The Hong Kong University of Science and Technology

UG Course Syllabus Template

[Integrated Circuit Fabrication Technology]

[ELEC4520]

[3 Credits]

[pre-/co-requisites: ELEC 3500]

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Office Hours: [Specify Office Hours and Location]

Course Description

For UG students only. The course is intended to provide students with fundamental knowledge in device and integrated circuits (IC's) fabrication. The class covers the modules of device fabrication (including clean room concept, cleaning procedures, diffusion, lithography, wet processing, dry etching, chemical vapor deposition, sputtering) and process integration to form IC's. The lab section will bring the students with hands-on experience in IC fabrication facilities in Nanoelectronics Fabrication Facility of HKUST.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. An ability to apply knowledge of mathematics, science, microelectronics, and integrated circuits

2. An ability to design efficient and economical microelectronics systems and integrated circuits, components, or processes subject to practical constraints

3. Explain the process modules available in microelectronic fabrication

4. Identify the basic operational principles of semiconductor fabrication equipment

5. Design process flows of microelectronic fabrication technologies

6. An ability to use current techniques, skills, and engineering tools necessary for solving microelectronics and integrated circuits problems

7. Satisfactorily test and characterize the devices fabricated and apply statistical criteria to provide upper and lower limits to process sensitivity

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

Assessment Task	Contribution to Overall Course grade (%)	Due date
Lab reports	30%	In two weeks after submission
In-course quizzes	30%	In one week after submission
attendance	-5% for each missing lab	In one week after each lab
Final examination	40%	29/05/2025

Mapping of Course ILOs to Assessment Tasks

[add to/delete table as appropriate]

Assessed Task	Mapped ILOs	Explanation
Lab reports	ILO1, ILO2, ILO3, ILO4, ILO5	Students need to understand all the details in the cleanroom and steps in IC fabrication
In-course quizzes	ILO1, ILO3, ILO4, ILO5, ILO6	The quizzes will cover most of key knowledge taught in course
Final examination	ILO1, ILO2, ILO3, ILO4, ILO5, ILO6, ILO7	The final examination will cover most of key points discussed in lectures and labs

Grading Rubrics

Based on right and wrong answers. Most questions have clear right answers.

Final Grade Descriptors:

[As appropriate to the course and aligned with university standards]

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	[Example: Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.]
B	Good Performance	[Example: Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.]

C	Satisfactory Performance	[Example: Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.]
D	Marginal Pass	[Example: Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.]
F	Fail	[Example: Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.]

Course AI Policy

AI is allowed for learning but is forbidden in quizzes and examinations.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback, including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

No resubmission

Required Texts and Materials

Lecture slides are sufficient

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

[Optional] Additional Resources

1. S. M. Sze, M. K. LEE, Fundamentals of semiconductor fabrication, *Wiley*, 2003.
2. James D. Plummer, Michael Deal and Peter B. Griffin, Silicon VLSI technology: fundamentals, practice and modeling, *Prentice Hall*, 2000.
3. Stephen A. Campbell, Fabrication Engineering at the Micro- and Nanoscale, *Oxford University Press*, 2008, 3rd ed.

4. S. M. Sze and K. K. Ng, Semiconductor devices: physics and technology, *Wiley*, 2006, 3rd ed.
5. Chang LIU, Foundations of MEMS, *Prentice Hall*, 2011.