

SYE8206: SEMICONDUCTOR MANUFACTURING

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Semiconductor Manufacturing

Subject Code

SYE - Systems Engineering

Course Number

8206

Academic Unit

Systems Engineering (SYE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

ADSE8206 Semiconductor Manufacturing (offered until 2023/24)

Exclusive Courses

Nil

Part II Course Details

Abstract

In the era of big data, customers have a growing demand for higher performance consumer electronic products. The continual advancement in semiconductor manufacturing is the key to ensuring the capacity for electronic information

processing and data storage. The course aims to provide students with a broad overview of modern semiconductor manufacturing and management in consumer electronic products. This course is suitable for students from different backgrounds. We will cover basic operation principles for semiconductor devices and technological details for the fabrication processes of semiconductor devices. Based on these discussions, the management in the semiconductor business will be discussed in the case studies of the renewal and transformation at big semiconductor companies, such as Samsung, TSMC, and Intel.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Have a clear understanding of the operation principles for semiconductor integrated circuits.	20		x	x
2	Can elaborate the main technologies in semiconductor manufacturing process.	50		x	x
3	Can get an overview of the renewal and transformation management in semiconductor companies.	30	x		x

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.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	The lectures will follow the chapters in the textbook	1, 2, 3	3hrs/wk(for 10 wks)
2	Presentation and Tests	Students will give presentations on topics related to the course. Tests will also be conducted.	1, 2, 3	3hrs/wk(for 3 wks)

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Presentation	1, 2, 3	30	-	Yes
2	Assignments (min.:3) -May include homework, tutorial exercise, project/mini-project, presentation.	1, 2, 3	10	-	No

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Assessment Rubrics (AR)**Assessment Task**

Continuous Assessment (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Continuous Assessment (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B) Moderate

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal level

Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B) Moderate

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal level

Part III Other Information

Keyword Syllabus

- Semiconductor materials
- Operation of semiconductor devices
- Process Technology
- Additive Processes, including thermal oxidation of silicon, Physical Vapor Deposition (PVD), Chemical Vapor Deposition (CVD), and electrochemical deposition.
- Lithography
- Subtractive Processes, including wet etching and dry etching.
- Processing of Contacts and Interconnects
- Assembly and packaging technology
- Dynamic techno-management capability
- Renewal and transformation of semiconductor companies, case studies including TSMC, Samsung, and Intel.

Reading List

Compulsory Readings

Title	
1	Guide to Semiconductor Engineering Jerzy Ruzyllo.
2	Thin-Film Deposition: Principles and Practice Donald L. Smith

Additional Readings

Title	
1	Thin Film Processes John L. Vossen