

City University of Hong Kong
Course Syllabus

offered by Department of Materials Science and Engineering
with effect from Semester A 2022/23

Part I Course Overview

Course Title: **Advanced Research**

Course Code: **MSE6309**

Course Duration: **Two semesters**

Credit Units: **12**

Level: **P6**

Medium of Instruction: **English**

Medium of Assessment: **English**

Prerequisites: **Nil**
(Course Code and Title)

Precursors: **Nil**
(Course Code and Title)

Equivalent Courses: **AP6309 Advanced Research (From the old curriculum)**
(Course Code and Title)

Exclusive Courses: **AP6306 Dissertation (From the old curriculum)**
(Course Code and Title) **MSE6306 Dissertation**

Part II Course Details

1. Abstract

The course is designed to develop methodological approach in advanced material research, organization and planning as well as skills in documentation and presentation of a selected topic. It is aimed to gain self-confidence and ability to solve emerging problems in materials science and engineering practice based on experimental and analytical approaches. The course is specifically designed to bridge theoretical knowledge and practice, stimulate the student's ingenuity, and build up skills in conducting independent material research and creation of novel materials and nanomaterials.

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.	Prepare comprehensive review report in the selected research field; create the project structure with milestones, formulate the research goals and methods to achieve them; integrate the theoretical knowledge on physics and materials principles into the selected project to support experimental reality.		✓	✓	
2.	Carry out independent experimental work, analyze and interpret data based on contemporary scientific understanding.		✓	✓	✓
3.	Demonstrate skill in scientific reasoning; make evident initiative, innovative abilities, and critical and constructive thinking; write a comprehensive research report on the selected project comprising motivation, objectives, background, experimental, methodological approach, results and their discussion, and conclusions with potential for further development.		✓	✓	✓
* If weighting is assigned to CILOs, they should add up to 100%.		100%			

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.)

The topic of Advanced Research is selected by students under the guidance of the course leader who has knowledge on the proposed research areas and expertise of the academic staff. Each student is expected to spend on average five hours of experimental work per week on the course for two semesters, i.e., 26 weeks. The course is designed for individual research work that involves development of methodologies and planning to undertake and perform comprehensive advanced research. The course gives opportunity to students to become members of a department research group supervised by an academic staff member.

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3				
Consultation	Research meeting	✓	✓	✓				1
Laboratory	Experiments, computer simulations, etc.		✓	✓				6
Outside lab activity	Literature review, data and theoretical analysis	✓	✓	✓				5

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					
Continuous Assessment: 100%								
Project proposal and oral presentation	✓						20%	During first semester
Oral presentation before oral examination	✓	✓	✓				12%	
Project report and oral examination	✓	✓	✓				68%	
							100%	

* The weightings should add up to 100%.

The dissertation is carried out on an individual basis. The topics are provided by the programme and are normally associated with departmental research activities. The topic of Advanced Research is selected by students with assistance of the course leader, who has knowledge on the proposed research areas and expertise of the academic staff. However, all the topics of advanced research are assessed and approved by the Committee for the Advanced Research (CAR). The progress in the course of Advanced Research is closely monitored and regulated in all aspects by the academic staff through the research group meetings.

At the beginning of the course, the student carries out literature survey and discusses with supervisor and research group members to develop a research proposal topic. The contents and idea of the proposal are presented to a panel for review and assessment.

Each advanced research report is evaluated by the assessor who is an expert in the field and therefore he/she is appointed by the CAR project committee in accordance with the research field. The report is assessed based on presentation (clarity, conciseness), technical knowledge,

understanding, and accomplishment (technical competence, initiative creativity, effort).

The oral presentation is assessed by a team of assessors, appointed by the CAR, according to the style, structure and presentation clarity, and response to questions. The assessment procedures are arranged on the principle of equal treatment across the student cohort and with respect to an international bench mark to maintain fairness and high education standard.

The oral examination is used to validate the extent of the student's understanding of the advanced research report and the degree of self-guidance achieved.

5. Assessment Rubrics

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

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. *Project proposal and oral presentation	ABILITY to write a research proposal, and able to EXPLAIN and respond to questions in DETAIL orally	High	Moderate	Basic	Not even reaching marginal levels
2. Oral presentation before oral examination	ABILITY to EXPLAIN orally the technical details of the research project	High	Moderate	Basic	Not even reaching marginal levels
3. **Project Report and oral examination	ABILITY to write a comprehensive research report, and able to EXPLAIN and respond to questions in DETAIL orally	High	Moderate	Basic	Not even reaching marginal levels

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. *Project proposal and oral presentation	ABILITY to write a research proposal, and able to EXPLAIN and respond to questions in DETAIL orally	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Oral presentation before oral examination	ABILITY to EXPLAIN orally the technical details of the research project	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. **Project Report and oral examination	ABILITY to write a comprehensive research report, and able to EXPLAIN and respond to questions in DETAIL orally	High	Significant	Moderate	Basic	Not even reaching marginal levels

*Write a research proposal comprising relevant literature review and analysis, proposed work plan.

**Write a comprehensive research report on the selected project comprising motivation, objectives, background, experimental, methodological approach, results and their discussion, and conclusions with potential for further development.

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

1. Keyword Syllabus

N/A

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.)

N/A

2.2 Additional Readings

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

N/A