
**ATTACHMENT 5.**

# T6. COURSE SPECIFICATIONS (CS)

هيئة تقويم التعليم
Education Evaluation Commission

# Course Specifications

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| Institution: King Saud University | Date: 31Dec 2017 |
| College/Department : Science/ Physics and Astronomy | |

## A. Course Identification and General Information

1. Course title and code: **Optical Instrumentation** : Phys-637

2. Credit hours: 3(2+1)

3. Program(s) in which the course is offered.
(If general elective available in many programs indicate this rather than list programs)
**PHD + STUDY PLAN**

4. Name of faculty member responsible for the course
Dr Zeyad A. Alahmed

5. Level/year at which this course is offered: Ph.D/first year

6. Pre-requisites for this course (if any): Laser Physics, Laser Applications

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? | 50 |
| b. blended (traditional and online) | √ | What percentage? | 50 |
| 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?

To understand the designing and working principles of Optical Instruments mentioned in the syllabus and their applications in optoelectronic devices.

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)

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

Course Description:

**Phys-637**

1. Topics to be Covered

| List of Topics | No. of Weeks | Contact hours |
|---|---|---|
| Exp. Data Analysis | 1 | 2 |
| Detector Theory and Performance Parameters | 1 | 2 |
| Thermal Detectors (pneumatic, pyroelectric, thermpelectric, bolometers, ) | 2 | 4 |
| Photon Detectors (photemissive, vacuum photodiode, photomultiplier, photncounting, image intensifier) | 2 | 4 |
| Junction detectors (PIN, APD, Schottky PD, phototransistor), Vidicon , Plumbicon , Diode arrays, CCD Camera. Noise in photon devices | 2 | 4 |
| Gas Laser Design: Gas discharge phenomena – Vacuum techniques- Cooling systems. Power supplies for low and high power cw lasers – High power pulsed lasers(CO2, TEA…) - Blumbin circuits (TEA, Excimer, N2 dynamic and chemical lasers design) | 2 | 4 |
| Liquid Lasers Design: Preparation of dye solvents – pump geometry –jet flow transverse pumping – high energy dye laser (flash and laser pumped) – fs lasers | 2 | 4 |

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|---|---|---|
| Insulator Solid Lasers: Flash and arc lamp – Diode pumped YAG lasers – Ti:sapphire laser design – Ring and Traveling wave laser design Injection Lasers: Fabrication and characterization- Diode array lasers for pumping. Laser Mirrors: Dielectric coating – thin films – dichroic mirrors. Detection circuits problems. | 2 | 4 |

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

| | | Lecture | Tutorial | Laboratory/ Studio | Practical | Other: | Total |
|---|---|---|---|---|---|---|---|
| Contact Hours | Planed | 28 | | | 14 | | 42 |
| | Actual | 28 | | | 14 | | 42 |
| Credit | Planed | 2 | | | 1 | | 3 |
| | Actual | 2 | | | 1 | | 3 |

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 Outcomes | Course Teaching Strategies | Course Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge** | | |
| 1.1 | Recognize the knowledge of fundamental concepts of working principle of optical detectors and their applications in lasers | 1. Lectures<br>2. Class discusion | 1.Short tests and quizzes.<br>2-Homework.<br>3-Exams |
| 1.2 | Learn how to use optical instruments in designing an experimental setup. | 3. Practical work | Report writing |
| **2.0** | **Cognitive Skills** | | |
| 2.1 | Perform experiments, data acquisition, data analysis and draw results and conclusions. | 1.Dialogues and discussions.<br>2. Lectures<br>3. Solving problems<br>4. Experimental work | 1.Oral and written tests<br>2.Discussions.<br>3.Lab. Reports |

| | | | |
|---|---|---|---|
| 2.2 | Design experiments for detection andmeasurements of different parameters. | --do---------- | -----do--------- |
| **3.0** | **Interpersonal Skills & Responsibility** | | |
| 3.1 | work effectively in groups as well as individually- group discussion | 1.Awareness of time management in completing their reports.<br>2.Encourage students to help each other Group assignments<br>3.Small group work.<br>4.Lab. demonstrations.<br>5.Whole group discussion | 1.Lab. Exam<br>2.Oral exams |
| 3.2 | be aware of professional and ethical responsibilities | Respecting deadlines.<br>• Helping each other in doing their experiments.<br>• Giving clear and logical arguments | -----do-------- |
| **4.0** | **Communication, Information Technology, Numerical** | | |
| 4.1 | Develop creativity about scientific Problems and their solutions. | 1.Internet Surfing<br>2. Discussion | 1.Practical exams.<br>2.Written exams. |
| 4.2 | learn how to collect and classify the required topics using internet communication tools | Using Internet and computer | Discussion |
| **5.0** | **Psychomotor** | | |
| 5.1 | N/A | | |
| 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 | Five Home Works | After every 2 week | 10 % |
| 2 | Quitz | After every 2 week | 0%<br>For practice |
| 3 | Mid-1 Exam | After 5 weeks | 10 % |
| 4 | Mid-2 Exam | After 8 weeks | 10% |
| 5 | Practical | After 12 | 30 % |

| | | | |
|---|---|---|---|
| | | weeks | |
| 6 | Final Exam | After 15 Weeks | 40% |
| 7 | | | |
| 8 | | | |

## D. Student Academic Counseling and Support

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| 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)<br><br>Available 2 hrs a week for counseling and advice |

## E Learning Resources

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| 1. List Required Textbooks<br>1. Laser Spectroscopy: Basic Concepts and Instrumentation by Demtröder, Wolfgang<br>2. Photodetectors: Devices, Circuits, and Applications by Silvano Donati<br>3. Optical radiation detectors by Eustace L. Dereniak, Devon G. Crowe<br>4. Gas Lasers- by Robert F. Walter, Masamori Endo<br>5. Basics of Laser Physics-Karl F. Renk |
| 2. List Essential References Materials (Journals, Reports, etc.) |
| 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. |

## 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.) |
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| 1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)<br><br>1. Normal class room for 10 students-<br>2. Two Labs: a. Routine experiments b. Project execution |
| 2. Technology resources (AV, data show, Smart Board, software, etc.)<br><br>1. PCs<br>2. Multimedia for female students.<br>3. Smart Board for Male-depending on situation |
| 3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)<br>1. Experimental Kits- Wave meter, different types of detectors, laser systems, Energy/Power meter, Oscilloscope, Digital Avometer,<br>2. Related software for each experiment<br>3. Related steering and collimating Optics<br>4. Necessary Power supplies and connecting BNC cables<br>5. Vacuum pumps and Accessories |

## G Course Evaluation and Improvement Processes

| 1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching<br>1. Get feedback evaluation reports and suggestions from students at the end of the course<br>2. Formal meeting of course organizers, chairman of the department and Instructor. |
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| 2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department<br>1. Discussion and feedback during lab skills sessions-A personal interview.<br>2. Getting external evaluators to participate in lab skills examination.<br>3. Curriculum upgrading committee meets regularly to revise the course content and methods of assessment. |
| 3. Processes for Improvement of Teaching<br>1. Encourage teaching staff to attend courses arranged by the Deanship to improve their teaching skills and capabilities.<br>2. Encouraging teaching staff to attend workshops and advanced conferences on the subject.<br>3. Collaborate with international training /research programs |

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| 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: _____Dr W Aslam Farooq
Signature: _____ Date Specification Completed: _____

Program Coordinator: _____

Signature: _____ Date Received: _____