City University of Hong Kong
Course Syllabus

offered by Department of Systems Engineering
with effect from Semester B 2024 / 25

Part I Course Overview

Course Title:	Multiscale Decision Making for Industrial Enterprise
Course Code:	SYE6303
Course Duration:	One Semester
Credit Units:	3
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)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

This course is designed to provide students with a deep understanding of optimization techniques and their applications in industrial processes, with a special emphasis on the semiconductor industry. Students will explore various optimization methods across different scales, from individual processes to enterprise-wide systems, including process design, production planning, scheduling, optimal process control, and supply chain management. The course will also cover how to address uncertainties in production and supply chains, as well as strategies for flexible operations in response to volatile energy markets. Through a series of semiconductor industry case studies, students will gain practical insights into applying these techniques in real-world scenarios. This course is suitable for both management and semiconductor students, equipping them with the skills needed for effective decision-making in dynamic industrial environments.

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.	Apply basic and advanced optimization techniques in industrial and enterprise-wide contexts.	20%		✓	
2.	Analyze and optimize production planning, scheduling, logistics, and site design with a focus on the semiconductor industry	20%		✓	
3.	Integrate process networks with supply chains in enterprise-wide optimization, particularly in semiconductor manufacturing.	20%		✓	
4.	Manage and optimize production and supply chains under uncertainty	20%		✓	
5.	Develop strategies for flexible operation of industrial processes in volatile energy markets	20%		✓	
		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.)

LTA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Lecture	Lectures on the topics of the keyword syllabus	✓	✓	✓	✓	3hrs/week
Tutorial	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.	✓	✓	✓	✓	1hrs/week
Self-Study	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.	✓	✓	✓	✓	3hrs/week

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: 70%						
Group Project	✓	✓	✓	✓	40%	
Home works	✓	✓	✓	✓	30%	
Examination: 30% (duration: 2 hours , if applicable)						
					100%	

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. Examination	Understanding of Concepts : Evaluate students' grasp of key optimization techniques, theoretical principles, and their applications in industrial processes, especially in the semiconductor industry. Problem-Solving Skills: Assess students' ability to apply learned concepts to solve complex problems, including calculations, derivations, and analytical thinking. Clarity and Organization: Consider the clarity of explanations, logical flow of ideas, and organization of answers.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Group presentation & report	Evaluate how effectively the group applies course concepts to a real-world problem, particularly within the semiconductor industry or related fields.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Homeworks	Evaluate how well students apply theoretical concepts learned in class to solve homework problems	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. Examination	Understanding of Concepts : Evaluate students' grasp of key optimization techniques, theoretical principles, and their applications in industrial processes, especially in the semiconductor industry. Problem-Solving Skills: Assess students' ability to apply learned concepts to solve complex problems, including calculations, derivations, and analytical thinking. Clarity and Organization: Consider the clarity of explanations, logical flow of ideas, and organization of answers.	High	Significant	Moderate/Basic	Not even reaching marginal levels
2. Group presentation & report	Evaluate how effectively the group applies course concepts to a real-world problem, particularly within the semiconductor industry or related fields.	High	Significant	Moderate/Basic	Not even reaching marginal levels
3. Homeworks	Evaluate how well students apply theoretical concepts learned in class to solve homework problems	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.)

Week 1: Introduction to Optimization Techniques
Week 2-3: Production Planning and Scheduling in Semiconductor Manufacturing
Week 4: Process Design and Synthesis in Semiconductor Manufacturing
Week 5-6: Enterprise-Wide Optimization in the Semiconductor Industry
Week 7: Supply Chain Optimization under Uncertainty
Week 8-9: Flexible Operations in Volatile Energy Markets
Week 10: Advanced Optimization Methods
Week 12: Integration and Advanced Case Studies
Week 13: Future Trends in Optimization and Decision Making

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.)

NIL