



Curriculum Information Record for a Major/Degree

Department of Materials Science and Engineering Effective from Semester A 2024 / 2025 For Students Admitted/Changed to the Major with Catalogue Term Semester A 2023 / 2024 and thereafter

The information provided on this form is the official record of the major/degree. It will be used for City University’s database, various City University publications (including websites) and documentation for students and others as required.

In specifying the curriculum for a major/degree, “catalogue term” is used to determine the set of curriculum requirements that a student is following. By mapping the student record and the version of curriculum rules applicable, the graduation requirements of individual students will be evaluated accordingly. The catalogue terms of curriculum requirements that students will follow are summarized below (BUS/04/A5R):

<u>Requirements</u>	<u>Catalogue Term</u>
a) Common Requirements <ul style="list-style-type: none"> • Gateway Education • University requirement • College/School requirement 	The same as student’s admission term
<hr/>	
b) Major <ul style="list-style-type: none"> • For normative 4-year degree students who will join the majors allocation exercise • For advanced standing students and 4-year degree students who already have a major at the time of admission • For students who have changed major 	<p>The same as student’s admission term</p> <p>The same as student’s admission term</p> <p>Effective term of the changed major</p>
<hr/>	
c) Stream	Follow the effective term of the associated major

Prepared / Last Updated by

Name:	<u>Prof Stephen TSANG</u>	Academic Unit:	<u>Department of Materials Science and Engineering</u>
Phone/email:	<u>4618/saitsang@cityu.edu.hk</u>	Date:	<u>10 July 2024</u>

City University of Hong Kong

Curriculum Information Record for a Major/Degree

Department of Materials Science and Engineering

Effective from Semester A 2024/ 2025

For Students Admitted/Changed to the Major with Catalogue Term

Semester A 2023 / 2024 and thereafter

Part I Major/Degree Overview**Major** (in English) : Materials Science and Engineering

(in Chinese) : 材料科學及工程

Degree *(For students admitted to the University in 2023/24 and thereafter)*

(in English) : Bachelor of Engineering

(in Chinese) : 工學士

Award Title[#] *(For students admitted to the University in 2023/24 and thereafter)*

(in English) : Bachelor of Engineering in Materials Science and Engineering

(in Chinese) : 工學士(材料科學及工程)

Please make reference to the "Guidelines on Award Titles" approved by the Senate when proposing new award titles or changes to existing award titles (Senate/86/A5R).

1. Normal and Maximum Period of Study

	Normative 4-year Degree	Advanced Standing I (Note 1)	Advanced Standing II (Senior-year Entry) (Note 2)
Normal period of study	4 years	3 years	2 years
Maximum period of study	8 years	6 years	5 years

2. Minimum Number of Credit Units Required for the Award and Maximum Number of Credit Units Permitted

Degree Requirements	Normative 4-year Degree	Advanced Standing I	Advanced Standing II (Senior-year Entry)
Gateway Education requirement *	30 credit units	21 credit units	12 credit units
College/School requirement *	6 credit units	waived	waived
Major requirement	72 credit units (Core: 60 Elective: 12)	72 credit units (Core: 60 Elective: 12)	69 credit units (Core: 57 Elective: 12)
Free electives# / Minor (if applicable)	12 credit units	0 credit unit	0 credit unit
Minimum number of credit units required for the award	120 credit units	93 credit units	81 credit units

Maximum number of credit units permitted	144 credit units	114 credit units	84 credit units
---	-------------------------	-------------------------	------------------------

* For details, please refer to the Curriculum Information Record for Common Requirements.

For students in the Undergraduate plus Taught Postgraduate Degree Programmes, they can take 3 required courses of the Master of Science in Materials Engineering and Nanotechnology to fulfill part of the free elective requirement.

3. Aims of Major

The major aims to educate and produce graduates who will be:

- *equipped with working knowledge of the production, characterization, and service performance of engineering materials;*
- *proficient communicators equipped with a range of disciplines and skills, computer literacy, language proficiency, and the ability to think quantitatively and analyse problems critically;*
- *able to contribute their specialist skills, alongside other engineering specialists, to the design, manufacture, maintenance, testing and safety of engineering components, devices, structures and process plants;*
- *able to demonstrate an awareness of the context within which they work, and take responsibility for*

their own personal and professional development;

- demonstrate the ability to integrate knowledge learned in the major to support in at least an original discovery or creative design relevant to materials engineering.

4. Intended Learning Outcomes of Major (MILOs)

(Please state what the student is expected to be able to do on completion of the major according to a given standard of performance.)

Upon successful completion of this major, students should be able to:

No.	MILOs	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
		A1	A2	A3
1.	apply knowledge of mathematics, science, and engineering appropriate to the materials engineering discipline.		√	√
2.	design and conduct experiments, as well as analyze and interpret data.	√	√	
3.	design a system, component, or process to meet the desired needs within realistic constraints, such as economic, environmental, social, political and ethical expectations, health and safety, manufacturability and sustainability.	√	√	√
4.	function in multi-disciplinary teams.			√
5.	identify, formulate, and solve engineering problems.	√	√	√
6.	recognize professional and ethical responsibility.	√	√	
7.	communicate effectively.			√
8.	recognize the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations for both workers and the general public.	√		
9.	recognize the need for, and to engage in life-long learning.		√	√
10.	stay abreast of contemporary issues.		√	
11.	use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the materials engineering discipline.		√	√
12.	use computers and IT relevant to the materials discipline along with understanding of their processes and limitations.		√	
13.	create an original design, or explore the materials engineering area for discovery of new knowledge.	√	√	√

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 accomplishments of discovery/innovation/creativity through producing/constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Part II Major Requirement

(The catalogue term of the major requirement that students will follow will be the effective term of the declared/allocated major.

For normative 4-year degree students who will join the majors allocation exercise, the catalogue term of major requirement will be one year after admission.

For advanced standing students and 4-year degree students who already have a major at the time of admission, the catalogue term of major requirement will be the same as their admission term.)

1. Core Courses

Normative 4-year degree: 60 credit units

Advanced Standing I: 60 credit units

Advanced Standing II: 57 credit units

Course Code	Course Title	Level	Credit Units	Remarks
CS1302	Introduction to Computer Programming	B1	3	
PHY1202	General Physics II	B1	3	Students with Grade D or above in HKAL Physics OR students with equivalent qualification may apply for exemption. They are required to complete any course of 3 credits to replace the exempted credits Advanced Standing II students are not required to take this course.
MSE1001	Programme Induction	B1	0	
MSE2102	Introduction to Materials Science and Engineering	B2	3	
MSE2104	Mechanical Behaviour of Materials	B2	3	
MSE2106	Quantum Properties of Materials	B2	3	
MSE2107	Measurement Theory and Application	B2	3	
MSE2108	Materials Chemistry	B2	3	
MSE2109	Bonding and Structure of Materials	B2	3	
MSE2243	Workshop Practice	B2	3	

MSE3110	Deformation and Fracture	B3	3	
MSE3113	Soft Materials	B3	3	
MSE3114	Fundamentals of Scientific Computing: a Course Powered by AI	B3	3	
MSE3171	Materials Characterization	B3	3	
MSE3172	Electronic Properties of Solids	B3	3	
MSE3190	Thermodynamics of Materials	B3	3	
MSE3195	Kinetics and Phase Transformations	B3	3	
MSE3244	Design Laboratory	B3	3	
MSE4116 / FS4003	Dissertation CES Placement Project	B4	6	A course to fulfil the internship/consultancy project/research project requirement for normative 4-year degree students
MA2001 / MA2158 / MA2181	Multi-variable Calculus and Linear Algebra Linear Algebra and Calculus Mathematical Methods for Engineering	B2	3	Advanced Standing students may be required to complete MA1200 Calculus and Basic Linear Algebra I and MA1201 Calculus and Basic Linear Algebra II (the pre-requisite courses) before they are allowed to enroll MA2001/ MA2158/ MA2181. They are advised to apply and sit for the placement test * organized by MA department before the commencement of Semester A of their admitted academic year. * Placement Test for MA1200 – ASI student Combined Placement test for MA1200 & MA1201 – ASII students

2. Electives (12 credit units)

Course Code	Course Title	Level	Credit Units	Remarks
MA2172	Applied Statistics for Sciences and Engineering	B2	3	

MA2177	Engineering Mathematics and Statistics	B2	3	Advanced Standing students may be required to complete MA1200 Calculus and Basic Linear Algebra I and MA1201 Calculus and Basic Linear Algebra II (the pre-requisite courses). They are advised to apply and sit for the placement test * organized by MA department before the commencement of Semester A of their admitted academic year. * Placement Test for MA1200 – ASI student Combined Placement test for MA1200 & MA1201 – ASII students
MSE3111	Ceramic Materials	B3	3	
MSE3130	Biomaterials	B3	3	
MSE4121	Thin Films	B4	3	
MSE4170	Corrosion and Protection of Materials	B4	3	
MSE4118	Composites	B4	3	
MSE4119	Modeling Materials: a Course Powered by AI	B4	3	
MSE4124	Failure Analysis and Case Studies	B4	3	
MSE4178	Nanostructures & Nanotechnology	B4	3	
MSE4179	Advanced Materials Characterization and its Industrial Applications	B4	3	
MSE4307	Building Materials	B4	3	
MSE4714	Special Topics in Materials Science and Engineering I	B4	3	
MSE4715	Special Topics in Materials Science and Engineering II	B4	3	
FS4002	Industrial Attachment Scheme	B3	3	
FS4005	Overseas Internship Scheme	B3	3	

Remarks: Course(s) under the major requirements may be waived for students of Advanced Standing I/II, depending on their academic qualifications.

MSE5301	Instrumentation for Materials Characterization	P5	3	
MSE5303	Structure and Deformation of Materials	P5	3	
MSE5304	Thermodynamics of Materials	P5	3	

Only students in the Undergraduate plus Taught Postgraduate Degree Programmes, they can MSE5301, MASE5303 and MSE5304 to fulfill part of the free elective requirement.

Part III Admission Requirements for Entry to the Major, if any

(Admission requirements here refers to specific requirements for students already admitted to the College/School/Department with an undeclared major. Academic units can state the prerequisites required for admission to the major.)

Nil

Part IV Accreditation by Professional / Statutory Bodies

The BEng degree in Materials Engineering is fully accredited by the Hong Kong Institution of Engineers (HKIE) as an award satisfying the academic requirements for its Corporate Membership.

Part V Additional Information

Nil

Part VI Curriculum Map

	MILOs												
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
City University Ideal Graduate Outcomes	GO 2	GO 2	GO 2, GO 5	GO 1,G O3	GO 2	GO 1, GO 5	GO 3	GO 1, GO 5	GO 4, GO 5	GO5	GO2	GO2	GO2
Discovery-enriched Curriculum (DEC) elements*	A2 A3	A1 A2	A1 A2 A3	A3	A1 A2 A3	A1 A2	A3	A1	A2 A3	A2	A2 A3	A2	A1 A2 A3
Graduate Attributes (Professional bodies) (Optional) (Professional Body: Hong Kong Institution of Engineers)	GA 1a	GA 2b	GA 3c	GA 4d	GA 5e	GA 6f	GA 7g	GA 8h	GA 10j	GA 9i	GA 11k	GA 12l	

Course			MILOs													DEC		
Code	Title	Credit	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	A1	A2	A3
Core Courses																		
CS1302	Introduction to Computer Programming	3	T													√	√	√
PHY1202	General Physics II	3	TP							T			T		T	√	√	√
MSE1001	Program Induction	0							T		T					√	√	
MSE2102	Introduction to Materials Engineering	3	TP			M				TM	M		T		T		√	
MSE2104	Mechanical Behaviour of Materials	3	TP	P	M		PM		P						TP M	√	√	
MSE2106	Quantum Properties of Materials	3	TP			P	TP	P	TP		TP	T	T	P	T	√	√	√
MSE2107	Measurement Theory and Application	3	TMP	TMP	P		P				P		TM P	P	TM P	√	√	√
MSE2108	Materials Chemistry	3	TP	TP			TP				T					√	√	√
MSE2109	Bonding and Structure of Materials	3	TP	TPM									TP			√	√	
MSE2243	Workshop Practice	3	TP	TP	T P M		TP	PM	PM				TP M	TP M	TP M		√	√
MSE3110	Deformation and Fracture	3	TPM	TP	T		T			T					T		√	
MSE3113	Soft Materials	3	TPM	P			TP M			T			T		T		√	
MSE3114	Fundamentals of Scientific Computing: a Course Powered by AI	3	TP	TP		T					M			TP M	TP	√	√	√
MSE3171	Materials Characterization	3	TP	TPM			T		M		T	M	TM		TP	√	√	√

MSE3172	Electronic Properties of Solids	3	TPM											T		T	√	√	√
MSE3190	Thermodynamics of Materials	3	TPM	P					P		P					T	√	√	
MSE3195	Kinetics and Phase Transformations	3	TPM	P					P		P					T	√	√	√
MSE3244	Design Laboratory	3	TP	TP	T P M	PM	TP M	M	PM	PM	P	P	PM	PM	TP M			√	
MSE4116	Dissertation	6	P	PM	M	PM	PM	M	PM	M	PM	PM	PM	PM	TP M	√	√	√	
FS4003	CES Placement Project	6	P	P		P	P		P		P	P	P	P	TP	√	√	√	
MA2001	Multi-variable Calculus and Linear Algebra	3	TP	T			T							T			√	√	√
MA2158	Linear Algebra and Calculus	3	TP	T			T							T			√	√	√
MA2181	Mathematical Methods for Engineering	3	TP	T			T							T			√	√	√
Electives																			
MA2172	Applied Statistics for Sciences and Engineering	3	TP	T			T							T			√	√	√
MA2177	Engineering Mathematics and Statistics	3	TP	T			T							T			√	√	√
MSE3111	Ceramic Materials	3	TP	TPM			T			T		T	TP		TP		√	√	√
MSE3130	Biomaterials	3	TP				TP			TM	M	TM	T		T		√	√	
MSE4121	Thin Films	3	TP	TPM			T				T	T	TP		T		√	√	√
MSE4170	Corrosion and Protection of Materials	3	TP	T	T		TP M			T		T	T		T		√	√	√
MSE4118	Composites	3	TP	T			TP				M	T	T		T		√	√	√
MSE4119	Modeling Materials: a Course Powered by AI	3	TP	TPM			T		M		T	M	TM		TP		√	√	√
MSE4124	Failure Analysis and Case Studies	3	TP	TP	TP M	T	TP	TP M	TP M	TP M	T	TP	TP M		TP M		√	√	√
MSE4178	Nanostructures & Nanotechnology	3	T	T						T	T	TM	TP		T		√	√	√
MSE4179	Advanced Materials Characterization and its Industrial Applications	3	TP	TPM			T		M		T	M	TM		TP		√	√	√
MSE4307	Building Materials	3	TP	P	T	M	T	T		TM			T		T		√	√	
MSE4714	Special Topics in Materials Science and Engineering I	3	TP	TP						T	T	TP M	T		T		√	√	√
MSE4715	Special Topics in Materials Science and Engineering II	3	TP	TP						T	T	TP M	T		T		√	√	√
FS4002	Industrial Attachment Scheme	3	P	P	P M	PM	P	PM	PM	PM	P	P	P	P	PM		√	√	√
FS4005	Overseas Internship Scheme	3	P	P	P M	PM	P	PM	PM	PM	P	P	P	P	PM		√	√	√
MSE5301	Instrumentation for Materials Characterization	3	TP	TPM			T		M		T	M	TM		TP		√	√	√
MSE5303	Structure and Deformation of Materials	3	TP	TP	TP M	T	TP	TP M	TP M	TP M	T	TP	TP M		TP M		√	√	√
MSE5304	Thermodynamics of Materials	3	TPM	P					P		P				T		√	√	

- 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 accomplishments of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.
- GO1: *Globally minded professional*
- GO2: *Innovative and critical thinker*
- GO3: *Effective communicator*
- GO4: *Lifelong learner*
- GO5: *Civically-oriented individual*
- GA1(a): *an ability to apply knowledge of mathematics, science, and engineering appropriate to the degree discipline*
- GA2(b): *an ability to design and conduct experiments, as well as to analyse and interpret data*
- GA3(c): *an 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*
- GA4(d): *an ability to function on multi-disciplinary teams*
- GA5(e): *an ability to identify, formulate and solve engineering problems*
- GA6(f): *an ability to understand professional and ethical responsibility*
- GA7(g): *an ability to communicate effectively*
- GA8(h): *an ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public*
- GA9(i): *an ability to stay abreast of contemporary issues*
- GA10(j): *an ability to recognize the need for, and to engage in life-long learning*
- GA11(k): *an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline*
- GA12(l): *an ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations*
- (The curriculum map shows the mapping between courses and the MILOs. It should cover all courses designed specifically for the major.)*