

# MNE6005: MICRO SYSTEMS TECHNOLOGY

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## Effective Term

Semester B 2024/25

## Part I Course Overview

### Course Title

Micro Systems Technology

### Subject Code

MNE - Mechanical Engineering

### Course Number

6005

### Academic Unit

Mechanical Engineering (MNE)

### College/School

College of Engineering (EG)

### Course Duration

One Semester

### Credit Units

3

### Level

P5, P6 - Postgraduate Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

MNE8117 Micro Systems Technology

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

The aim of the course is to introduce the state-of-the-art knowledge of micro systems technologies for modern manufacturing. It will enable students to understand the basic principles and develop skills in the areas of micro

manufacturing, micro-electronic-mechanical systems (MEMS), sensors and actuators, micro electronics such as VLSI (very-large-scale-integration) and semiconductor manufacturing.

### Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)		
1	Identify the basic principles of micro systems technology and micro manufacturing.		x	x
2	Apply micro manufacturing process for MEMS and sensor and actuator technologies.			x
3	Design a micro systems relating to basic mechanics and micro electronics of VLSI (very-large-scale-integration).			x
4	Investigate modern manufacturing and related business.			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	Lecture	Introduction of key concepts.	1, 2, 3, 4	2 hours/week for 11 weeks
2	Tutorial	Sample questions and case studies related to the assignments.	1, 2, 3, 4	1 hour/week for 11 weeks
3	Mini-project	Mini-project covering various topics on micro systems technology and micro manufacturing.	1, 2, 3, 4	3 hours/week for 2 weeks

### Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignment (2)	1, 2, 3, 4	50	
2	Mini-project Report (one per group)	1, 2, 3, 4	30	
3	Mini-project Presentation (one per group)	1, 2, 3, 4	20	

**Continuous Assessment (%)**

100

**Assessment Rubrics (AR)**

**Assessment Task**

Assignment (2) (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

ABILITY to EXPLAIN in details and with the acquired engineering methods for ANALYZING and DESIGNING laboratory procedures for micro system applications.

**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

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**Assessment Task**

Mini-project Report (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

CAPACITY for SELF-DIRECTED LEARNING to COMPARE existing methods and DEVELOP new designs for micro system applications.

**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

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**Assessment Task**

Mini-project Presentation (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

ABILITY to REPORT the literature survey and EVALUATE the result of different approaches.

**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

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**Assessment Task**

Assignment (2) (for students admitted from Semester A 2022/23 to Summer Term 2024)

**Criterion**

ABILITY to EXPLAIN in details and with the acquired engineering methods for ANALYZING and DESIGNING laboratory procedures for micro system applications.

**Excellent**

(A+, A, A-) High

**Good**

(B+, B) Significant

**Marginal**

(B-, C+, C) Moderate

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**Part III Other Information****Keyword Syllabus**

Nil

**Reading List****Compulsory Readings**

Title	
1	Nil

**Additional Readings**

Title	
1	Crystal Fire: The Birth of the Information Age, W W Norton & Co Inc, 1998. Michael Riordan and Lillian Hoddeson ISBN-10: 0393318516 ISBN-13: 978-0393318517
2	Liu, C., Foundations of MEMS (2nd Edition), Prentice Hall, 2011. ISBN-10: 0132497360
3	Microchip Manufacturing Stanley Wolf Lattice Press (www.latticepress.com) ISBN 0-9616721-8-8
4	Understanding Fabless IC Technology Jeorge Hurtarte Evert Wolsheimer Lisa Tafoya, Fabless Semiconductor Association Elsevier