Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكـة العربيـة السعوديـة
الهيئـــة الوطنيـــة للتقويـم
والاعـتـمـاد الأكـاديـمـي

كلية العلوم التطبيقية
Faculty of Applied Sciences

Kingdom of Saudi Arabia
The National Commission for Academic Accreditation & Assessment

T6. Course Specifications (CS)

Course title: Optics

Course code: 23062231-4

Course Specifications

Institution: **Umm AL – Qura University**	Date : **18/1/1439**
College/Department : **Jamoum University College – Physics Department**	

A. Course Identification and General Information

1. Course title and code: **Optics (code: 23062231-4)**
2. Credit hours: **4 hrs.**
3. Program(s) in which the course is offered. **BSc Physics.**
(If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course
One of the academic staff member
5. Level/year at which this course is offered : **2st Year / Level 5**
6. Pre-requisites for this course (if any) : 4032102
7. Co-requisites for this course (if any) : ---
8. Location if not on main campus: **Al-Jamoum**
9. Mode of Instruction (mark all that apply)

a. traditional classroom	✓	What percentage?	70%
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other	✓	What percentage?	30%

Comments: Lab 30%

B Objectives

1. What is the main purpose for this course?

The objectives of this course are to through light on nature of light. And also through light on different phenomena like interference, diffraction, polarization and their application in life.

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)

1- Explain strategy of the course in the beginning of the semester .
2- Outlines of the physical laws, principles and the associated proofs.
3- Highlighting the day life applications whenever exist.
4- Encourage the students to see more details in the international web sites and reference books in the library.
5- Encourage the student to build an example of different experiments related to course and comparing it with experiments in the lab.
6- Cooperate with different institution to find how they deal with the subject.
7- Renew the course references frequently.
8- Frequently check for the latest discovery in science

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

Course Description:
The course will cover the principle of physics, such as aberrations, interference, Fourier analysis for physical optics, diffraction grating, Fourier optics and Polarization. This course will provide a conceptual and experimental background in physics sufficient to enable students to take courses that are more advanced in related fields.

1 Topics to be Covered

Topics	No of Weeks	Contact hours
❖ **Aberrations** 1- Types of aberrations and correction of aberrations.	**2**	**6**
❖ **Interference** 1- Young double slit 2- Double beam experiments 3- General conditions of interference 4- Superposition and Michelson interferometer 5- Plane parallel plates 6- Fabry - Perot interferometer and Newtons rings	**3**	**9**
❖ **Fourier analysis for physical optics** 1- Fraunhofer diffraction 2- Fraunhofer diffraction by a single slit (by integration methods) 3- Diffraction maxima and half width for single slit 4- Fraunhofer diffraction by circular slit (by integration methods)	**3**	**9**

5- Airy disk and Rayleigh`s criterion 6- Fresnel diffraction and Fresnel integrals (by integration methods) 7- Cornu spiral, Fresnel diffraction on single slit. 8- Huygens principle		
❖ **Diffraction grating** 1- One dimension gratings. 2- Grating equation and angular dispersion. 3- Chromatic resolving power. 4- Two dimension grating. 5- X ray diffraction and Bragg's law .	**2**	**6**
❖ **Fourier optics** 1. Basic rules for Fourier transform. 2. Spatial filtering. 3. Diffraction theory of image formation in the microscope 4. Optical image processing.	**2**	**6**
❖ **Polarization** 1. Types of polarized light 2. Production of polarized 3. Optical active phenomena 4. Polarization caused by electric and magnetic fields	**2**	**6**
❖ **Exercises and Solved problems**	**1**	**3**
	15 weeks	**45hrs**

Practical part:

1. Safety, security and introduction to the lab.
2. Interference of Light and eye resolving power.
3. Diffraction of Light.
4. Newton's Rings.
5. Polarization of Light and Brewster's angle.
6. Diffraction Grating .
7. Study of prism properties using Spectrometers Thermobiles.
8. Abbe refractometer.
10. Malus law Experiment**.**

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact hours	**45**		**42**			**87**
Credit	**3**		**1**			

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	Define the physical quantities, physical phenomena, and basic principles.	1- Demonstrating the basic principles through lectures. 2. Discussing phenomena with illustrating pictures and diagrams. 3. Lecturing method: Board, Power point. 4. Discussions 5. Brain storming 6. Start each chapter by general idea and the benefit of it.	Solve some example during the lecture. Discussions during the lectures Exams: a) Quizzes (E-learning) b) Short exams (mid- term exams) c) Long exams (final) d) Oral exams .
1.2	Describe the physical laws and quantities using mathematics		
1.3	Determine the physical quantities at the Lab.	1. Doing team research or team project. 2.Doing team work to perform some experiments 3. Perform the experiments correctly. 4. Demonstrate the results correctly. 5. Write the reports about the experiment. 6. Discussion with the student about the results	Writing scientific Reports. Lab assignments Exam.
2.0	**Cognitive Skills**		

2.1	Apply the laws of physics to calculate some quantities.	1. Preparing main outlines for teaching. 2. Following some proofs. 3. Define duties for each chapter 4. Encourage the student to look for the information in different references. 5. Ask the student to attend lectures for practice solving problem.	1. Exams (Midterm, final, quizzes) 2. Asking about physical laws previously taught 3. Writing reports on selected parts of the course. 4. Discussions of how to simplify or analyze some phenomena.
2.2	Solve problems in physics by using suitable mathematics.		
2.3	Analyse and interpret quantitative results.		
2.4	Apply physical principle on day life phenomena.		
2.5	Derive the physical laws and formulas.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics	• Search through the internet and the library. • Small group discussion. • Enhance self-learning skills. • Develop their interest in Science through : (lab work, visits to scientific and research institutes).	• Evaluate the efforts of each student in preparing the report. • Evaluate the scientific reports. • Evaluate the team work in lab and small groups. • Evaluation of students presentations.
3.2	Work effectively in groups and exercise leadership when appropriate.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively in oral and written form.	• Incorporating the use and utilization of computer, software, network and multimedia through courses • preparing a report on some topics related to the course depending on web sites	• Evaluating the scientific reports. • Evaluating activities and homework
4.2	Collect and classify the material for the course.		
4.3	Use basic physics terminology in English.		
4.4	Acquire the skills to use the internet communicates tools.		
5.0	**Psychomotor**		
5.1	Use experimental tools safely and correctly.	Follow up the students in lab and during carryout all experimental work.	• Practical exam. • Giving additional marks for the results with high and good accuracy
5.2	Determine the physical quantity correctly at the Lab.		

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 (Use Program LO Code #s provided in the Program Specifications)**															
	1.1	**1.2**	**1.3**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**3.1**	**3.2**	**4.1**	**4.2**	**4.3**	**4.4**	**5.1**	**5.2**
1.1	✓															
1.2		✓														
1.3			✓													
2.1				✓												
2.2					✓											
2.3						✓										
2.4							✓									
2.5								✓								
3.1									✓							
3.2										✓						
4.1											✓					
4.2												✓				
4.3													✓			
4.4														✓		
5.1															✓	
5.2																✓

6. 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	Exercises & Home works (lectures)	All weeks	5%
2	Exercises & Home works (lab)	All weeks	5%
3	Participation in lectures activities	All weeks	5%
4	Participation in lab activities	All weeks	5%
5	Midterm Exam (theoretical)	8th week	20%
6	Lab. Reports (Practical)	11th week	5%
7	Final Exam (Practical)	14th week	15%
8	Final Exam (theoretical)	16th week	40%

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)
Each student will supervise by academic adviser in physics Department and the time table for academic advice were given to the student each semester. (6hrs per week)

E Learning Resources

1. List Required Textbooks
Introduction to classical and modern optics, Jurgen R. Meyer-Arendt, Prentic-Hall international , 1995.
Fundamentals of optics , by Francis Jenkins and Harvey White, Mc Graw Education, (2001)

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

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
http://www.physicsclassroom.com and http://www.learnerstv.com/

5. 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.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)
There are enough classrooms provided with a good accommodation, including good air condition, good Data show, suitable white board.
There are enough laboratories for experimental physics, provided with air conditions, good data show, and experimental equipment.

2. Computing resources (AV, data show, Smart Board, software, etc.)

In each class room and laboratories, there is a data show, and board.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) Each Class room and laboratories require a TV screen at least 65 inch-and smart, and double layer white board.

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Evaluating the instructor by the student using questionnaires • Following up the progress of student in the course • Evaluating the progress of student by the projects and reports • Evaluating the course by specialized committees
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department • Self-evaluation • Student evaluation • Evaluation by other instructor in the same department or outside it.
3 Processes for Improvement of Teaching • Course report • Program report • Program self-study • Handling the weakness point. • By the Accreditation committee in the department
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. • Check marking of a sample of papers by others in the department. • Feedback evaluation of teaching from independent organization. • Independent evaluation by another instructor that give the same course in another faculty. • Evaluation by the accreditation committee in the university.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. 1- The following points may help to get the course effectiveness • Student evaluation • Course report • Program report 2- According to point 1 the plan of improvement should be given. 3- Contact the college to evaluate the course 4- Reviewing the course and updating it.