



COURSE SPECIFICATION

Phys.462

(Optics & Lasers)

1434/1435AH.

Course Specification

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

A Course Identification and General Information

1. Course title and code: Phys.462 (Optics & Lasers)
2. Credit hours: 2.0
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.S plan- Faculty of Science / Physics Specialty
4. Name of faculty member responsible for the course Dr. Mohammad Awwad El-Farra Dr. El Sayed Said Yousef
5. Level/year at which this course is offered 8th level/ 4th year
6. Pre-requisites for this course (if any) : Phys.326 (Electromagnetic theory 1)
7. Co-requisites for this course (if any): None
8. Location if not on main campus: Main campus

B Objectives

<p>1. Summary of the main learning outcomes for students enrolled in the course.</p> <p>المعالجة الدقيقة لبصريات المواد الصلبة وتنمية قدرات الطالب على حل لمسائل التطبيقية وكذلك التعرف على بعض الظواهر الحديثة وتطبيقاتها أن يفهم الطالب طبيعة ضوء الليزر وكيفية إنتاجه وكيفية تصميم الرنانات الضوئية ويدرس بعض الليزر الحقيقية ويتعرف على التطبيقات الحديثة والمتنوعة لأشعة الليزر أن ينمي الطالب قدراته في الاطلاع والبحث في مجال المكتشفات العلمية الحديثة</p> <p>Student learns about the proper treatment of the interaction of electromagnetic radiation with matter and its application- deduce many important optical properties of these materials. The student learns about the nature and properties of Laser light, how to produce it, how to design a Laser cavity. He studies some real lasers and the application of laser radiation in may fields. In completing the course, the student becomes capable of applying the concepts included to solve numerical problem and increase his knowledge about the modern technology .</p>
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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) ***The contents of the course are renewed periodically by the dept. council. ** To use the e-learning facility and to use the internet sources of knowledge to broaden the student's knowledge about the modern application of lasers. ***To encourage students to use textbooks and references written in foreign language independently.**

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- Optics of Solids – Maxwell equations and the interaction of optical radiation with insulators and metals. Dispersion- optical properties- absorption and reflectivity - some applications	4	8
2-Amplification of light- Ray transfer equations and matrices – Optical resonators- Types of emission-pumping- population inversion- Active media- Gain in laser cavity- Monochromacy-Laser oscillations- spot size.	6	12
3- Some real Lasers and applications: Ruby laser- Gas lasers (He-Ne and CO2)-short review of laser applications.	4	8

2 Course components (total contact hours per semester):			
Lecture: 28	Tutorial: Open any time	Practical/Fieldwork/Internship : Demonstration Experiments when required.	Other: 10 office hrs/wk

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)

- **problem solutions given on the blackboard .**
- **Extra readings and search duties on the internet are given.**

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

- Principles and important applications of Optics and Lasers.

-Different methods of mathematical treatment.

- Solution of Numerical problems

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

- Lectures. – Scientific dialogue. - Self learning

- contribution and participation of students inside the class.

- scientific research and team work

(iii) Methods of assessment of knowledge acquired

1-Contribution during Lectures 2- Midterm exam

3- Homework's and open book Exam. 4- Final exam

b. Cognitive Skills

(i) Cognitive skills to be developed

- Solving problems related to course contents.

- Discussing typical and lengthy problems .

<p>(ii) Teaching strategies to be used to develop these cognitive skills</p> <ul style="list-style-type: none"> - A number of homework is assigned to students. - Solving selected problems inside the class. - Each student is obliged to carry a calculator to the class .
<p>(iii) Methods of assessment of students cognitive skills</p> <ul style="list-style-type: none"> - A student follow-up is maintained using quick questions style. - Encouraging the student to increase the lecture attendance. - Adopting quizzes or fast exam.
<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"> To train students how to prepare a scientific report independently To develop strong relationship between students and their teacher. To develop cooperation spirit among students themselves.
<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> - Academic supervision and interaction are continuously maintained. - Teamwork is applied through dividing the class into small groups for them to tackle a certain problem. - Open doors policy is always maintained. - Occasionally group discussion is also applied.
<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> <p>- Communication - using the internet and the e-learning facility - mathematical skills and problem solving.</p>
<p>(ii) Teaching strategies to be used to develop these skills</p> <p>- Using blackboard facility - Open book Exam's and searching the net. - Each student is obliged to participate in problem solving in the class.</p>
<p>(iii) Methods of assessment of students numerical and communication skills.</p> <p>-Continuous assessment inside the class. - Duties and homework's are continuously given.-</p>
<p>e. Psychomotor Skills (if applicable)</p>
<p>(i) Description of the psychomotor skills to be developed and the level of performance required</p> <p>- Not applicable</p>
<p>(ii) Teaching strategies to be used to develop these skills</p> <p>- None</p>
<p>(iii) Methods of assessment of students psychomotor skills</p> <p>- None</p>

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	Class activities and participation	throughout the term	10%
2	Home works and open book Exams	2 - 3 times /	15%

		semester	
3	Mid term 1	Week 10	25%
6	Final examination	End of semester	% 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)

10 office hours per week officially, but effectively: assistance of students is available all the day long

E Learning Resources

1. Required Text(s) summaries and translated items by the teacher. Fundamentals of Optics: By Jenkins & White
2. Essential References 1-Optics / Hecht 2-University Physics / Western & crummett
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) ---
4-.Electronic Materials, Web Sites etc e- learning blackboard facility provided by the university. The internet in general.
5- Other learning material such as computer-based programs/CD, professional standards/regulations -None

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.) .
1. Accommodation (Lecture rooms, laboratories, etc.) lecture room for 40 students. (Available) Optics and waves Laboratory (Available)
2. Computing resources computer lab. facility (available). Optional
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) All Experiments of the course Phys. 334 (practical optics and waves) are designed to serve this course. This laboratory is equipped and modernized annually through orders by a specialized departmental committee.

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching The student evaluates the course and the teacher is notified. - Academic evaluation is performed continuously by the deanship of quality and promotion. - the course contents are renewed periodically by the department.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department - Course and teacher evaluation schemes are conducted each semester
3 Processes for Improvement of Teaching - A comparison of the course standard should be made with similar courses at international level.
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 at present, but it may take place in the near future.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. - All courses of the study plan are reviewed periodically in the department of physics and endorsed by the college board.