



Course Specifications

Course Title:	Applications of Nanotechnology
Course Code:	2044210-2
Program:	Bachelor in Chemistry
Department:	Department of Chemistry
College:	College of Sciences
Institution:	Taif University

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A. Course Identification

1. Credit hours: 2 (Theoretical)
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 8 th Level/ 4 th Year
4. Pre-requisites for this course (if any): Principle of Nanotechnology (2044103-2)
5. Co-requisites for this course (if any): NA

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2 Theoretical hours/ Week	100 %
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	-
3	Tutorial	-
4	Others (specify)	-
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

The course is designed to introduce students to a wide range of applications of nanomaterials and nanostructures including, solar cells, drug delivery, water transport, catalysis, fuel cells, rechargeable batteries, sensors and water purification and waste water treatment.

2. Course Main Objective

The main purpose of this course is to recognize the importance of changes in surface properties as decrease size of structures and subsequent influence on their applications.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding:	
1.1	Recognize changes in surface properties as decrease size of structures and subsequent influence on applications	K1
1.2	List some applications of nanomaterials and nanostructures	K3
2	Skills:	
2.1	Interpret the use of carbon nanotubes in solar cells, drug delivery and rechargeable	S1
2.2	Use of Nano-materials in improving water purification technologies.	S2

CLOs		Aligned PLOs
3	Values:	
3.1	Illustrate the concept of personal responsibility for achieving duties by teamwork.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Nanotechnology: introduction, classification and properties	2
2	Effects of the nanometer length scale	2
3	Solar cells	4
4	Drug delivery	4
5	Water transport	2
6	Catalysis	4
7	Fuel cells and Rechargeable batteries	4
8	Sensors	2
9	Water purification and waste water treatment	4
10	The impact of nanotechnology: scientific, technical and environmental impacts	2
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Recognize changes in surface properties as decrease size of structures and subsequent influence on applications.	Lecture	Written Exam
1.2	List some applications of nanomaterials and nanostructures.	Lecture	Written Exam
2.0	Skills		
2.1	Interpret the use of carbon nanotubes in solar cells, drug delivery and rechargeable.	Discussion	Homework Assignments
2.2	Use of nano-materials in improving water purification technologies.	Problem- Solving	Homework Assignments
3.0	Values		
3.1	Illustrate the concept of personal responsibility for achieving duties by teamwork.	Collaborative Learning	Individual presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework Assignments (Electronic)	Throughout Semester	15%
2	Individual presentations	Throughout Semester	5%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Periodical Exam	7/8	15%
4	Mid Term Exam	11/12	15%
5	Final exam	16	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Commitment to the rules of the Academic Advising Department at the university in accordance with the academic guidance manual approved by the university and the attached forms, there are different arrangements made by teaching staff to support student consultations including;

- Office hours: 8 hours per a week for each academic member.
- Academic guidance: an academic member has a number of students to guide them throughout degree journey.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> • Nanostructures and Nanomaterials: Synthesis, Properties, and Applications. Guozhong Ca, (2004). Imperial College Press (UK), Latest Edition. ISBN-13: 978-1860944802. • Nanomaterials for Medical Applications. Z, Aguilar, 2013, Elsevier (Netherland), Latest Edition. ISBN: 9780123850904. • Industrial Applications of Carbon Nanotubes, Peng, Huisheng, Qingwen Li, and Tao Chen (2016), Elsevier (Netherland), Latest Edition. ISBN: 9780323414814. • Applications of Nanomaterials in Sensors and Diagnostics. A.Tuantranont (2012). Springer (Germany), Latest Edition. ISBN: 978-3-642-36024-4.
Essential References Materials	<ul style="list-style-type: none"> • Nanotechnology: Fundamentals and Applications, Karkare, Manasi (2008). IK International Pvt Ltd. (India), Latest Edition. ISBN: 9788189866990.
Electronic Materials	<ul style="list-style-type: none"> • Saudi Digital Library (SDL)
Other Learning Materials	<ul style="list-style-type: none"> • Learning Management System (Blackboard)

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	A classroom with movable tables and chairs conducive to group discussion and teamwork.
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show, smart board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	--

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and assessment	Students	Survey (indirect method)
Extent of achievement of course learning outcomes	Program leader	Reports (Direct method)
Quality of learning resources	Peer referees Students	Reports (Direct method) Survey (indirect method)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

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

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department Council/ Quality assurance committee
Reference No.	7-3-1445
Date	27/2/1445 HJ 12/09/2023 G



Chemistry Program