ATTACHMENT 2 (e)

Course Specifications

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CS)

Selected Subjects

Course Specifications

Institution: University of Dammam Date: 5/3/2014

College/Department : College of Science / Department of physics

A. Course Identification and General Information

1. Course title and code **Selected Subjects**: **Phys410**
2. Credit hours: 3 (Lecture)
3. Program(s) in which the course is offered.

(If general elective available in many programs indicate this rather than list programs): Bachelor of Physics from department of physics /College of Science

4. Name of faculty member responsible for the course:

A specific team from the Physics Department

5. Level/year at which this course is offered: Level 4
6. Pre-requisites for this course (if any):
   - Vector Analysis and basic geometry in 2D and 3D,
   - Elementary Electricity and Magnetism,
   - Quantum Mechanics.
7. Co-requisites for this course (if any): Scientific English
8. Location if not on main campus: Physics Department/ College of Science-Dammam
9. Mode of Instruction (mark all that apply)

a. traditional classroom Yes What percentage? 20

% b. blended (traditional and online) Yes What percentage?

60 % c. e-learning No What percentage?

5% d. correspondence No What percentage?

0%

f. other Yes What percentage? 15%

Comments: Used the Cooperative Education and interactive learning

B Objectives

1. What is the main purpose for this course?

- The objective of the first part of the selected subjects course is to provide the students elementary knowledge and to link them with the most up to date topics in physics.
- To develop the student's appreciation of physics new experiments, devices and phenomena.
- To familiarize the students with research writing so as to be ready for post graduate studies in future.

✓ The objective of the second part of the selected subjects' course is to provide the students elementary knowledge of crystal structure and X-Ray Diffraction (XRD). For a passing grade the student :

- Must be able to identify different types of crystal structures that occur in materials.
- Appreciates the concepts of reciprocal lattice to find the crystal structure.

- Must be able to apply the concepts of X-ray diffraction as a materials characterization technique to analyse the crystal structure.

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)

- Explain strategy of the course in the beginning of the semester
- Lectures and power point presentation.
- Open discussions.
- Group work.
- Small project.
- Highlighting the day life applications whenever exist.
- Encourage the students to see more details in the international web sites and reference books in the library.

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

Course Description:

	1. Topics to be Covered		
	List of Topics	No. of Weeks	Contact hours
	❖ **Crystal and XRD**		
1a	• **First contact** - define the program of the module - Distribution of grades of assessment **Crystal Structure:** Solid state, Amorphous, Crystal, Poly-crystal , motif, translation, Crystal lattice, 2D and 3D Basis vectors in crystal structures,	1	3

2a	Unit cells, crystal system , primitive and non-primitive cells, multiplicity, Face centered cell, body centered cell, side centered cell, Bravais lattices, fractional coordinates, Side	2	3
3a	family of lattice planes, lattice rows , Miller Indices, Exercises	3	3
4a	**1- Reciprocal lattice:** relationship between direct and reciprocal lattices, Properties of Reciprocal Lattice Vector, interplaner distance d_{hkl},	4	3
5a	Interplaner distance d_{hkl} of 7 crystal systems Exercises	5	3
6a	**2- X-ray Diffraction:** Diffraction of light by slit, Production of X- rays, Bragg's law, Atomic scattering factor, Intensity diffracted by a periodic arrangement, Structure factor, Form factor	6	3
7a	**3-** Selection rules; Crystal Structure determination via X-ray	7	3
8a	Introduction To Nanoscience and nanotechnology	8	3
9a	Application of Quantum Mechanics	9	3
01a	Solid State Physics Usages	01	3
10a	Nano materials: Fabrication	00	3
12a	Nano materials: Characterization	02	3
13a	Nano devices I	03	3
04a	Nano devices II	14	3

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	28	14	NA	NA	NA	42
Credit	28	14	NA	NA	NA	42

3. Additional private study/learning hours expected for students per week.	4

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	Course Teaching Strategie	Course Assessment Method
1.0	**Knowledge**		
1.1	• Use the scientific method to come to understand the growth and the structure of crystal in terms of a few relatively simple relations	• Demonstrating the basic information and principles through lectures and the achieved applications	• Evaluation within the classroom by discussion every week
1.2	• Expand the knowledge of this course in a broader field of materials science and engineering.	• Solve some example during the lecture.	• Discuss the applications and concepts in addition to ways to solve
1.3	• Increase the knowledge about Nanoparticles –nanofaprication and anodevices.	• Demonstrating the basic information and principles through lectures and the	• Evaluation within the classroom by discussion every week
1.4	Improving logical thinking	• Lecturing method • Blackboard • Power point • e-learning • Tutorials	• Quizzes • Midterm exam • Final exams • Oral exams
2.0	**Cognitive Skills**		
2.1	• The ability to use physical laws and principles to understand the subject.	• Define tasks for each chapter	• Assignments • Midterm exam • Short quizzes

2.2	• The student's ability to solve crystalline structure via XRD methods.	• Lectures • Support student thinking skills by developing dealing with the basic ideas and concepts and resolution	• Asking about physical laws previously taught • Small project
2.3	•The ability of the student to discussion.	• Open discussions • Group work • Homework assignments	• Encourage the student to look for the information in different references
2.4			
3.0	**Interpersonal Skills & Responsibility**		
3.1	• The students learn independently and take up responsibility	• Learn how to search the internet and use the library.	• Quizzes on the previous lecture.
3.2	• The student fluent in dealing with others and collaborative work.	• Teamwork	• Mini project
3.3	• The student respects the opinions of other . • The student accepts criticism.	• Interactive learning	• Assignments • Teamwork
4.0	**Communication, Information Technology, Numerical**		
4.1	• The ability to solve problem using simple laws • The ability of analyze and interpretation of Data.	• Discuss with the student • Know the basic physical principles	• Their interaction with the lectures and discussions
5.0	**Psychomotor**		
5.1	NA	NA	NA
5.2			

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top.)

Course LOs #	Program Learning Outcomes													
	Knowledge				Cognitive Skills				Interpersonal Skills & Responsibility			Communication, Information Technology,		Psychomotor
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	5.0

1a														
2a														
3a														
4a														
5a														
6a														
7a														
8a														
9a														
10a														
11a														
12a														
13a														

6. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project,	Week Due	Proportion of Total
1	Homework , Activity, Assignments , Group works,research	Every week	25
2	Midterm exam 1	6th weeks	12.5
3	Midterm exam 2	12th weeks	12.5
4	Final exam	End of semester	50
5	Total		100

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)

- Faculty web-page with communication tolls in Black Board.
- 4 office hours/ week.

E Learning Resources

1. List Required Textbooks:

1- Introduction to Nanoscience and Nanotechnology. Gabor L. Hornyak , H.F. Tibbals, JoydeepDutta, John J. Moore
2- Textbook of Nanoscioence and Nanotechnology.B S Murty, P Shankar & et al.
3- Nanoscience Nanotechnologies and Nanophysics Dupas, Claire; Lahmani, Marcel (Eds.)

4- C. Hammond, The Basics of Crystallography and Diffraction, 3rd Edition, Oxford University Press, Oxford, UK, 2009.
5- Y. Waseda, E. Matsubara, and K. Shinoda, X-ray Diffraction Crystallography, Springer, New York, NY, 2011.

2. List Essential References Materials (Journals, Reports, etc.):

Does not exist

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
http://iopscience.iop.org/0957-4484

4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
Consult courses in website of the certified universities, lectures in Youtube

1- http://en.wikipedia.org/wiki/Nanotechnology

1- http://www.nano.gov/
2- http://iopscience.iop.org/0957-4484 http://www.forbes.com/sites/brucedorminey/2013/02/26/nanotechnologys-4 civilization-changing-revolutionary-next-phase

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.
Does not exist

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.) Classrooms enough for 30 student, Black (white) boards
2. Computing resources (AV, data show, Smart Board, software, etc.) Computer, data show, Smart Board
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list): Does not exist

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Via questionnaires • Meeting with students
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department Does not exist
3 Processes for Improvement of Teaching • Report writing of the course and determine goals. • Fortification of the student learning. • Handling the weakness point.
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) • The instructors of the course are checking together and put a unique process of evaluation. Feedback evaluation of teaching from independent organization.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Student evaluation,
- Course report,
- Program report,
- Program Self study,
- Plan of improvement should be given.
- Collect all reports and evaluations at the end of the year for a reviewing purpose.
- Conduct a workshop to presents finding of reports and evaluation to share knowledge.