

City University of Hong Kong
Course Syllabus

offered by Department of Materials Science and Engineering
with effect from Semester A 2024/25

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 approaches in advanced materials research, organization and planning as well as skills in documentation and presentation of a selected topic. It is aimed to allow students to gain self-confidence and ability to solve emerging problems in materials science and engineering 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 materials research and creating 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 a 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 realization.		✓	✓	
2.	Carry out independent experimental work, analyze and interpret data based on contemporary scientific understanding.		✓	✓	✓
3.	Demonstrate skills 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.		✓	✓	✓
		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 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.

3. Learning and Teaching Activities (LTAs)

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

Students will select the topic of Advanced Research under the guidance of an academic staff member who has knowledge and expertise of the proposed research. 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. Each student will engage in an individual research work that involves development of methodologies and planning to undertake and perform comprehensive advanced research. Through attending this course, students will gain an opportunity to become members of a department research group supervised by an academic staff member.

LTA	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	✓						25%	During the first semester
Project report and oral examination	✓	✓	✓				75%	During the second semester
							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 and expertise of the proposed research. The progress in the course of Advanced Research is closely monitored and regulated in all aspects by the academic staff through his or her research group meetings.

At the beginning of the course, students carry out literature survey and discuss with a project supervisor and research group members to develop a research proposal. The idea and contents of the proposal are presented to a panel for review and assessment.

Each advanced research report is evaluated by an assessor who is an expert in the field and therefore he/she is appointed by the programme 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 programme committee, according to the style, structure and presentation clarity, and student's response to panel's questions. The assessment procedures are arranged based on the principle of equal treatment across the student cohort and with respect to an international benchmark 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 before Semester A 2022/23 and in Semester A 2024/25 & thereafter

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

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

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

*Write a research proposal comprising relevant literature review and analysis, and a 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