هيئة تقويم التعليم
Education Evaluation Commission
المركز الوطني للتقويم والاعتماد الأكاديمي
National Center for Academic Accreditation and Evaluation

ATTACHMENT 5.

T6. COURSE SPECIFICATIONS (CS)

هيئة تقويم التعليم
Education Evaluation Commission

Course Specifications

Institution: King Saud University	Date: 01/01/2018
College/Department : Department of Physics and Astronomy	

A. Course Identification and General Information

1. Course title and code: **Nanostructures Science and Engineering** Code # **PHYS 577**
2. Credit hours: (3+0+0)
3. Program(s) in which the course is offered. Msc. condensed matter physics

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course
   Dr Bouraoui ILAHI
5. Level/year at which this course is offered: : Level 3 of Msc
6. Pre-requisites for this course (if any):
   PHYS 505
7. Co-requisites for this course (if any):
8. Location if not on main campus:
9. Mode of Instruction (mark all that apply):

a. traditional classroom	⊗	What percentage?	100%
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course?

The main purpose of this course is to provide the Msc student with a consistent knowledge of basic physical phenomena related to the lowering of the materials dimension down to the nanometer scale. This course ensure best understanding of the quantum phenomena related to the degree of carrier's confinement and consequent impact on the density of states in several nanostructures like Nanoparticles, Nanowires, Superlattices , Fullerenes, Nanotubes and Graphene. It give an insight on the growth mechanism, characterization tools and application of these nanostructures.

The course aims to provide sufficient theoretical background related to the low dimensional materials and applications allowing best preparation of the students for a research subject in the field of nanoscale science and technology

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

Depending on their BSc background in solid state physics and quantum mechanics, the students are encouraged to carry out independent bibliographic search to explore the wide range of state of the art nanostructures types and related prospective applications

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

Introduction to nanostructure, Nanoparticles, Nanowires, Superlattices , Fullerenes, Nanotubes, Graphene , Interfaces, Silicon Technology, Solar Cells , Magnetic Data Storage, Spin Valves, Self-Assembly, Supermolecular Chemistry, Single Electron Devices, Molecular Electronics, Bio-Interfaces, Bio-Sensors, Molecular Motors, Quantum dots; Nano-scale probes; Fabrication of nanostructures; Transport in low-D systems; Optoelectronics of nanostructures

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction to nanostructure, ,	2	6
Nanoparticles, Nanowires, Superlattices , Fullerenes, Nanotubes, Graphene	2	6
Interfaces, Silicon Technology, Self-Assembly	1	3
Magnetic Data Storage, Spin Valves, , Supermolecular Chemistry	1	3
Single Electron Devices, Molecular Electronics, Bio-Interfaces, Bio-Sensors, Molecular Motors,	1	3
Quantum dots;	1	3
Transport in low-D systems;	1	3
Nano-scale probes;	2	9

Fabrication of nanostructures;	**2**	**9**
Optoelectronics of nanostructures	2	6

2. Course components (total contact hours and credits per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other:	Total
Contact Hours	Planed	45	0	0	0		45
	Actual	45	0	6	0		51
Credit	Planed	3	0	0	0		3
	Actual	3	0	0	0		3

3. Additional private study/learning hours expected for students per week. 3 hours

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	The student will be able to understand origin of the carriers' confinement in 1, 2 and 3 dimensions and its impact on the density of states	• Through interactive class lectures. • Problem solving in the class. • Home assignment	Raising quiz during the class Evaluating the home assignment Midterm and final exam Term paper presentation
1.2	Assimilation of the fabrication mechanism and available tools for each type nanostructure and the available methods for structural and spectroscopic characterization	• Through interactive class lectures. • Problem solving in the class. • Home assignment	Raising quiz during the class Evaluating the home assignment Mid term and final exam

			Term paper presentation
1.3	Understanding the impact of the reduced material's dimensionality on some optoelectronic device performance	• Through interactive class lectures. • Problem solving in the class. • Home assignment • Through animation and video	Raising quiz during the class Evaluating the home assignment Midterm and final exam Term paper presentation
2.0	**Cognitive Skills**		
2.1	Students will have good basic concepts of theoretical back ground of the nanoscale sized structures and devices	• Through interactive class lectures. • Problem solving in the class. • Home assignment	Raising quiz during the class Evaluating the home assignment Midterm and final exam
2.2	Develop the skills to do the literature survey and writing articles in journals,	Writing term paper	presentation of term paper
3.0	**Interpersonal Skills & Responsibility**		
3.1	Manage information, develop technical reports and make presentations	Problem solving in groups in the class Home assignment Term papers	Presentation of research paper Monitoring the discussion and problem solving session in the class
3.2	Work under various constraints to meet the targets of submission of research papers and home assignment	Home assignment Term papers	
4.0	**Communication, Information Technology, Numerical**		
4.1	Develop communication skill	through discussion in class Problem solving in class	Presentation of bibliographic project related to the course
4.2	Search research and scholar articles on dedicated websites	Term paper submission	
5.0	**Psychomotor**		
5.1			
5.2			

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Home assignment every alternate week	4^{th} , 8^{th} , 10^{th}	10%
2	Midterm exam 1	6^{th}	20%
3	Midterm exam 1	12^{th}	20%

4	Term paper (research paper/bibliographic research project)	14th	10%
5	Final exam	16th	40%
6			
7			
8			

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week) Office time : Two hours weekly

E Learning Resources

1. List Required Textbooks Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience, 3rd Edition (2015) Edward L. Wolf ISBN: 3527413243
2. List Essential References Materials (Journals, Reports, etc.) **Fundamentals of Nanotechnology**, CRC Press Gabor L. Hornyak, John J. Moore, H.F. Tibbals, Joydeep Dutta **Computational Nanotechnology: Modeling and Applications with MATLAB®** Sarhan M. Musa
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. COMSOL Multiphysics software

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)
2. Technology resources (AV, data show, Smart Board, software, etc.)
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3. Processes for Improvement of Teaching
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Name of Course Instructor: _____

Signature: _____ Date Specification Completed: _____

Program Coordinator: _____

Signature: _____ Date Received: _____