

MNE6046: NANO-MANUFACTURING

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Nano-manufacturing

Subject Code

MNE - Mechanical Engineering

Course Number

6046

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

MNE8104 Nano-manufacturing

Exclusive Courses

Nil

Part II Course Details

Abstract

More than \$2 trillion/year by 2030 in new technologies and products and 2 million jobs have been projected by nanotechnology. Nanomanufacturing is crucial to bring nanotechnology out of the laboratory into the factory for

commercial scale-up and applications. This course aims to introduce the modern multidisciplinary nanomanufacturing to the students and get them prepared for the new industrial revolution led by rapid progresses in nanotechnology. It covers important topics in nanomanufacturing such as top-down and bottom-up manufacturing, reliability and defect control, and many key issues on how to conduct nanomanufacturing today and overcome its many technical barriers. Moreover, this course will also promote discovery learning through Web 2.0.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Describe the basic knowledge of nanotechnology and nanomanufacturing.			x	
2 Explain the main techniques and processes of nanomanufacturing.			x	
3 Apply nanomanufacturing techniques to perform synthesis and characterization of nanowires/rods.			x	x
4 Discover interesting application(s) of the synthesized nanowires/rods.		x	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 Lecture	Students will engage in formal lectures on the topics of the keyword syllabus and promote discovery learning through Web 2.0.	1, 2, 3, 4	26 hrs
2 Laboratory/Tutorial	Students will engage in lab experiment projects and tutorial classes and promote discovery learning through Web 2.0.	2, 3, 4	13 hrs

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1 Test	1, 2	20	20% marks, 1.5 hours.	No

2	Labs & Discovery Learning	3, 4	30	30% marks; students' performance in on hand lab experiments and group presentation.	Yes
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Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Assessment Rubrics (AR)**Assessment Task**

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

Criterion

Describe the fundamental concepts of nano-manufacturing and apply them to solve the problems and answer the questions correctly and properly.

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

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

Criterion

Apply the concepts of nano-manufacturing to solve problems and answer the questions correctly and properly.

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

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

Criterion

Ability to explain the methodology and procedure analyse the experimental data discuss the experimental findings and demonstrate discovery during learning.

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 from Semester A 2022/23 to Summer Term 2024)

Criterion

Describe the fundamental concepts of nano-manufacturing and apply them to solve the problems and answer the questions correctly and properly.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

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

Criterion

Apply the concepts of nano-manufacturing to solve problems and answer the questions correctly and properly.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

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(B-, C+, C) Moderate

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Assessment Task

Labs & Discovery Learning (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to explain the methodology and procedure analyse the experimental data discuss the experimental findings and demonstrate discovery during learning.

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(A+, A, A-) High

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Part III Other Information

Keyword Syllabus

Background to nanotechnology and nanomanufacturing, top-down and bottom-up approaches self-assembly soft and nanoimprint lithography technologies reliability and defect control, leaving the laboratory: regulatory and societal issues confronting nanotechnology commercialization.

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	Editors: Zhaoying Zhou, Zhonglin Wang, Liwei Lin (Eds.), "Microsystems and Nanotechnology", Springer, 2012, ISBN: 978-3-642-18293-8.