



COURSE SPECIFICATION

موضوعات خاصة ٤٩١

2013-2014

1434-1435H

Course Specification

Institution: King Khalid University
College/Department : Faculty of science/ physics department

A Course Identification and General Information

1. Course title and code: 491 phys
2. Credit hours: 2
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) The Academic program at the physics department
4. Name of faculty member responsible for the course Dr. Hosam Eldin Helmy Hegazy
5. Level/year at which this course is offered: Eightieth level, fourth year
6. Pre-requisites for this course (if any) : Solid state physics and Electricity and magnetism courses
7. Co-requisites for this course (if any):
8. Location if not on main campus:

B Objectives

<p>1. Summary of the main learning outcomes for students enrolled in the course.</p> <p>The course is an introduction to fiber optics and semiconductor devices: carrier concentration, and transport properties, Optical Properties, Heterojunctions , $p-n$ Junctions, are briefly surveyed. The final part, treats photonic devices and sensors which include: the semiconductor light-emitting diode (LED) , Semiconductor lasers, optical-fiber, Various Photodetectors, the solar cell which converts optical energy to electrical energy similar to a photodetector but with different emphasis and device configuration.</p>
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <p>- Establishing an educative laboratory for fiber optics. - Establishing an simulation laboratory for semiconductor devices.</p>

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered		
Topic	No of Weeks	Contact hours
1- fundamental of fiber optics	6	12
Consists of fiber optics		
Numerical Aperture		
Types of optical fibers		
V coefficient		
Attenuation in optical fibers		
Preparation of fiber optics		
2 –fundamentals of semiconductors	4	8
Preparation method of single crystals		
Semiconductors models		
Carrier properties		
Manipulation of carrier numbers		
State and carrier distribution		
Equilibrium carrier concentration		

Formulas for n and p		
Charge neutrality relationship		
Determination of Fermi level		
Change of carrier concentration with temperature		
Drift current		
Mobility		
3. LEDs and Lasers	3	6
Light-Emitting Diode (LED),		
Laser Physics		
4. Photodetectors and Solar Cells	2	4
Photoconductor		
Photodiodes		

2 Course components (total contact hours per semester): 30			
Lecture: 30	Tutorial: _____	Practical/Fieldwork/Internship: 15	Other: _____

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4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

(i) Description of the knowledge to be acquired

- The conceptual physics of fiber optics

- The concepts of semiconductor devices.

(ii) Teaching strategies to be used to develop that knowledge

- **Lecturers**
- **Self learning/ training**
- **Homework.**
- **Learning by project/Problem**
- **Hands on training in the lab.**

(iii) Methods of assessment of knowledge acquired

- **Attendance: participation during the lecture**
- **Homework**
- **Exams: (Mid-term and final)**

b. Cognitive Skills

(i) Cognitive skills to be developed

Undertaking problems related to course contents.

(ii) Teaching strategies to be used to develop these cognitive skills

<ul style="list-style-type: none"> - Solving problems and homework. - Self learning
<p>(iii) Methods of assessment of students cognitive skills</p> <p style="text-align: center;">Students following up are ensured by quizzes, and fast exams.</p>
<p>c. Interpersonal Skills and Responsibility</p>
<p>(i) Description of the interpersonal skills and capacity to carry responsibility to be developed</p> <ul style="list-style-type: none"> - Responsibility meaning - Academic sense in the works. - collaboration
<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> - Educating students to work in team. - Encouraging students to develop the sense of information exchange and scientific discussions.
<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <ul style="list-style-type: none"> - None
<p>d. Communication, Information Technology and Numerical Skills</p>
<p>(i) Description of the skills to be developed in this domain.</p> <ul style="list-style-type: none"> - Instructing students for writing-up reports and learning the use of databases.
<p>(ii) Teaching strategies to be used to develop these skills</p> <ul style="list-style-type: none"> - Using graphic and computational programs

(iii) Methods of assessment of students numerical and communication skills - None
e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required - None
(ii) Teaching strategies to be used to develop these skills - None
(iii) Methods of assessment of students psychomotor skills - None.

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Periodical homework	Two times per term	10 %
2		After 6 weeks	20 %
3		After 6 weeks	20 %
4		End of the term	50 %

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Two office hours two times per week.

E Learning Resources

1. Required Text(s)
2. Essential References Ajoy Ghatak, K. Thyagarajan, An Introduction to Fiber Optics

S. M. Sze, and Kwok K. Ng, Physics of Semiconductor Devices, 2007 by John Wiley & Sons, Inc.
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) Jai Singh, Optical Properties of Condensed Matter and Applications, 2006, John Wiley & Sons.
A. Goetzberger V.U. Hoffmann, Photovoltaic Solar Energy Generation, Springer-Verlag Berlin Heidelberg 2005
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations Scout software

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.) A computer Lab. With 5 PC for 10 students. Scout software
1. Accommodation (Lecture rooms, laboratories, etc.)
2. Computing resources 10 desktop computers
3. Other resources (specify --eg. 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 -Evaluation of student reports. - Updating the course contents periodically.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department Establishing at the department a scientific comity to evaluate and follow up the updating of the course.
3 Processes for Improvement of Teaching Establishing at the department level a scientific comity to evaluate and follow up the updating of the course.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- None

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

- Being scientifically updated in term published and specialized books, conferances and university educational system.