هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Nanoscience and Technology
Course Code:	2034212-2
Program:	Bachelor in Physics
Department:	Physics
College:	Science
Institution:	Taif University
Version:	2nd
Last Revision Date:	10/10/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (8th / 4th Year)					
4. Course general Description:					
This course covers important parts in nanotechnology and nanoscience. Students will study the effect of the nanoscale on the properties of matter. Fabrication methods of nanomaterials and nano-devices will be covered. Characterization techniques at the nanoscale will be considered. Furthermore, semiconductor nanomaterials will be studied in addition to their applications in nanoelectronics. Magnetic nanomaterials will be covered in addition to their applications. Finally, the benefits and risks of nanotechnology will be considered.					
5. Pre-requirements for this course (if any):					
None					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
Basic concepts of nanoscience and nanotechnology. Fabrication techniques of nanomaterials and nanodevices. Studying magnetic nanomaterials and devices. Studying smart polymeric nanomaterials.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning	--	--
3	Hybrid • Traditional classroom • E-learning	--	--
4	Distance learning	--	--

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	-
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	State the basic concepts of nanotechnology and nanoscience and their role in our daily life.	K1	Lecture	Written exam and Homework reports
1.2	Define the effect of the nanoscale on the properties of matter.	K3	Lecture and Group discussion	Written exam
2.0	Skills			
2.1	Explain physical phenomena and concepts relevant to nanoscience and its applications.	S4	Lectures	Written exam and Homework reports
2.2	Develop physics problems solving skills	S2	Lecture and Group discussion	Homework reports
3.0	Values, autonomy, and responsibility			
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	V1	Group discussion	Project
3.2				

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to Nanotechnology:** ▪ Classification and Fabrication ▪ What is Nanotechnology? ▪ Classification of Nanostructures. ▪ Nanoscale Architecture. ▪ Electronic Properties of Atoms and Solids. ▪ Effect of the Nanometer length scale. ▪ Fabrication Methods: ▪ "Bottom-up Process". ▪ "Top-down Process".	6
2.	**Charaterization Techniques:** ▪ Imaging and Analytical Techniques. ▪ Microscopy Techniques. ▪ Spectroscopy techniques. ▪ Diffraction Techniques. ▪ Surface Analytical Techniques.	4
3.	**Organic and Inorganic Semiconductor Nanostructures and Devices:** ▪ Introduction to Semiconductors. ▪ Inorganic Semiconductors. ▪ Quantum Confinements (Quantum Wells, Dots and Wires). ▪ Organic Semiconductors ▪ Organic Field Effect Transistor. ▪ Organic Light-emitting Devices. ▪ Organic Photovoltaics. ▪ Carbon Nanotubes.	6
4.	**Nanomagnetic Materials and Devices:** ▪ Magnetism. ▪ Nanomagnetic Materials. ▪ Magnetoresistance. **Applications.**	4
5.	**Smart Polymeric Systems and their Applications:** ▪ Polymers (Macromolecules). ▪ Self-assembly. ▪ Polymer Thin Films. ▪ Smart Polymeric Materials. ▪ Applications.	4

6.	**Benefits and Risks of nanotechnology**: ▪ **Health.** ▪ **Environment.** **Military and Wars.**	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	Throughout Semester	20
2.	1st Periodic Exam	7	15
3.	2nd Periodic Exam	12	15
4.	Final Exam	16	50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Nanostructured materials, Second Edition: Processing, Properties and Applications, William Andrew, 2006.
Supportive References	Nanoscale Science and technology, Robert Kelsall, Ian W. Hamley, Mark Geoghegan, Wiley 2005.
Electronic Materials	https://www.youtube.com/watch?v=L67VRh-iNgg
Other Learning Materials	NONE

2. Required Facilities and equipment

Items	Resources
facilities	A classroom with movable tables and chairs conducive to group discussion and teamwork.
Technology equipment	Data show, smart board
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Student Feedback on Effectiveness of Teaching	Students	Indirect
Evaluation of Teaching	Pear reviewer Program coordinator Departmental council Faculty council	Indirect
Improvement of Teaching	Program coordinator Relevant committee	Direct
Quality of learning resources	Students Instructor Faculty	Indirect
Extent of achievement of course learning outcomes,	Program coordinator Instructor	Direct
Course effectiveness and planning for improvement	Program coordinator Instructor	Indirect

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PHYSICS DEPARTMENT COUNCIL
REFERENCE NO.	NO. 4-45
DATE	27/09/2023 (12/03/1445)

قسم الفيزياء
Physics Department
TU
جامعة الطائف
TAIF UNIVERSITY