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

COURSE SPECIFICATIONS
(CS)

Solid state Physics laboratory

PHYS 491

June 2018

Course Specifications

Institution **King SaudUniversity** Date2017	
College/Department: **College of Science / Department of physics and Astronomy**	

A. Course Identification and General Information

1. Course title and code:**Laboratory of Solid state Physics (PHYS 491)**	
2. Credit hours**2(0+0+4) hours per week**	
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) **B.Sc. Physics Course**	
4. Name of faculty member responsible for the course	
5. Level/year at which this course is offered**8th level**	
6. Pre-requisites for this course (if any)**PHYS 371**	
7. Co-requisites for this course (if any)**None**	
8. Location if not on main campus	
9. Mode of Instruction (mark all that apply)	
a. traditional classroom	What percentage?
b. blended (traditional and online)	What percentage?
c. e-learning	What percentage?
d. correspondence	What percentage?
f. Lab	What percentage? 100%
Comments: **Laboratory**	

B Objectives

1. What is the main purpose for this course?

- Explain the basic concept of solid state physics what such as crystal , lattice and reciprocal lattice etc.
- Explain basic theories, such as band theory, difference between metals, semiconductors and insulators by doing the experiment.
- Demonstrate the various physical properties such as electrical, magnetic, dielectric, thermo electrical, and structural properties of materials and how these properties are effected as a function of external parameter such as temperature, electric field and magnetic field.
- discuss the properties of materials which are used in various sensor development such as the resistance of metal platinum and that of semiconductors Si or Ge are used in developing the temperature sensors in measuring the temperature.
- Perform correctly the calculations on some solid state laws such as: Hall Effect phenomenon in metals and semiconductors and find the carrier concentration 'n' and nature of electrical carriers in different materials.
- Able to communicate results through written reports and oral presentations

Carry out experiments with high safety specially when using the high voltage sources.

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)

- Research project was given to every student on any one of the topic of laboratory experiment to prepare them to take up research career.
- Plan to introduce computer based virtual experiments on different properties of materials to give better understanding.
- Plan to introduce multimedia based computer programme for the demonstration of experiment for the novel properties of materials.
- The lab experiments were reviewed and new experiments would be introduced on the new emerging field in solid state physics.

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

Course Description:

X-Ray diffraction, Dielectric constant, Hall effect, Magnetic Succipility, Magnetic Resonance, Solar Cells, Energy gap for semiconductors, Noble metal resistance, Electron diffraction, Photoelectric effect. Optical absorption of solids and solids with defects and nano inclusions.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Structure determination of materials usiing X-rays diffraction	1	4
Curie temperature and Curie-weiss constant for a dielectric materials	1	4
Study of temperature dependence of Hall constant, Carrier concentration and mobility for semiconductor materials	1	4
Magnetic susceptibility of dia and para magnetic substance,	1	4
Electron spin resonance experiment	1	4
Solar Cell Characteristics. To study the IV charecteristics and determination of fill factor and efficiency.	1	4
Determination of energy gap of intrinsic semiconductor,	1	4
Variation of resistance of a noble metal with temperature.	1	4
The thermoelectric phenomenon. To study the Seebeck, Peltier and Thomson effect.	1	4
Diffraction of electrons in graphite Crystal	1	4

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours			40			40

Credit			20			20

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

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 1.2	• To define the crystal structure using X-ray • To recognize how some materials interact with magnetic and electric fields	• Lecture • Debates	• Exams
2.0	**Cognitive Skills**		
2.1 2.2 2.3	• To recognize the differences between dependent and independent variable • To explain some main phenomena in solid state physics • To differentiate between crystalline and amorphous solids	• Lab demonstrations • Small group discussion	• Projects • Exams
3.0	**Interpersonal Skills & Responsibility**		
3.1	• To be able to illustrate the observations as a graph	• Lab demonstrations • Debates	• Lab reports • Exams
4.0	**Communication, Information Technology, Numerical**		

4.1	• To be able to operate software for data analysis	• Small group work • Lab demonstrations	• group reports • Exams
5.0	**Psychomotor**		
5.1	• To experiment the effect of temperature changes on physical properties of materials	• Small group work • Lab demonstrations	• Debates • Exams

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	**Laboratory reports**	**weekly**	**20%**
2	**Quizzes**	**weekly**	**20%**
3	**Research project**	**10**	**20%**
6	**Final laboratory exam**	**13**	**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)
3 h with the supervisor

E Learning Resources

1. Required Text(s) • **Introduction to Solid state Physics by Charles Kittle 7th Edition 2007 Johns Willey & Sons**
2. Essential References
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc. **Websites on the internet that are relevant to the topics of the course**
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. **Simulations 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.) **Class room for 25 students**
2. Computing resources (AV, data show, Smart Board, software, etc.) **Computers**
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **Smart board**

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • **Course evaluation by student** • **Students- faculty meetings**

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- **Peer consultation on teaching**
- **Departmental council discussions**
- **Discussions within the group of faculty teaching the course**

3 Processes for Improvement of Teaching

- **Conducting workshops given by experts on the teaching and learning methodologies**
- **Periodical departmental revisions of its methods of teaching**
- **Monitoring of teaching activates by senior faculty members**

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)

- **Providing samples of all kind of assessment in the departmental course portfolio of each course**
- **Faculty from other institutions are invited to review the accuracy of the grading policy**

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

- **The course material and learning outcomes are periodically reviewed and the changes to be taken are approved in the departmental and higher councils.**
- **The head of department and faculty take the responsibility of implementing the proposed changes.**

Name of Instructor: _____

Signature:_____Date Report Completed:_____

Name of Field Experience Teaching Staff _____

Program Coordinator:_____

Signature: _____ Date Received:_____