and others in the workplace.	20		x	
3	Recognise the impact of technology on the society, economy, and politics of the world, the responsibilities of environmental protection and the duties of securing health and safety in the workplace.	10	x		
4	Recognize the need for, and to engage in life-long learning.	10	x		
5	Stay abreast of modern technologies beneficial to mankind.	20			x
6	Explore the materials engineering area for discovery of sustainable engineering solution.	20		x	

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 real-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.

Teaching and Learning Activities (TLAs)

TLAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Topics related to the role of materials engineer in the local and global context.	1, 3, 4, 5	20

2	Tutorial	Discussion/debate/ presentation on contemporary issues related to materials engineering.	1, 2, 3, 4, 5, 6	20
3	Technical visits & report	Organise and/or participate in factory and company visits. (2-4 visits)	2, 3, 5	10-15
4	Interview & report	Interview engineers, professors or relevant professionals about a social issue related to the engineering profession.	1, 2, 3, 6	10
5	Essays	Reflection/report after (a) attending seminars, (b) reading some selected articles or book chapters relevant to the profession of materials engineering. (5-10 essays)	1, 2, 3, 4, 5	20
6	Individual investigation	Investigate on an assigned engineering issue related to materials science and/ or the general public. An oral presentation is required.	1, 2, 3, 4, 5, 6	30

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes	1, 3, 4, 5	10	
2	Tutorial participation	1, 2, 3, 4, 5, 6	10	
3	Technical visits and reports	2, 3, 5	30	
4	Interview and report	1, 2, 3, 6	10	
5	Essays	1, 2, 3, 4, 5	20	
6	Individual investigation & report	1, 2, 3, 4, 5, 6	20	

Continuous Assessment (%)

100

Examination (%)

0

Additional Information for ATs

To pass the course, students are required to have grade D or above in all continuous assessment components.

Assessment Rubrics (AR)

Assessment Task

Quizzes

Criterion

Understand the important concepts presented in the lectures/talks

Excellent (A+, A, A-)

Score more than 85% in the quizzes

Good (B+, B, B-)

Score more than 70% in the quizzes

Fair (C+, C, C-)

Score more than 55% in the quizzes

Marginal (D)

Score 30-40% in the quizzes

Failure (F)

Score less than 30% in the quizzes

Assessment Task

Tutorial participation

Criterion

Active participation in the tutorial

Excellent (A+, A, A-)

Attend more than 90% of the tutorials actively and punctually

Good (B+, B, B-)

Attend more than 80% of the tutorials actively and punctually

Fair (C+, C, C-)

Attend more than 70% of the tutorials actively and punctually

Marginal (D)

Attend more than 60% of the tutorials actively and punctually

Failure (F)

Attend less than 50% of the tutorials actively and punctually

Assessment Task

Technical visits and reports

Criterion

Participate in technical visits and submit relevant informative short reports

Excellent (A+, A, A-)

A detail report with in-depth reflection about the related industry

Good (B+, B, B-)

An informative report with relevant reflection about the related industry

Fair (C+, C, C-)

An accurate report with simple reflection about the related industry

Marginal (D)

A short report with superficial reflection about the related industry

Failure (F)

A report which is too brief with insufficient reflection about the related industry

Assessment Task

Interview and report

Criterion

Interview a professional and submit a relevant report

Excellent (A+, A, A-)

A detail report with in-depth reflection about the interviewee and the related industry

Good (B+, B, B-)

An informative report with relevant reflection about the interviewee and related industry

Fair (C+, C, C-)

An accurate report with simple reflection about the interviewee and related industry

Marginal (D)

A short report with superficial reflection about the interviewee and related industry

Failure (F)

A report which is too brief with insufficient reflection about the interviewee and related industry

Assessment Task

Essays

Criterion

Write an essay after reading a book chapter or article

Excellent (A+, A, A-)

A detail report with in-depth reflection about the book chapter or article

Good (B+, B, B-)

An informative report with relevant reflection about the book chapter or article

Fair (C+, C, C-)

An accurate report with simple reflection about the book chapter or article

Marginal (D)

A short report with superficial reflection about the book chapter or article

Failure (F)

A report which is too brief with insufficient reflection about the book chapter or article

Assessment Task

Individual investigation & report

Criterion

An independent investigation report and oral presentation of a social/global issue related to materials engineering

Excellent (A+, A, A-)

A detail investigation with in-depth analysis of the social/global issue

Good (B+, B, B-)

An informative investigation with relevant analysis of the social/global issue

Fair (C+, C, C-)

An accurate investigation with simple analysis of the social/global issue

Marginal (D)

A short investigation with superficial analysis of the social/global issue

Failure (F)

An investigation which is too brief with insufficient analysis of the social/global issue

Part III Other Information

Keyword Syllabus

- Introduction to Local Industry
Overview of electronics, materials and IT industries in Hong Kong, and mainland China. The interaction and link of local industry with the Pearl River Delta, and Greater China, Asia Pacific Region, Europe, North America and other newly industrialized countries. Current socio-economic issues in local industry, and its impact on engineering and manufacturing technology (e.g. HKMMA, HKSFS, watch makers and trade unions, ... etc.).
- Society and Engineering
Overview and analysis of the economic, political and social structure of Hong Kong in relation to engineering activities. The role and obligation of an engineer towards society. Engineering professionalism (e.g. HKIE)
- Introduction to Product Engineering
Current quality assurance practices in Hong Kong. Overview of local product engineering skills: integration of design, research, development, production, marketing and sales. Technology transfer. Market competition: price, quality, delivery and product (e.g. HKPC, NAMI, HKDI ... etc.)
- Business Fundamentals for Engineers
Product Life Cycle, Introduction to fundamental elements of business in the engineering sector. Overview of Sales / Marketing management for technical products. Selected case examples. The role of other professionals such as lawyers, solicitors, accountants, ... etc.
- Ethics in Practice
Professional ethics are important to engineers, Offering and acceptance of illegal advantages, Preservation of confidential information, Avoid conflicts of interest (e.g. ICAC).
- Health and safety
Engineer's duties for securing the health, safety and welfare of persons at work, for protecting others against risks to health or safety in connection with the activities of persons at work, for controlling the keeping and use and preventing the unlawful acquisition, possession and use of dangerous substances, and for controlling certain emissions into the atmosphere. Work safety (Labour Dept).
- Environmental Control
Overview of methods, products, and technologies to reduce, reuse, and recycle industrial wastes at the point of generation. Strategies may include, but are not limited to: process changes, separations, feedstock substitutions, product modifications and reformulations, and recovering and treating process wastes for reuse on-site or by another company.
- Testing and Certification

Testing industry, Hong Kong Accreditation Services (HKAS: HOKLAS, HKCAS, HKIAS), ASTM, BSI, GB and other widely used national and international standards. The Hong Kong Council for Testing and Certification (HKCTC) and related international practice and organization.

- Topics of current interest

A selection of about 6 topics of current interest is delivered by guest lecturers who are eminent practitioners in industry and commerce. These may vary from year to year as the guest lecturers may change. For example, the topics may include the art of technical sales, knowledge based economy, public speaking for engineers, TRIZ as means of systematic product innovations, how to build up a charming relationship in professions.

- Professional Career Advising

Professionals are invited from the industry to give talks on career development, SWOTs, manpower demand in the field etc. Data collected from graduate employment surveys are provided to students for reference. Talks from various professional body and trade unions (e.g. HKIE, HKPC, Science Park, NAMNI, HKMMA, HKSFS ... etc.).

Reading List

Compulsory Readings

Title	
1	A Guide to Writing as an Engineer by Beer, David F. Hoboken : John Wiley Inc, 2013. 4th ed.
2	Engineering your future : the professional practice of engineering by Stuart G. Walesh. Hoboken, N.J. : J. Wiley & Sons, c2012. 3rd ed.
3	Website of HKIE http://www.hkie.org.hk/~Eng/html/home/index.asp

Additional Readings

Title	
1	The handbook for quality management : a complete guide to operational excellence by Thomas Pyzdek, Paul Keller. New York : McGraw-Hill, [2013] 2nd ed.
2	Engineering peace and justice : the responsibility of engineers to society by P. Aarne Vesilind. New York ; London : Springer, 2010.
3	Ethics in science and engineering by James G. Speight and Russell Foote. Hoboken, N.J. : Wiley ; Salem, Mass. : Scrivener, c2011.
4	Engineering, social justice and sustainable community development : summary of a workshop by Rachele Hollander, editor ; Nathan Kahl, co-editor ; Advisory group for the center for engineering, ethics and society. National Academy of Engineering. Washington, D.C. : National Academies Press, 2010.
5	Engineering ethics: outline of an aspirational approach by W. Richard Bowen. London : Springer, c2009.