جامعة أم القرى

كلية العلوم التطبيقية

الماجستير في الفيزياء بالرسالة

3/2/2 Survey of Similar Programs in Local, Regional and International Universities.

Similar programs	Local		Regional		International	Submitted program
	Program 1	Program 2	Program 3	Program 4	Program 5	
University	King Saud	King Abdulaziz	Cairo	United Arab Emirate	Oslo	Umm Al-Qura
College	Science	Science	Science	Science	Science	Applied Science
Department	Physics and Astronomy	Physics	Physics	Physics	Physics	Physics
Program	Physics	Physics	Physics	Physics	Physics	Physics

Program units and courses	Units	Courses	Units	Courses	Units	Courses	Units	Courses	Units	Courses	Units	Courses
compulsory courses	15	6	17	7	14	7	15	7	20	4	8	4
Elective courses	9	7 ×7	9	6 ×9	4	4×2	9	25	40	8	18× 3	6×3
Thesis – Research Project	6		10		18		6		60		6	
Total	30	55	36	71	36	15	30	32	120 ECTS	12	32	22

5. Learning and Teaching

4/1/1 Main tracks or specializations covered by the program:

(a) Nuclear and High Energy Physics
(b) Optics and Photonics
(c) Material Science

4/1/2 Curriculum Study Plan Table

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 1	4036XX	Phys. 638, 656 & 662	Elective	Academic guide	3
	4036XX	Phys. 640, 658 & 664	Elective	Academic guide	3
	4036XX	Phys. 642, 660 & 666	Elective	Academic guide	3
	4036XX	Phys. 647, 649, 651	Elective	Academic guide	3
	Semester Hours				12
Level 2					
	4036 XX	Phys. 639, 657 & 663	Elective	Academic guide	3
	4036XX	Phys. 641, 659 & 665	Elective	Academic guide	3
	403643	Research Methodology	Required		3
	403645	Seminar*	Required		1
	Semester Hours				10
Level 3	403652	Special topics (1)**	Required	Academic guide	2
	403654	Thesis	Required	Department approval	6
	Semester Hours				8
Level 4	403653	Special topics (2)**	Required	Academic guide	2
	403654	Thesis	Required	Department approval	
	Semester Hours				2
	Total Hours				32
	*Scheduled discussions of current problems in physics, centered around guest lecturer and student presentations. It is designed to acquaint the graduate student with current research areas in physics. **This course is proposed by faculty members based on students 'track and new trends in Physics.				

Include additional levels or courses if needed

4/1/2/1 Curriculum Study Plan (Nuclear and High energy physics track)

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 1	403638	Introduction to Nuclear and High energy physics	Required	Academic guide	3
	403640	Nuclear Reactions	Required	Academic guide	3
	403642	Quantum Field Theory	Required	Academic guide	3
	4036XX	Phys. 647, 649, 651	Elective	Academic guide	3
	Semester Hours				12
Level 2	403639	High energy Physics	Required	403642	3
	403641	Detector Physics	Required	403638	3
	403643	Research Methodology	Required	Academic guide	3
	403645	Seminar*	Required	Academic guide	1
	Semester Hours				10
Level 3	403652	Special topics (1)**	Required	Academic guide	2
	403654	Thesis	Required	Department approval	6
	Semester Hours				8
Level 4	403653	Special topics (2)**	Required	Academic guide	2
	403654	Thesis	Required	Department approval	
	Semester Hours				2
	Total Hours				32

Elective Courses	403647	Advanced Programming	Academic guide	3hrs
	403649	Semiconductor device modelling		3hrs
	403651	Advanced Research Lab.		3hrs

*Scheduled discussions of current problems in physics, centered around guest lecturer and student presentations. It is designed to acquaint the graduate student with current research areas in physics.
**This course is proposed by faculty members based on students 'track and new trends in Physics.

Include additional levels or courses if needed

4/1/2/2 Curriculum Study Plan (Optics and Photonics track)

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 1	403656	Advanced Optics	Required	Academic guide	3
	403658	Optical Wave Propagation	Required	Academic guide	3
	403660	Quantum Optics	Required	Academic guide	3
	4036XX	Phys. 647, 649, 651	Elective	Academic guide	3
	Semester Hours				12
Level 2					
	403657	Numerical methods in photonics	Required	403656	3
	403659	Laser Physics and Optoelectronics	Required	403656	3
	403643	Research Methodology	Required	Academic guide	3
	403645	Seminar	Required	Academic guide	1
	Semester Hours				10
Level 3	403652	Special topics (1)*	Required	Academic guide	2
	403654	Thesis	Required	Department approval	6
	Semester Hours				8
Level 4	403653	Special topics (2)*	Required	Academic guide	2
	403654	Thesis	Required	Department approval	
	Semester Hours				2
	Total Hours				32

Elective Courses	403647	Advanced Programming	Academic guide	3hrs
	403649	Semiconductor device modelling		3hrs
	403651	Advanced Research Lab.		3hrs

*Scheduled discussions of current problems in physics, centered around guest lecturer and student presentations. It is designed to acquaint the graduate student with current research areas in physics.
**This course is proposed by faculty members based on students 'track and new trends in Physics.

Include additional levels or courses if needed

4/1/4. Course Specification: (To be added as appendix 8/10)

Nuclear and High Energy track:

4/1/5 Learning Outcomes in Domains of Learning, Assessment Methods and Teaching Strategy:

4/1/5/1/1 Matrix of Learning Outcomes, Teaching Strategies and Assessment Methods

	NQF Learning Domains and Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Recognize the basics of nuclear physics and nuclear interactions	-Lectures -Oral presentation -Small Projects	-Exams -Tutorials -Reports -Oral exams (Due Level 1)
1.2	Recognize the basics of quantum field theory and its applications in describing the scattering and decomposition of particles using the standard model of basic reactions.	-Lectures -Oral presentation -Small Projects	-Exams -Tutorials -Reports -Oral exams (Due Level 1)
1.3	Describe the detectors used in the global laboratories of nuclear physics and high energy.	-Lectures -Oral presentation -Small Projects	-Exams -Tutorials -Reports -Oral exams (Due Level 2)
1.4	Construct a deep understanding of the path of nuclear and high energy physics in relation to the recent theories and research.	-Lectures -Oral presentation -Small Projects	-Exams -Reports -Oral exams (Due Levels 3 & 4)
1.5	Perform C ++ programming (used at the International Center for Nuclear and Particle Research (CERN), Switzerland)	-Lectures -Oral presentation -Small Projects	-Exams -Tutorials (Due Level 1)
1.6	Apply the key concepts of nuclear and high energy physics in a specialized academic research.	-Workshops -Directed Reading	A Publication (Due Level 4)
1.7	Discuss the impact of modern research on the nuclear and high energy physics track.	-Lectures -Directed reading	-Discussion -Report -Presentation (Due Level 2)

1.8	Discuss the regulations and modern procedures that may affect the specialization.	-Lectures -Directed reading	-Discussion -Report -Presentation (Due Levels 3 & 4)
2.0	**Cognitive Skills**		
2.1	Apply the theoretical tools of nuclear physics to solve problems in nuclear reactions.	-Lectures -Tutorials -Small Projects	-Exams -Tutorials -Reports -Oral exams (Due Level 2)
2.2	Use of theoretical tools of quantum field theory to solving problems in high energy physics	-Lectures -Tutorials -Small Projects	-Exams -Tutorials -Reports -Oral exams (Due Level 2)
2.3	Apply C ++ programming in the ROOT data analysis framework adopted by CERN	-Lectures -Small Projects -Workshops	-Tutorials -Oral exams (Due Level 2)
2.4	Employ original and innovative responses to physical problems	-Projects -Presentation	-Oral exams (Due Levels 2 & 4)
2.5	Conduct part of scientific research independently	-Projects -Directed Reading	Dissertation (Due Level 3 &4)
3.0	**Interpersonal Skills & Responsibility**		
3.1	Identify physical problems and treat them creatively.	-Projects -Directed Reading	-Reports -Oral exams (Levels 1 and 2)
3.2	Develop information and skills required for research.	-Lectures -Workshops -Projects -Directed Reading	-Discussions during Lectures (Due Levels 2, 3 & 4)
3.3	Manage with others when dealing with problems	-Tutorials -Small Projects	-Tutorials -Reports -Oral exams (Due Levels 1-4)
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively with academics and the community through formal and informal reports	-Events -Conferences -Workshops	-Workshops -Events -Conferences
4.2	Analyze experimental data	-Projects -Workshops	-Dissertation
5.0	**Psychomotor**		
5.1	Not applicable		
5.2	Not applicable		

4/1/5/2/1 Program Learning Outcomes Mapping Matrix

	Course Offering NQF Learning Domains and Learning Outcomes	638	640	642	639	641	643	645	647	652	653	654
1.0	**Knowledge**											
1.1	Recognize the basics of nuclear physics and nuclear interactions	√	√									
1.2	Recognize the basics of quantum field theory and its applications in describing the scattering and decomposition of particles using the standard model of basic reactions.			√	√							
1.3	Describe the detectors used in the global laboratories of nuclear physics and high energy.					√						
1.4	Construct a deep understanding of the path of nuclear and high energy physics in relation to the recent theories and research.									√	√	
1.5	Perform C ++ programming (used at the International Center for Nuclear and Particle Research (CERN), Switzerland)								√			
1.6	Apply the key concepts of nuclear and high energy physics in a specialized academic research.											√
1.7	Discuss the impact of modern research on the nuclear and high energy physics track.							√				
1.8	Discuss the regulations and modern procedures that may affect the specialization.						√	√				
2.0	**Cognitive Skills**											
2.1	Apply the theoretical tools of nuclear physics to solve problems in nuclear reactions.		√									
2.2	Use of theoretical tools of quantum field theory to solving problems in high energy physics.				√							
2.3	Apply C ++ programming in the ROOT data analysis framework adopted by CERN								√			
2.4	Employ original and innovative responses to physical problems.											√
2.5	Conduct part of scientific research independently.											√
3.0	**Interpersonal Skills & Responsibility**											
3.1	Identify physical problems and treat them creatively.											√

3.2	Develop information and skills required for research.											√
	Manage with others when dealing with problems							√				
4.0	**Communication, Information Technology, Numerical**											
4.1	Communicate effectively with academics and the community through formal and informal reports						√					
4.2	Analyze experimental data											√
5.0	**Psychomotor**											
5.1	Not applicable											
5.2	Not applicable											

Optics and photonic track:

The study in optics and photonics concentrates on comprehension of light propagation and interactions with matter including applications to the design and fabrication of photonic devices and systems. The applications are within optical communications, nanophotonic devices, sensing and biomedicine. The area contains theory and simulations, fabrication, and characterization. Topics include lasers, optical fibers and waveguides, photonic crystals, quantum photonics, terahertz radiation, plasmonics, biosensing, and high-speed transmission.

4/1/5/1/2 Matrix of Learning Outcomes, Teaching Strategies and Assessment Methods

	NQF Learning Domains and Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Recognize most fundamental laws and principles of Optics and Electromagnetism, along with their applications.	**1.** Lectures. **2.** Discussions **3.** Slides and computer simulation software may be used by the teachers to clarify concepts. **4.** Problems solving	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question –answer session in class. **4-** Exams: quizzes, Mid-term and final exams
1.2	Describe fundamental properties of light propagation and interaction with matter and atoms.		
1.3	Learn fundamentals of computerized modeling of diverse optical and photonics systems and gain working experience with standard computational tools used in industry.		
1.4	Recognition of research techniques which might include research and summation of the literature, designing appropriate experiments to test physical principles and presenting their results making their assumptions and approximations explicit.		
1.5	Describe most common laser operating principles and structures as well as basic physical principles related to laser pumping and semiconductors.		
1.6	Recognize the principles of functioning of most important optoelectronic devices.		
1.7	Recognize basic concepts of the most popular numerical methods used for studying both fundamental optics and applications such as design, development, and optimization of photonic devices.		
1.8	Recognition of several guided wave optical devices and the principles underlying their operation.		

1.9	Learn about the emerging field of biophotonics which deals with the application of optics based technologies for life science applications.		
1.10	Describe the physical world using mathematical tools.		
2.0	**Cognitive Skills**		
2.1	Critically evaluate current developments and emerging trends within the photonic areas.	**1.** Lectures. **2.** Discussions. **3.** Problems solving. **4.** Encourage the student to look for the information in different references. **5.** Ask the student to attend lectures for practice solving problem. 6. Following some proofs 7. Define duties for each chapter	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question –answer session in class. **4-** Exams: quizzes, Mid-term and final exams
2.2	Capacity for predict, calculate, analyse and interpret quantitative results in all photonics related areas.		
2.3	Apply theoretical knowledge of optical principles and mathematical techniques to practical problems.		
2.4	Implement and develop a numerical tool in MATLAB to Design, analyse and predict the behaviours of some photonic devices.		
2.5	Research and examine critically the scientific literature.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics.	**1.** Ask the students to search the internet and use the library. **2.** Encourage them how to attend lectures regularly by assigning marks for attendance. **3.** Small group discussion. **4.** Give students tasks of duties. **5.** Discussion in class	**1.** Evaluate the scientific values of solutions. **2.** Evaluate the work in team **3.** Evaluation of the role of each student in group Project assignment **4.** Evaluation of student's presentations. **5.** Direct contact during office hours. **6.** Direct contact during office hours.
3.2	Work effectively both individually and in teams.		
3.3	Communicate effectively with peers.		
3.4	Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.		
3.5	Show some therapeutic applications of light (Photo-activation of drugs Photo-dynamic therapies Tissue engineering with light)		
4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrate the ability to plan, undertake, and report on a programme of original work; including the planning and execution of	**1.** Ask the students to search the internet and use the library.	**1.** Evaluate the scientific values of solutions.

	experiments, the analysis and interpretation of experimental results, and an assessment of the errors involved.	**2.** Encourage them how to attend lectures regularly by assigning marks for attendance. **3.** Small group discussion. **4.** Give students tasks of duties. **5.** Discussion in class	**2.** Evaluate the work in team **3.** Evaluation of the role of each student in group Project assignment **4.** Evaluation of student's presentations. **5.** Direct contact during office hours. **6.** Direct contact during office hours.
4.2	Demonstrating capability in performing research as well as an effective oral and written communication.	**1.** Independent study. **2.** Problem solving.	**1.** Homework **2.** Assignments.
4.3	Acquire a working knowledge of basic research methodologies, data analysis and interpretation.	**1.** Oral Presentations. **2.** Problem solving.	**1.** Homework. **2.** Assignments.
4.4	Demonstrate effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments
4.5	Use of the internet to research solution for relevant scientific problems.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments.
4.6	Demonstrate enough knowledge in evaluating published works.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments.
5.0	**Psychomotor** ***(Not applicable)***		

4/1/5/2/2 Program Learning Outcomes Mapping Matrix

	Course Offering NQF Learning Domains and Learning Outcomes	656	658	660	647	649	651	657	659	643	645	652	654	653
1.0	**Knowledge**													
1.1	Recognize most fundamental laws and principles of Optics and Electromagnetism, along with their applications.	X	X	X	X	X	X	X	X	X	X	X	X	X
1.2	Describe fundamental properties of light propagation and interaction with matter and atoms.	X	X	X					X					
1.3	Learn fundamentals of computerized modeling of diverse optical and photonics systems and gain working experience with standard computational tools used in industry.							X						
1.4	Recognition of research techniques which might include research and summation of the literature, designing appropriate experiments to test physical principles and						X	X				X	X	X

	presenting their results making their assumptions and approximations explicit.													
1.5	Describe most common laser operating principles and structures as well as basic physical principles related to laser pumping and semiconductors.								X					
1.6	Recognize the principles of functioning of most important optoelectronic devices.		X											
1.7	Recognize basic concepts of the most popular numerical methods used for studying both fundamental optics and applications such as design, development, and optimization of photonic devices.							X						
1.8	Recognition of several guided wave optical devices and the principles underlying their operation.		X											
1.9	Describe the physical world using mathematical tools.	X	X	X	X	X	X	X	X	X	X	X	X	X

2.0	**Cognitive Skills**													
2.1	Critically evaluate current developments and emerging trends within the photonic areas.	X	X	X	X	X	X	X	X	X	X	X	X	X
2.2	Capacity for predict, calculate, analyse and interpret quantitative results in all photonics related areas.	X	X	X	X	X	X	X	X	X	X	X	X	X
2.3	Apply theoretical knowledge of optical principles and mathematical techniques to practical problems.	X	X	X	X	X	X	X	X	X	X	X	X	X
2.4	Implement and develop a numerical tool in MATLAB to Design, analyse and predict the behaviours of some photonic devices.							X						
2.5	Research and examine critically the scientific literature.									X	X	X	X	X
3.0	**Interpersonal Skills & Responsibility**													
3.1	Show responsibility for self-learning to be aware with recent developments in physics.	X	X	X	X	X	X	X	X	X	X	X	X	X

3.2	Work effectively both individually and in teams.	X	X	X	X	X	X	X	X	X	X	X	X	X
3.3	Communicate effectively with peers.	X	X	X	X	X	X	X	X	X	X	X	X	X
3.4	Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.	X	X	X	X	X	X	X	X	X	X	X	X	X
4.0	**Communication, Information Technology, Numerical**													
4.1	Demonstrate the ability to plan, undertake, and report on a programme of original work; including the planning and execution of experiments, the analysis and interpretation of experimental results, and an assessment of the errors involved.	X	X	X	X	X	X	X	X	X	X	X	X	X
4.2	Demonstrating capability in performing research as well as an effective oral and written communication.	X	X	X	X	X	X	X	X	X	X	X	X	X

4.3	Acquire a working knowledge of basic research methodologies, data analysis and interpretation.	X	X	X	X	X	X	X	X	X	X	X	X	X
4.4	Demonstrate effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.	X	X	X	X	X	X	X	X	X	X	X	X	X
4.5	Use of the internet to research solution for relevant scientific problems.	X	X	X	X	X	X	X	X	X	X	X	X	X
5.0	Demonstrate enough knowledge in evaluating published works.	X	X	X	X	X	X	X	X	X	X	X	X	X

Material Science Track:

4/1/5/1/3 Matrix of Learning Outcomes, Teaching Strategies and Assessment Methods

	NQF Learning Domains and Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Apply fundamentals of physics to the solution of problems related to materials science.	-Lectures -Seminars -Structured Laboratory classes -directed reading -presentations -projects	-Exams -Laboratory reports. -Written reports. -Preparation of dissertation
1.2	Effectively plan and record data.		
1.3	Be able to discuss the relevance of their research in the context of published work.		
1.4	Investigate new materials in a methodical way, conduct and analyze experimental data.		
2.0	**Cognitive Skills**		
2.1	Select appropriate techniques, resources and modern instruments and IT tools, including prediction and modelling, to new materials, with an understanding of the limitations.	-Lectures -Structured Laboratory classes -directed reading -presentations -projects	-Laboratory reports. -Presentations. -Written reports for the preparation of dissertation.
2.2	Evaluate different potential solutions to an unfamiliar problem.		
2.3	Predict the limits of accuracy of data to inform the planning of future work.		
2.4	Apply specific data analysis methods and tools, including appropriate software.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Understand the impact of environmental contexts.	-Lectures -Projects. -Workshops	-Laboratory reports. -Presentations.
3.2	Evaluate the need for sustainable, new and renewable energy.		
3.3	Commitment to professional ethics and responsibilities and norms of experimental practice of material science.		
3.4	Make decisions in complex and unpredictable situations.		
3.5	Work independently under minimum supervision.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate results of research by presenting a seminar to the research group.	-Projects. -Workshops -Presentations.	-Lab. Reports. -Presentations.
4.2	Communicate and interact with professionals from other disciplines. .		

4.3	Show competence in the use of IT and information handling.		
5.0	**Psychomotor** *(Not applicable)*		

4/1/5/2/3 Program Learning Outcomes Mapping Matrix

	Course Offering NQF Learning Domains and Learning Outcomes	662	664	666	649	651	663	665	643	645	652/653	654
1.0	**Knowledge**											
1.1	Apply fundamentals of physics to the solution of problems related to materials science.	√	√									
1.2	Effectively plan and record data.					√						
1.3	Be able to discuss the relevance of their research in the context of published work.									√		
1.4	Investigate new materials in a methodical way, and analyze experimental data.			√		√	√					
2.0	**Cognitive Skills**											
2.1	Select appropriate techniques, resources and modern instruments and IT tools, including prediction and modelling, to new materials, with an understanding of the limitations.			√		√	√					
2.2	Evaluate different potential solutions to an unfamiliar problem.											√
2.3	Predict the limits of accuracy of data to inform the planning of future work.					√						√
2.4	Apply specific data analysis, methods and tools, including appropriate software.											√
3.0	**Interpersonal Skills & Responsibility**											
3.1	Understand the impact of environmental contexts.							√				
3.2	Evaluate the need for sustainable, new and renewable energy.							√				
3.3	Commitment to professional ethics and responsibilities and norms of experimental practice of material science.								√			
3.4	Make decisions in complex and unpredictable situations.											√
3.5	Work independently under minimum supervision.					√						√
4.0	**Communication, Information Technology, Numerical**											
4.1	Communicate results of research by presenting a seminar to the research group.									√		
4.2	Communicate and interact with professionals from other disciplines. .									√		

4.3	Show competence in the use of IT and information handling.									√		√
5.0	**Psychomotor** (NA)											

5. Students

5/1 Admission Requirements for the Program:

The physics department offers two MSc programs: **Master of Science in physics by Courses & Thesis** (**or mixed mode**) and **Master of Science in Physics by Courses & Research Project** (**or Coursework**). **Both Programs are offered to both full-timers and part-timer** .The admission conditions for each program are listed below.

Mixed mode Program (code number 403044):

The admission requirements are categorized into the following:

I) The general requirements based on the Unified Regulations for Postgraduate Studies for Saudi Universities, which are:

1- The applicant must be a Saudi national or a non-Saudi on an official scholarship.
2- The applicant must have a bachelor degree in Physics from a Saudi university or a non-Saudi university that is recognized by the Ministry of Education.
3- The candidate must have a GPA of at least 2.75 out of 4 (or 3.75 out of 5).
4- The candidate must provide a good-conduct certificate, and must also be medically fit.
5- The candidate must provide two letters of recommendation written by faculty members who have thought the candidate.
6- The candidate must provide a permission letter from his/her employer in case the candidate works in a governmental job.

II) The physics department requirements, which are:

1- The candidate should pass TOEFL test with a score not less than 400. TOEFL equivalent tests are acceptable such as ILTS and STEP.
2- The candidate must pass the Post-Graduate General Aptitude Test (which is a governmental test offered by the National Center of Assessment) with a score not less than 60.
3- The candidate must pass the admission exams (both written and oral) offered by the physics department.

Any candidate must fulfill all requirements mentioned above to be officially registered as a postgraduate student (MSc degree) in the physics department.

Coursework Program (code number 403045):

1- The applicant must have a bachelor degree from a Saudi university or a non-Saudi university recognized by the Ministry of Education.
2- The candidate must have a GPA of at least 1.75 out of 4 (or 2.75 out of 5).

3- The candidate should pass TOEFL test with a score not less than 400. TOEFL equivalent tests are acceptable such as ILTS and STEP.
4- The candidate must pass the Post-Graduate General Aptitude Test (which is a governmental test offered by the National Center of Assessment) with a score not less than 60.
5- The candidate must pass the admission exams (both written and oral) offered by the physics department.

Important note: All applicants who work as Teacher Assistants in any Saudi university have the following privileges:

1- They are exempted from the admission exams mentioned above.
2- They are allowed to choose between both **the mixed mode and Coursework** programs. In the case they choose the **Coursework** program, they are exempted from all fees.

Exit Requirements for the Program:

The student is awarded a diploma in physics when completing 26 units of the program (if he fails to complete the thesis project).

6- Learning Resources, Facilities and Equipment.

6/1 Available Learning Resources, Facilities and Equipment at the Department	Capacity	Available in Numbers
Classrooms	40	25
Laboratories and workshops	24	16
Laboratory of photonics	24	16
Laboratory of nanomaterials	24	16
Laboratory of condensed matter	24	16
Library and information resources	Few hundred	50
1- Books and references	Few hundred	>100
2- Digital resources and data bases	yes	yes

6/2 Required Learning Resources, Facilities and Equipment at the Department	Capacity	Available in Numbers
Classrooms	40	25
Laboratories and workshops	24	16
Lab 1	24	16
Lab 2	24	16
Lab 3	24	16
Library and information resources	Few hundred	50
1- Books and references	Few hundred	>100
2- Digital resources and data bases	yes	yes
In Physics department main research equipment items are available. Both for synthesis and characterization techniques of solid materials. **Synthesis and manufacturing equipment items include:** - Ball millers (automated and manual) - Autoclaves, spin coating, eco-spray, sol-gel - Furnaces, microbalances , pH meter ,viscosity meter, ultrasonic tank, ….. - High pressure compacting machine - Stress and strain measurement machine **Analysis and characterization equipment items include:** - X-ray diffractometer - Scanning microscope - Atomic field microscope - Impedance analyzer - UV-visible spectrometer We note that in the near future new well equipped* central laboratory of the applied science faculty will be available for researchers. • SEM, TEM, FTIR, XRD, HRNMR….		

7. Scientific Research and Projects:

7/1 Main Research Domains at the Department:

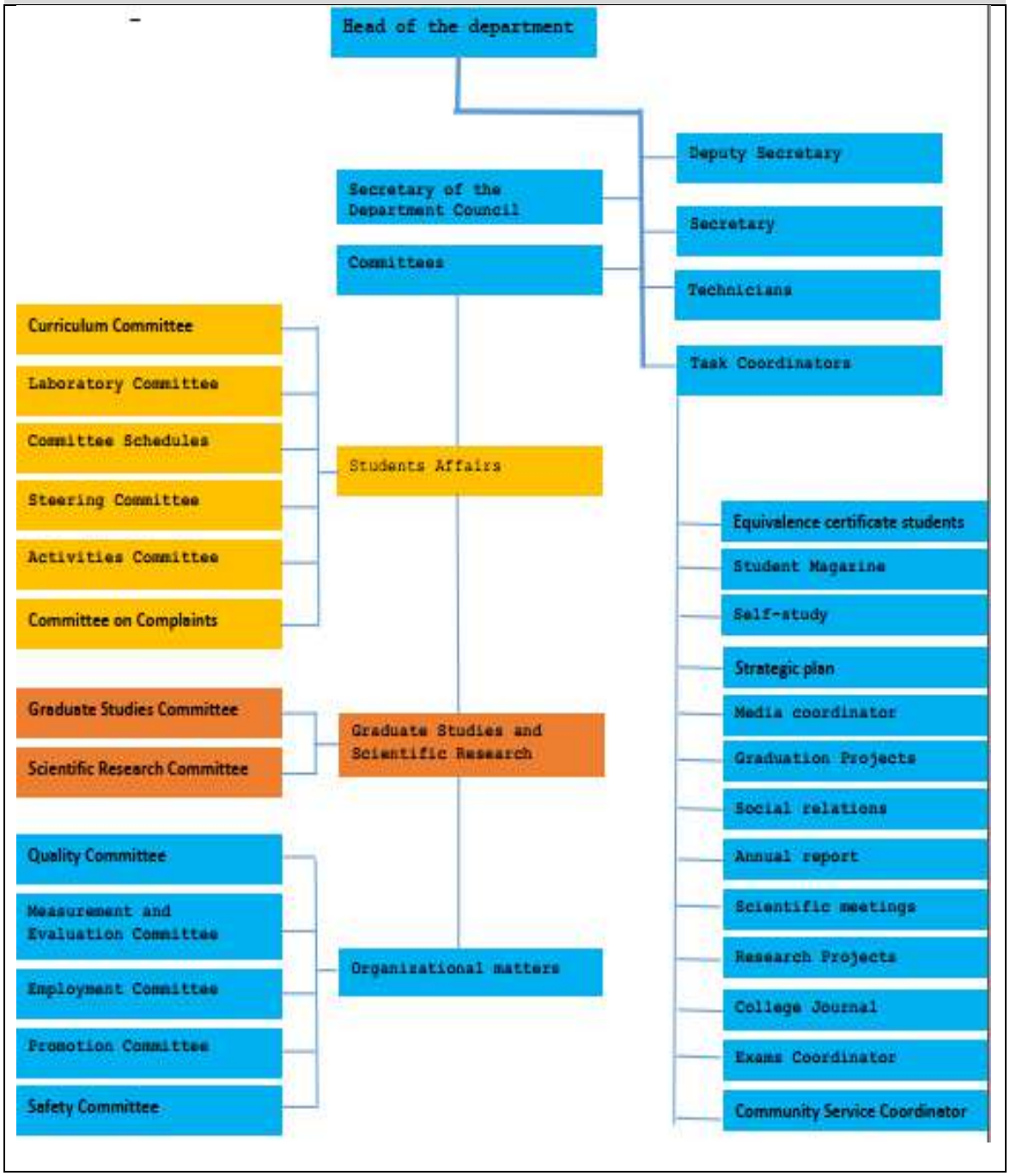
- Solid State Physics.
- Photonics and Optics.
- Nuclear & High Energy Physics.

(See **appendix 8/9** for C.V. of all faculty members)

8. Form Appendices

(Administrative and Regulatory Form Documents)

8/1 Skeletal Structure of the Department:



8/2 Copy of Decision of forming departmental post-graduate Studies committee including program coordinator:

Kingdom of Saudi Arabia
Ministry of Education
Umm Al-Qura University

المملكة العربية السعودية
وزارة التعليم
جَامِعَةُ أمِّ القُرىٰ

قرار داخلي

إنّ رئيس القسم: بناء على الصلاحيات المخولة له نظاما بالقرار رقم (٤٣٩٠٠٣٠٥٧١) وبتاريخ ١٩-٢-١٤٣٩ هـ وبناء على ما تقضيه المصلحة لمتابعة أمور الدراسات العليا بالقسم يقرر ما يلي :

أولاً: تعيين سعادة الأستاذ الدكتور/ خالد عبدالواجد محمد منسقا لبرنامج ماجستير الفيزياء بنظام المقررات والرسالة (الغير مدفوع) ونظام المقررات والمشروع البحثي (المدفوع)،

ثانيا: تضمن القيام بالمسئوليات التالية:

١. إعلان دعوة الاجتماعات الى سعادة أعضاء وعضوات اللجنة الموقرين لمتابعة سير العمل والمستجدات.
٢. وضع جداول المهام والأعمال ومتابعة نسب الإنجاز.
٣. القيام بالتواصل المستمر مع أصحاب السعادة باللجنة.
٤. كتابة التقارير والمحاضر.
٥. التنسيق مع الجهات المتعلقة بالبرنامج وحضور اجتماعاتها.
٦.

والله ولي التوفيق،،،

رئيس قسم الفيزياء

د. صالح بن مرزوق اللقماني

الرقم : ..... التاريخ : ..... المشفوعات : .....

قرار داخلي

إنّ رئيس القسم: بناء على الصلاحيات المخولة له نظاما بالقرار رقم (٤٣٩٠٠٣٠٥٧١) وبتاريخ ١٩- ٢- ١٤٣٩ هـ وبناء على ما تقضيه المصلحة لمتابعة أمور الدراسات العليا بالقسم يقرر ما يلي :

أولاً: تشكيل لجنة لاستحداث برنامج الماجستير (المدفوع/الغير مدفوع) في الفيزياء بالقسم برئاستنا وعضوية أصحاب السعادة:

١- أ.د. خالد عبدالواجد محمد عبداللطيف
٢- أ.د. محمد محمود صبري
٣- أ.د. عادل محمد الهاشمي المدني
٤- أ.د. رشدي سعودي محمد عوض
٥- د. عبدالمجيد عمر طيمومي
٦- د. أحمد محمد الهادي عبدالغفار
٧- د. وليد بلحاج بلقاسم

شطر الطالبات

٨- د. زينب سليمان مطر
٩- د. نهى عبدالحليم فلمبان
١٠- د. تسنيم ملك عظيم

ثانياً: استحداث برنامج الماجستير في الفيزياء (المدفوع/الغير مدفوع) بنظام المقررات في قسم الفيزياء بكلية العلوم التطبيقية- جامعة أم القرى.

والله ولي التوفيق،،،

رئيس قسم الفيزياء

د. صالح بن مرزوق اللقماني

الرقم: ..... التاريخ: ١٤٣٩/٠٢/١٩ هـ ..... المشفوعات: .....

8/3 Minutes of meeting of departmental graduate studies committee.:

Kingdom of Saudi Arabia
Ministry of Education
Umm Al-Qura University

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى

محضر اجتماع

لجنة الدراسات العليا بقسم الفيزياء : بتاريخ 31 /10/ 2018م

عقدت لجنة الدراسات العليا بقسم الفيزياء اجتماعا يوم الاربعاء الموافق 2018/10/31م في الساعة الثانية عشر ظهرا بدعوة من سعادة رئيس قسم الفيزياء د صالح اللقماني لاعتماد برنامج الماجستير في الفيزياء بنظامي المقررات والرسالة (البرنامج الغير مدفوع) ونظام المقررات والمشروع البحثي (النظام المدفوع). وقد حضر هذا الاجتماع كل من الأعضاء الموقعين أدناه:

الإسم	التوقيع
د. صالح مرزوق اللقماني	
د. محمد خليل تركستاني	
د. علي الشمراني	
د. ثامر العميري	
أ.د. خالد عبد الواجد مجمد	
أ.د. محمد صلاح الدين	
د. وليد بلقاسم بلحاج	

بدأ منسق اللجنة أ. د. خالد عبدالواجد بالحمد لله و الصلاة و السلام على رسول الله صلى الله عليه و سلم ثم بكلمة ترحيبية للحضور وبعد ذلك تم تناول المواضيع التالية:

1- اعتماد الهيكل العام لبرنامج ماجستير الفيزياء (المدفوع والغير مدفوع)

2- اجراءات تقويم الرسالة (للبرنامج الغير مدفوع) والمشروع البحثي (للبرنامج المدفوع)

3- شروط قبول البرنامج المدفوع والغير مدفوع

توصيات:

- **اعتماد الهيكل العام للبرنامج بشقيه المدفوع والغير مدفوع كما هو بالجداول 1 و2.**
- **يكون تقويم الرسالة "باجتياز" أو "اجتياز مع تعديلات" أو "رفض الرسالة" (ويكون تقدير الطالب عن طريق المقررات الدراسية فقط).**
- **يكون تقويم المشروع البحثي بالدرجات (علي أن يكون هناك اختبار شفوي للطالب من قبل لجنه مشكلة من القسم ويرصد الدرجة المشرف الاكاديمي للطالب).**
- **شروط القبول للبرنامج الغير مدفوع تبقي كما هي في النظام السابق (ويبقي علي درجة اختبار التوفل من 400)**
- **شروط القبول للبرنامج المدفوع هي كالتالي**
  - **التقدير العام جيد.**
  - **يبقي علي درجة اختبار التوفل من 400 درجه (وذلك لان لغة تدريس البرنامج هي اللغة الانجليزية)**
  - **لايتطلب مو افقة جهة عمل الطالب.**
  - **أن تكون الدراسة مسائية فقط للبرنامج المدفوع.**

اختتام الاجتماع بالحمد لله والصلاة والسلام على رسول الله صلى الله عليه وسلم على الساعة الواحدة ظهرا

8/4 Minutes of departmental council meeting adopting the program prior to arbitration.

Kingdom of Saudi Arabia
Ministry of Education
Umm Al-Qura University

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى

(ســـري)

محضر مجلس قسم الفيزياء المنعقد بتاريخ ١٤٤٠/٣/١٣هـ
في الجلسة (السادسة) للعام الجامعي ١٤٣٩هـ/١٤٤٠هـ
الزمن:- الساعة ١١ ونصف ظهر يوم الأربعاء الموافق ١٤٤٠/٣/١٣هـ

تم في المكان والزمان المشار اليهما بعاليه اجتماع مجلس قسم الفيزياء برئاسة د/ صالح مرزوق اللقماني رئيس القسم في جلسته السادسة للعام الدراسي الحالي ١٤٣٩هـ/١٤٤٠هـ للفصل الدراسي الأول وكان الحضور على النحو التالي:-

م	الاسم	م	الاسم
١	أ.د. سمير سليمان نقو	١٧	د. محمد عمر بوستيمي
٢	أ.د.سعود حميد اللحياني	١٨	د.محرز الشرياني لولو
٣	أ.د. خالد عبد الواجد	١٩	د.وليد بلقاسم بلحاج
٤	أ.د. رشدي سعودي	٢٠	د.طه محمد طه الفوال
٥	أ.د.محمد محمود صبري	٢١	د.عبد الرحمن يوسف ناشين
٦	أ.د/ عادل محمد مدني	٢٢	د. جلال الناصر الورتلي
٧	د.صالح رزق اللقماني	٢٣	د. الحسيني الطاهر محمد
٨	د. فهد عبدالله الهاشمي	٢٤	د. عبد المجيد عمر طيمومي
٩	د. رمضان على حسن	٢٥	د.زينب سليمان مطر
١٠	د. المنجي الساسي بنموس	٢٦	د. أمينة نايف الأحمدي
١١	د. ناصر سلمان العميري	٢٧	د. حنان حسين ابراهيم عامر
١٢	د. علي صالح الشمراني	٢٨	د. نهى عبد الحليم فلمبان
١٣	د. بديع عبد الحليم قرني	٢٩	د. رباب خالد سندي
١٤	د.أحمد محمد الفادي	٣٠	د. تسنيم ملك محمد اعظم
١٥	د.سعيد محمد عطيه	٣١	د. مفاف معوض عبد المجيد علي
١٦	د. خالد ناصر الثقفي	٣٢	د.فاطمة السيد محروس

الرقم : ..... التاريخ : ..... المشفوعات : .....

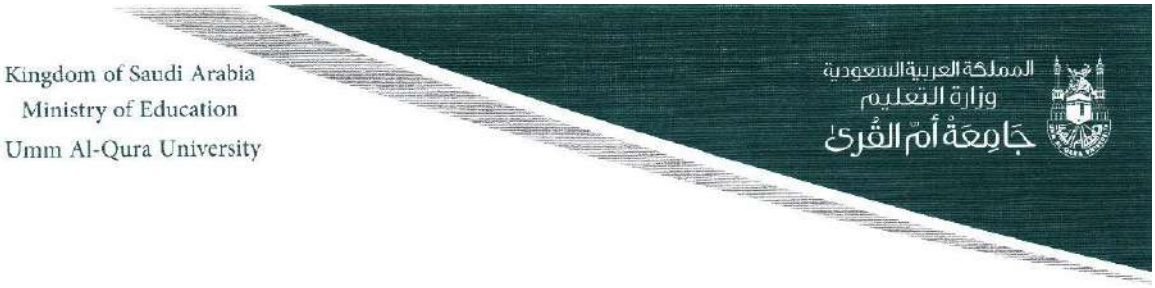
مواضيع المجلس السادس

١	اعتماد استحداث برامج الماجستير في الفيزياء بنظاميها المدفوع والغير مدفوع
٢	اعتماد استحداث برامج الماجستير في الفيزياء الطبية بنظاميها المدفوع والغير مدفوع
٣	اعتماد التقرير السنوي البرامجي لبرنامج الفيزياء
٤	اعتماد التقرير السنوي البرامجي لبرنامج الفيزياء الطبية

الرقم : ..... التاريخ : ..... المشفوعات : .....

وقد بدأ رئيس الجلسة الاجتماع بالحمد لله و الصلاة و السلام على رسول الله صلى الله عليه و سلم ثم بكلمة ترحيبية للحضور متمنيا للجميع دوام التوفيق و النجاح و بعد ذلك وجه سعادة رئيس الجلسة الشكر لسعادة الاستاذ الدكتور/ يسري مصطفى عيد لتأليفه وترجمته للعديد من الكتب العلمية القيمية ، كما أثنى سعادة رئيس الجلسة لحصول احد خريجي القسم على جائزة اختراع عالمية تحت اشراف سعادة الدكتور/ عبد المجيد طيمومي، كما هنأ سعادة رئيس الجلسة القسم لحصول القسم على تمويل مشروعين بحثين من عمادة البحث العلمي احدهما على برنامج "باحث" الباحث الرئيسي سعادة الدكتور/ صالح اللقماني والأخر على برنامج "واعد" الباحث الرئيسي سعادة الدكتوره/ رباب سندي كما أثنى سعادة رئيس الجلسة على الحضور الرائع والمشاركة اللافتة لقسم الفيزياء في فعالية اليوم العالمي بالمستشفى الجامعي بجدة والتكريم المتميز لسعادة الدكتورة/ حنان عامر ومشاركة طالبات القسم في الحدث، كما أثنى سعادة رئيس الجلسة على القيادة الاستثنائية لسعادة الدكتورة/ امينة الأحمدي في تراس وفد جامعة أم القرى المشارك بمعرض الكتاب بالنمسا، كما هنأ سعادة رئيس الجلسة سعادة الأستاذ الدكتور/ خالد عبد الواجد لفوزه بجائزة افضل ثاني مقرر تعليمي على مستوى جامعة أم القرى من عمادة التعليم الإلكتروني، كما هنأ سعادة رئيس الجلسة كل من سعادة الدكتور/ رمضان علي وسعادة الدكتورة تسنيم عظيم كأفضل ١٠ اعضاء هيئة تدريس على مستوى الجامعة في تفعيل التعليم الإلكتروني. بعد ذلك استعرض سعادة رئيس المجلس المواضيع التالية واتخذ بشأنها القرارات اللازمة وهي كالتالي:-

الرقم : ..... التاريخ : ..... المشفوعات : .....



الموضوع الاول:-

مناقشة اعتماد استحداث برامج الماجستير في الفيزياء بنظاميها المدفوع والغير مدفوع .

الحيثيات:-

اطلع المجلس على برنامج الماجستير المقترح والتي قام على اعداده لجنة مشكلة من القسم وقام سعادة الأستاذ الدكتور/ خالد عبد الواجد باستعراض البرنامج بنظاميه المدفوع والغير مدفوع ، وتم مناقشة الخطة الدراسية للبرنامج من حيث عدد الساعات الخاصة بالمقررات وعدد الساعات الخاصة بالرسالة بالنسبة لبرنامج الماجستير الغير مدفوع ، كما تم استعراض ومناقشة عدد ساعات برنامج الماجستير في الفيزياء المدفوع ، ولقد اتخذ المجلس التوصية التالية:-

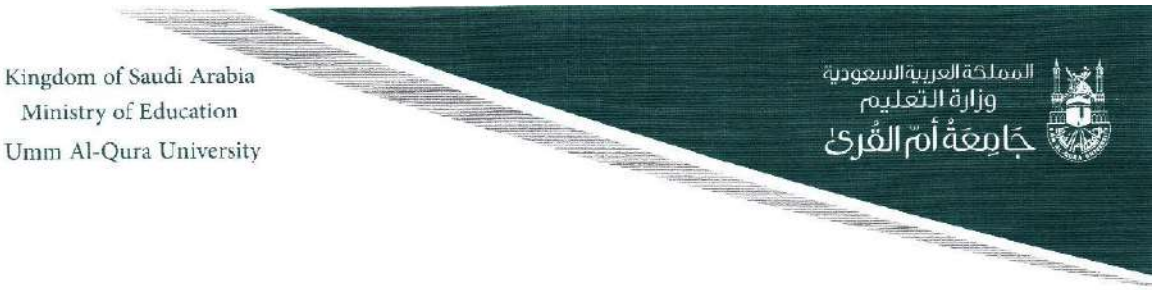
التوصية:-

أوصى المجلس باعتماد برنامج الماجستير في الفيزياء بنظاميه المدفوع والغير مدفوع، مع التمنيات بالتوفيق والسداد.

المستند النظامي المؤيد للتوصية :

المواد ٧- ٨ من اللائحة الموحدة للدراسات العليا في الجامعات .

الرقم : ..... التاريخ : ..... المشفوعات : .....



الموضوع الثاني:-

مناقشة اعتماد استحداث برامج الماجستير في الفيزياء الطبية بنظاميها المدفوع والغير مدفوع .

الحيثيات:-

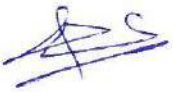
اطلع المجلس على برنامج الماجستير المقترح لدرجة الماجستير في الفيزياء الطبية بنظاميها المدفوع والغير مدفوع والتي قام على اعدادها لجنة مشكلة من القسم وقام سعادة الدكتور/ طه محمد الفوال منسق البرنامج باستعراض الخطة الدراسية المقترحة ، وتم مناقشة الخطة من حيث عدد الساعات الخاصة بالمقررات وعدد الساعات الخاصة بالرسالة بالنسبة لبرنامج الماجستير الغير مدفوع ، كما تم استعراض ومناقشة عدد ساعات المقررات و المشروع البحثي وكذلك توزيع عدد الساعات على الفصول لبرنامج الماجستير في الفيزياء الطبية المدفوع ، ولقد اتخذ المجلس التوصية التالية:-

التوصية:-

أوصى المجلس باعتماد برنامج الماجستير في الفيزياء الطبية بنظاميه المدفوع والغير مدفوع، مع التمنيات بالتوفيق والسداد.

المستند النظامي المؤيد للتوصية :

المواد ٧- ٨ من اللائحة الموحدة للدراسات العليا في الجامعات .



الرقم : ..... التاريخ : ..... المشفوعات : .....

Kingdom of Saudi Arabia
Ministry of Education
Umm Al-Qura University

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى

التوقيعات

لمحضر مجلس قسم الفيزياء في جلسته السادسة للعام الدراسي ١٤٣٩/١٤٤٠هـ الفصل الدراسي الأول

م	الاسم	التوقيع	م	الاسم	التوقيع
١	أ.د/سمير سليمان احمد نتو		١٧	د/عبدالمجيد عمر طيموني	
٢	أ.د/ سعود حميد اللحياني		١٨	د/ عادل محمد مدني	
٣	أ.د/ رشدي سعودي محمد		١٩	د/ سعيد محمد عطيه	
٤	أ.د/يسري محمد عبد مصطفى		٢٠	د/حسام صلاح الدين محمد	
٥	أ.د/خالد عبدالواجد محمد		٢١	د/احمد محمد الغادي	
٦	د/ وليد جميل أنطه		٢٢	د/الحسيني الطاهر محمد	
٧	د/صالح مرزوق اللحماني		٢٣	د/ محرز الشرياني محمد نولو	
٨	د/فهد عبدالله الهاشمي		٢٤	د/ وليد بلقاسم بلحاج	
٩	د/محمد خليل التركستاني		٢٥	د/طه محمد طه الفوال	
١٠	د/ خالد ثامر الثقفي		٢٦	د/بديع عبدالحليم قرني	
١١	د/ محمد عمر بوستيمي		٢٧	د/ عبد الرحمن يوسف لاشين	
١٢	د/ رمضان على حسن		٢٨	د/أحمد مقبول الحكمي	
١٣	د/المنجي الساسي بنموس		٢٩	د/ عاطف محمود إسماعيل	
١٤	د/علي صالح الشمراني		٣٠	د/جلال الناصر الورفلي	
١٥	د/ ثامر سلمان الحميري		٣١	د/ تركي عثمان المعطاني	
١٦	د/محمد محمود صبري		٣٢		

رئيس قسم الفيزياء

د/صالح مرزوق اللحماني

الرقم : ..... التاريخ : ..... المشفوعات : .....

توقيع عضوات هيئة التدريس

م	الاسم	التوقيع	م	الاسم	التوقيع
٣٤	د/ زينب سليمان مطر		٣٩	د/ منى عبدالخالق محسب	—
٣٥	د/ أمينة نايف الأحمدي		٤٠	د/ أماني إبراهيم العلوي	—
٣٦	د/ هنان حسين عامر		٤١	د/ نهى عبدالحليم فلمبان	
٣٧	د/ عفاف معوض علي		٤٢	د/ رباب خالد سندي	
٣٨	د/ فاطمة السيد محروس		٤٣	د/ تسنيم ملك محمد مظيم	Jasmin Bgl

رئيس قسم الفيزياء

د/ صالح بن مرزوق اللقماني

الخير البادئ (٦)

الرقم : ..... التاريخ : 13 / 3 /1440هـ المشفوعات : .....

8/5 Copy of decision of forming the college post-graduate studies committee including Program Coordinator

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى
(٠٣١)

قرار داخلي

إنّ رئيس القسم: بناء على الصلاحيات المخولة له نظاما بالقرار رقم (٤٣٩٠٠٣٠٥٧١) وبتاريخ ١٩- ٢- ١٤٣٩ هـ وبناء على ما تقضيه المصلحة لمتابعة أمور الدراسات العليا بالقسم يقرر ما يلي :

أولاً: تشكيل لجنة لاستحداث برنامج الماجستير (المدفوع/الغير مدفوع) في الفيزياء بالقسم برئاستنا وعضوية أصحاب السعادة:

١- أ.د. خالد عبدالواجد محمد عبداللطيف
٢- أ.د. محمد محمود صبري
٣- أ.د. عادل محمد الهاشمي المدني
٤- أ.د. رشدي سعودي محمد عوض
٥- د. عبدالمجيد عمر طيمومي
٦- د. أحمد محمد الهادي عبدالغفار
٧- د. وليد بلحاج بلقاسم

شطر الطالبات

٨- د. زينب سليمان مطر
٩- د. نهى عبدالحليم فلمبان
١٠- د. تسنيم ملك عظيم

ثانياً: استحداث برنامج الماجستير في الفيزياء (المدفوع/الغير مدفوع) بنظام المقررات في قسم الفيزياء بكلية العلوم التطبيقية- جامعة أم القرى.

والله ولي التوفيق،،،

رئيس قسم الفيزياء

د. صالح بن مرزوق اللقماني

الرقم: ..... التاريخ: ١٤٣٩/١١/٠٩ هـ ..... المشفوعات: .....

8/6 Minutes of meeting of college post-graduate committee chaired by the dean and membership of program departmental coordinator.

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى
(٠٣١)

قرار إداري

إن عميد الكلية وبناءً على الصلاحيات المخولة له بقرار معالي مدير الجامعة رقم ٣٩٠٢٠٠٤٠٢٨ في ١٤٣٩/١٠/١٧هـ، ورغبة في تطوير الأداء وتوزيع المهام وتحديد الصلاحيات لانتظام العمل في الكلية

يقرر ما يلي:

أولاً: إعادة تشكيل لجنة الدراسات العليا برئاسة سعادة وكيل الكلية للدراسات العليا والبحث العلمي وعضوية كل من:

- سعادة وكيلة الكلية — نائباً
- رؤساء لجان الدراسات العليا في أقسام الكلية الأربع — عضواً
- أ. عبد العزيز بن عبد الله سجادة — سكرتيراً

ثانياً: تكون مهام اللجنة كالتالي:

- متابعة استحداث وتحديث الخطط الدراسية لبرامج الدراسات العليا في الكلية.
- متابعة ما يصدر من تعاميم من عمادة الدراسات العليا.
- الاشراف على عمليات القبول في برامج الدراسات العليا.
- التوصية بالأعداد المقترحة لقبول الطلبة في برامج الدراسات العليا.

ثالثاً: يعمل بهذا القرار لمدة عام من تاريخه.

عليه آمل الاطلاع كلا فيما يخصه والعمل بموجبه من تاريخه والله ولي التوفيق

لكم خالص تحياتي وتقديري،،،،

عميد كلية العلوم التطبيقية

د. حاتم بن محمد الطس

المملكة العربية السعودية
وزارة التعليم
جَامِعَةُ أمّ القُرى

محضر لجنة الدراسات العليا بكلية العلوم التطبيقية

فقد اجتمعت اللجنة يوم : الخميس الموافق ١٤ / ٣ / ١٤٤٠هـ الساعة (١ ظهرا) برئاسة عميد كلية العلوم التطبيقية وعضوية كلاً من أصحاب السعادة :

١. أ . د . باسم بن حسين أصغر وكيل الكلية للدراسات العليا والبحث العلمي

٢ . د. رجاء طاهر معتوق وكيلة الكلية

٣ . أ د. صالح عبدالمجيد أحمد ممثل قسم الكيمياء

٤. أ. د. خالد عبدالرحمن البنا ممثل قسم الاحياء.

٥ . د . خالد عبدالواجد محمد ممثل قسم الفيزياء.

٦. د . منتصر أحمد سعفان ممثل قسم العلوم الرياضية.

٧ . أ . عبدالعزيز عبدالله سجادة سكرتيراً ومقرراً

لمناقشة الموضوع التالي والخاص بقسم الفيزياء لاستكمال نموذج ١٠٢ وبعد اطلاع اللجنة على الملف كاملا ومنه:

الموضوع الأول: استحداث برنامج الماجستير في الفيزياء:

بعد دراسة ملف استحداث برنامج الماجستير لقسم الفيزياء والمشتمل على:

١- برنامج ماجستير الفيزياء بالمقررات والرسالة (غير مدفوع).

٢- برنامج ماجستير الفيزياء بالمقررات والمشروع البحثي (مدفوع).

٣- برنامج ماجستير الفيزياء الطبية بالمقررات والرسالة (غير مدفوع).

٤- برنامج ماجستير الفيزياء الطبية بالمقررات والمشروع البحثي (مدفوع).

الرقم: ..... التاريخ : ..... المشفوعات : .....

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وزارة التعليم
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والمقدمة جميعها من قسم الفيزياء والتأكد من ان اهداف البرنامج مطابقة لأهداف الكلية والجامعة واهداف التعليم العالي وجميع متطلبات نموذج ١٠٢.

بالإضافة الى ان البرنامج المقدم من قسم الفيزياء مستوفي كامل الشروط والقواعد الأساسية لإستحداث وتحديث البرنامج للدراسات العليا التي قررتها عمادة الدراسات العليا وفقا لنموذج ١٠٢، عليه توصي اللجنة بإكمال اللازم نحو تقديم البرنامج لعمادة الدراسات العليا واستكمال نموذج ١٠٢ للنظر في إقرار واعتماد برامج الدراسات العليا.

الرقم : ..... التاريخ : ..... المشفوعات : .....

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى

((التوقيعات))

أ.د. باسم حسين أصغر	
د. رجاء طاهر معتوق	
أ . د. صالح عبدالمجيد احمد	
أ .د. خالد عبدالرحمن البنا	
أ.د. خالد عبدالواجد محمد	
د . منتصر أحمد سعفان	
أ.عبدالعزيز عبدالله سجادة	

عميد كلية العلوم التطبيقية

د. حاتم بن محمد الطلس

الرقم : ..... التاريخ : ..... المشفوعات : .....

8/7 A Copy of job classifications of the program's graduates from the Civil Service Department website:

اسم السلم الوظيفي :	سلم الموظفين العام	اسم المجموعة العامة :	الوظائف التخصصية
اسم المجموعة النوعية :	الوظائف التخصصية المتنوعة	رمز سلسلة الفئات :	00714
اسم سلسلة الفئات :	وظائف الفيزيائيين		

المراتب ومسميات الفئات

مسمى الفئة	المرتبة - المستوى	المرتبة - المستوى
فيزيائي	7	0071407
فيزيائي	8	0071408
فيزيائي	9	0071409
فيزيائي	10	0071410
فيزيائي	11	0071411
كبير فيزيائيين	12	0071412
كبير فيزيائيين	13	0071413

:-

.: تعريف موجز لسلسة الفئات

تشمل هذه السلسلة الوظائف التي تتعلق بإجراء التجارب والبحوث النظرية والعملية في مجال قوانين المادة والطاقة وتطبيقاتها لحل المشاكل الفنية في المجالات العلمية والهندسية والطبية والزراعية والبيئية كما تشمل دراسة الظواهر الفيزيائية المختلفة في ضوء المشاهدات والتجارب العملية بغرض إستثمارها في المجالات العلمية المختلفة من زراعة وطب وصناعة وهندسة...الخ والقيام بالاعمال الاخرى ذات العلاقة بهذا المجال

.: الخبرات المناسبة

سلسلة الفئات : وظائف الفيزيائيين

.: خواص السلسلة - امثلة على اعمال السلسلة

إجراء التجارب والبحوث الفيزيائية في مجال علم المواد والحرارة وتأثيرها على الخواص الفيزيائية للمواد بهدف تطوير بدائل ذات خواص أفضل

إجراء البحوث والتجارب الفيزيائية في مجال الضوء وطبيعته ومصادر أنتشاره وخصائصه الفيزيائية

إجراء التجارب والدراسات العلمية في مجال أشعة الليزر وإستخداماتها للإستفادة من ذلك في مجالات الطب والزراعة ووسائل السلامة

أجراء التجارب والبحوث الفيزيائية في مجال الصوت وإنتقاله وإنتشاره وخصائصه الفيزيائية بغرض الاستخدامات في مجال الطب والاتصالات

إجراء التجارب العلمية في مجال النرة والنواة والالكترونيات وخصائصها الفيزيائية ومجالات النشاط الاشعاعي وآثاره ومجالات إستخدامه في الطب والزراعة

إجراء التجارب والبحوث في مجال الطاقة الشمسية واستخداماتها والمحافظة عليها

.: أمثلة للمعارف و القدرات

8/8 Formation of program's advisory committee (if applicable)

Not applicable

8/9 Curriculum Vitae of Faculty Members over the Past Five Years

(p.s. The citation data and journal quality indicators for all faculty members can be found in **https://uqu.edu.sa/physcim/51901)**

3/1/6/1 Curriculum Vitae of Faculty Members over the Past Five Years.

Name:	**Khaled Abdel-Waged**
Degree:	**Full Professor**

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Nuclear Physics	Joint institute for nuclear Research (Russia)	1994
M.Sc.	Nuclear Physics	Banha University (Egypt)	1992
B.Sc.	Physics	Banha University (Egypt)	1987

Employment:

Position	Employer	Period
Full Professor	Umm Al-Qura University	2007-Now
Associate Professor	Umm Al-Qura University	2002-2007
Assistance Professor	Umm Al-Qura University	2000-2002
Assistance Professor	Benha University	1996-2000

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2010-2012	Geant4 hadronic cascade models…	550,000 SR

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. "Effects of shadowing in Pb + Pb collisions at energies available at the CERN Large Hadron Collider within the HIJING code", Eur.Phys.J. A54 (2018) no.9, 155.
2. "Nucleon shadowing effects in Cu + Cu and Au + Au collisions at RHIC within the HIJING code", J.Phys. G45 (2018) no.2, 025104.
3. "Kinematic constrains on interacting nucleons in Pb+Pb collisions at sNNv= 2.76 TeV within the HIJING code", Phys.Rev. C93 (2016) no.2, 024910.
4. "Interpretation of charged particle spectra in p+p and p+Pb collisions at CERN Large Hadron Collider energies", Phys. Rev. C 91, 034908 (2015).
5. "Lightening-like interactions in nuclear collisions at CERN large hadron collider", Proceedings of Science (EPS-HEP 2015) 190.
6. "Geant4 hadronic cascade models analysis of proton and…" Physical Review C 84, 014905 (2011).

7. "Isospin effects in a covariant transport approach to spallation…", Physical Review C 81, 014605 (2010).
8. "Enabling comparison of UrQMD with Geant4 hadronic cascade models", CERN-LCGAPP-2010-04 (2010).

	Proceeding	Country
1	**23rd geant4 collaboration meeting** , Very High Energy Models (28 Aug 2018).	Sweden
2	**Geant4 Hadronic Working Group Meeting,** Shadowing effects in HIJING code of Geant4 (20 Jun 2018).	Switzerland
3	**Simulation Weekly meeting**, Constraining HIJING code of Geant4 (4 Jul. 2017)	Switzerland
4	**Simulation Weekly meeting ,** The improved HIJING code of Geant4 (9 Aug 2016)	Switzerland

Supervision of Research Students:

Student Name	*Degree*	*Title*	*Year*
Fathia Kari	*M.Sc*	*Study of Spallation neutrons…*	*2005*
Nuha Felemban	*M.Sc*	*Study of nucleon induced reactions…*	*2006*
Sheren Al-Salami	*M.Sc*	*Influence of initial configuration …*	*2010*

Training Programs:

1. SHMS - Saudi OER Network (second Level) (2018/03/04)
2. SHMS - Saudi OER Network (first Level) (2018/02/01)
3. Video Production Tutorial (2017/04/20)
4. Basics of instructional design (2017/04/27)

3/1/6/2

Name:	**Dr. Adel MADANI**	
Degree:	**Professor**	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Physisc	Al Manar University Tunisia	1990
M.Sc.	Physics	Al Manar University Tunisia	1985
B.Sc.	Physics and chemistry	ENS Bizerte Tunisia	1983

Employment:

Position	Employer	Period
Assistant professor	Faculty of Science of Bizerte –Tunisia	1993
Associate professor	Faculty of Science of Bizerte –Tunisia	2011
Associate professor	Umm Al qura university KSA	2012
Professor	Faculty of Science of Bizerte / Umm Al Qura University	2017

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2013-2014	Synthesis and characterization of anode materials for SOFC (KACST	126000
2015-2017	Syynthesis and characterization of materials for SOFC (Master)	35000 SAR

Patents and Copyright:

Title	Date

Publications (published papers and books):

1) Synthesis and spectroscopic investigations of Mn3O4 nanoparticles Materials Letters, , Available online 16 July 2010

2) Rietveld refinement and ionic conductivity of Ca8.4Bi1.6(PO4)6O1.8 I. a Journal of Solid State Chemistry 197 (2013) 154–159

3) Magnetoresistivity and microstructure of YBa2Cu3Oy prepared using planetary ball milling , Physica C 472 (2012)

4) Structural, opto-thermal and electrical properties of ZnO:Mo sprayed thin films , Materials Science in Semiconductor Processing 15 (2012)

5) Ageing effect on electricalproperties of the oxyapatite/ Nd2NiO4 interface ; Ceramics International, Ceramics International, Volume 39, Issue 4, May 2013, Pages 4507-4512

6) Rietveld refinement and ionic conductivityof Ca8.4Bi1.6(PO4)6O1.8 ; Journal of Solid State Chemistry 197 (2013) 154–159

7) Synthesis, characterization and ionic conductivity of oxyphosphosilicates with apatite structure ; Materials Science MSAIJ, 9(1), 2013 [36-40]

8) Synthesis, crystal structure, vibrational properties and dielectric properties of 1-(2-ammonium-ethyl) pipérazindiium hexachlorobismuthate(III) , Polyhedron 48 (2012)

9) Synthesis and electrical properties of co-doping with La, Nd, Y3, and Eu citric acid-nitrate prepared samarium-doped ceria ceramics , Ceramics International, Volume 39, Issue 4, May 2013, Pages 3873-3879

10) Elec trochemical and structural study of Ce0.8Sm0.2xLaxO1.9 electrolyte materials for SOFC , Ceramics International, Volume 39, Issue 6, August 2013, Pages 6175-6182

Experience:

1. Supervisor of many Students and researchers in master's degree and PhD in physics.
2. Referee and consultant in some scientific journals.
3. Evaluation of research projects, academic programs and books .
4. Certificate in psychology and education
5. Participation in many cycles of training
6. Supervising of scientific clubs

3/1/6 /3

Name:	Dr. Sabry	
Degree:	Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Physics	Helwan University (Egypt) in collaboration with Loughborough University (UK)	2003
M.Sc.	Physics	Ain Shams University (Egypt)	1996
B.Sc.	Physics	Ain Shams University (Egypt)	1989

Employment:

Position	**Employer**	**Period**
Professor	Umm Al Qura University	2018-
Associate Professor	Umm Al Qura University	2011-2018

Supported research and development projects related to specialization:

Date	**Project title**	**Amount of funding**
2012-2014	Steam Generation using solar concentrators	120,000 SR

Patents and Copyright:

Title	**Date**

Publications (published papers and books):

1. Ebtehal M. Althobaiti, Atif Ismail, M.Sabry, "The Total Ground State Energies and First Ionization Energies of the Incomplete 3d-Transition Metal-Elements Atoms" Universal Journal of Physics and Application 11(3): 85-90, 2017. DOI: 10.13189/ujpa.2017.11030
2. H. Singh, M. Sabry, D.A.J. Redpath, " Experimental Investigations into low concentrating line axis solar concentrators for CPV applications" Solar Energy 136, 2016,pp. 421–427
3. M. Sabry, "Prismatic TIR (total internal reflection) low-concentration PV (photovoltaics)-integrated façade for low latitudes," Energy, vol. 107, pp. 473–481, Jul. 2016
4. M. Sabry, "Temperature optimization of high concentrated active cooled solar cells," NRIAG J. Astron. Geophys., Mar. 2016
5. Yasser A. Abdel-Hadi , Ahmed Ghitas, Ahmed Abulwfa, M.Sabry, " Simulation model of a new solar laser system of Fresnel lens according to real observed solar radiation data in Helwan of Egypt", NRIAG Journal of Astronomy and Geophysics, Volume 4, Issue 2, December 2015, Pages 249-255

6. A. M. A. El-Hameed, M. Sabry, A. Ghitas, F. S. El-Tokhy, and V. Schlosser, "The Performance of Silicon Solar Cells Exposed to a Simulated Low Earth Orbit Plasma Environment: Laboratory Ground Tests," J. Electron. Mater., vol. 44, no. 12, pp. 4740–4746, Sep. 2015.
7. M. Sabry, M. Nahas, and S. H. Al-Lehyani, "Simulation of a Standalone, Portable Steam Generator Driven by a Solar Concentrator," Energies, vol. 8, no. 5, pp. 3867–3881, May 2015.
8. M. Nahas, M. Sabry, and S. Al-Lehyani, "Feasibility Study of Solar Energy Steam Generator for Rural Electrification," Energy Power Eng., vol. 07, no. 01, pp. 1–11, 2015.
9. M. Sabry, P. C. Eames, H. Singh, and Y. Wu, "Smart windows: Thermal modelling and evaluation," Sol. Energy, vol. 103, pp. 200–209, May 2014.
10. A. Ghitas, H. M. A. Mageed, A. El-Rifaie, V. Schlosser, and M. Sabry, "Validation of a new measuring system for performance evaluation of a large module in a desert area," J. Optoelectron. Adv. Mater., vol. 15, no. 5–6, pp. 565–570, 2013.
11. M. Sabry, Y. A. Abdel-Hadi, and A. Ghitas, "PV-integrated CPC for transparent façades," Energy Build., vol. 66, pp. 480–484, Nov. 2013.
12. Yasser A. Abdel-Hadi, Ahmed Ghitas, A. Abulwfa and M. Sabry, "Simulation Model of a New Solar Laser System of Fresnel Lens According to Real Observed Solar Radiation Data in Helwan of Egypt", Seventh Annual Conference "The Future of new and Renewable Energy in the Arab World" at Assiut University, February 12–14, 2013.

Experience:

1. Review of many papers submitted to high-ranked journals
2. Editor of Umm Al Qura journal for applied science
3. Representing Physics dept. in Applied science research center-Umm Al Qura Uni.

Training Programs:

1. Developing lecturing skill of the academic staff members
2. E-Learning program

3/1/6/4

Name:	Said Mohamed Attia	
Degree:	Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Condensed matter physics	Tongji University- China	2001
M.Sc.	Solid State Physics	Tanta University – Egypt	1994
B.Sc.	Physics	Tanta University – Egypt	1988

Employment:

Position	Employer	Period
Associated Professor	Umm Al-Qura University – KSA	2011-
Associated Professor	Kaferelshiekh University – Egypt	2007-
lecturer	Tanta University – Kaferelshiekh branch Egypt	2001-2007
Assistant lecturer	Tanta University – Kaferelshiekh branch Egypt	1994-2001
Demonstrator	Tanta University – Kaferelshiekh branch Egypt	1988-1994

Supported research and development projects related to specialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. S. M. Attia, , M S Abdelfatah, and M. M. Mossad , “Characterization of pure and composite resorcinol formaldehyde aerogels doped with silver” Journal of Physics: Conf. Series 869 (2017) 012036
2. S. M. Attia, , M S Abdelfatah, and M. M. Mossad, “Conduction mechanism and dielectric properties of pure and composite resorcinol formaldehyde aerogels doped with silver” Journal of Physics: Conf. Series 869 (2017) 012035
3. S. M. Attia, W. I. A. Ismail, and M. M. Mossad, “Characterization of Pure and Composite Resorcinol Formaldehyde Aerogels Doped with Copper” Egyptian Journal of Physics (2017)
4. Fatma El-Sayed, and S. M. Attia, “Energies, Wavelengths, and Transition Rates for Ga-Like Ions (Nd XXX- Tb XXXV)” J. Appl. Spectrosc. **83** 126-132(2016)
5. Fatma El-Sayed, Manal Khered, and S. M. Attia, “Energies and Transition Rates for Be-Like Ions (Xe LI- Ce LV)”, Eur. Phys. J. Plus **130**: 104 (2015)
6. M. R. Eraky, and S. M. Attia, “Transport properties of Ti–Ni spinel ferrites” , Physica B: Condensed Matter 462, 97-103 (2015)
7. S. M. Attia, T. Sharshar, A. R. Abd-Elwahed, and A. Tawfik, “Study of transport properties and conduction mechanism of pure and composite resorcinol formaldehyde aerogel doped with Co-ferrite” Materials Science and Engineering: B 178 (14), 897-910 (2013)

8. Fatma El-Sayed and S. M. Attia, Journal of Physics: Conference Series **869** (2017) 012002
Experience:
1. Supervising the master thesis entitled “Theoretical spectral studies for some ionic systems”, Umm Al-Qura University, KSA.
2. Frontiers in Theoretical and Applied Physics , conference at Sharjah , UAE, 2017
Training Programs:
1. Workshop on “Fundamental of e-learning”, Umm Al-Qura University
2. Workshop on “Publishing of scientific papers”, Umm Al-Qura University
3. Workshop on “writing a self- study report”, Umm Al-Qura University
4. Workshop on “Self-Study of program”, Umm Al-Qura University

3/1/6/5

Name:	Yosry Moustafa	
Degree:	Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Math and Physics	Odessa National University - Ukraine	1991
M.Sc.	Physics	Mansoura University	1982
B.Sc.	Physics	Mansoura University	1975

Employment:

Position	Employer	Period
Professor	Mansoura University	2002-
Associated Professor	Mansoura University	1996-*2002*
Assistant Professor	Mansoura University	1991-1996
Assistant Lecturer	Mansoura University	1982-1991
Demonstrator	Mansoura University	1977-1982

Supported research and development projects related to specialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

كتاب مبادئ الإحصاء الكيميائي والبيئي، تأليف أ.د/ يسري مصطفى، د. / الحسيني الطاهر و د./ طه الفوال

التحليل الآلي: النظرية والتطبيق - الجزء الثاني – طرق الفصل الكروماتوغرافي والطرق الكهربية ومطيافية الكتلة والطرق الحرارية، تأليف أ.د/ يسري مصطفى،

التحليل الآلي: النظرية والتطبيق - الجزء الأول - الطرق الطيفية، تأليف أ.د/ يسري مصطفى

الكيمياء البنائية للزجاج، تأليف ك ج راو، ترجمة: ، أ.د/ محمد سرور الشهاوي ، أ.د/ احمد عبد الله الغامدي، أ.د/يسري مصطفى،

مبادئ السيراميك، تأليف ميتشيل دبليو بارسوم، ترجمة: أ.د/ احمد عبد الله الغامدي، أ.د/ محمد سرور الشهاوي، أ.د/يسري مصطفى،

أساسيات كيمياء الجوامد، تأليف أ.د / يسرى مصطفى، د. / الحسيني الطاهر

مقدمة في فيزياء أشباه الموصلات، تأليف أ.د / يسرى مصطفى، د. / الحسيني الطاهر
موسوعة التأثيرات والظواهر الفيزيائية وتطبيقاتها، تأليف أ.د / يسرى مصطفى،
الفيزياء العامة وتطبيقاتها في المجال الحيوي والطبي، تأليف أ.د / يسرى مصطفى، و د./ الحسيني الطاهر، و د. / رمضان على، و أ.د. / وليد ألطف،
الفيزياء العامة لغير المتخصصين وطلاب قسم التربية الخاصة، تأليف أ.د / يسرى مصطفى، د./ الحسيني الطاهر، د./ عفاف معوض، و د. / دعاء محمود،
موسوعة الفيزياء والفلك، تأليف أ.د / يسرى مصطفى، أ.د / سعود حميد اللحياني، و د. عفاف معوض
فيزياء الحالة الصلبة وتطبيقاتها، المرجع الشامل، تأليف/ د. يسرى مصطفى، د احمد الغامدى
علم الصوتيات، تأليف ليو أل. بيرانيك، ترجمة/ د. يسرى مصطفى و د. محمد التوهامى
قاموس مصطلحات الفيزياء المشروحة، الجزء الأول: الالكترونية، تأليف/ د. يسرى مصطفى
Scientific research papers:
الأجهزة الالكترونية (الطبعة الثالثة، تأليف فلويد) ترجمة د. يسرى مصطفى & د. جمال الصغير الفردغ
فيزياء الحالة الصلبة، الجزء الأول، تأليف/ د. يسرى مصطفى
Impact and correlation of pKa and d Q1 n electrons of selected thiosemicarbazone Schiff base metal Co, Ni, Cu complexes: a study of electrochemical behavior, excitation and optical energies, Yosry Moustafa, Mohammad Soror El-Saeed El-Shahawi, W. Ahmad, G. A. Al-Hazmi
Characterisation of Iron Oxychloride Potassium Phosphate Glasses. J. Physics D: Applied Physics 32 (1999) 2278-2286.
Phase Separation and NMR Studies on Sodium Borosilicate Glasses Containing V_2O_5.
Effect of Vanadium Oxide on the Structure and Properties of Lithium borate Glasses.
Potassium Borosilicate Glasses:- Electrical Resistivity
Potassium Borosilicate Glasses:- II Temperature Derivative of Electrical Resistivity near the Transition Temperature.

3/1/6/6

Name:	Roshdi Seoudi Mohamed Awed	
Degree:	Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	B.Sc Degree	Mansoura University	Egypt
M.Sc.	M.Sc Degree	Cairo University	Egypt
B.Sc.	Ph.D Degree	Cairo University	Egypt

Employment:

Position	Employer	Period
Teach Assistance	Mansoura University	Dec 1992: April 1993
Researcher Assistant	National Institute for Standards	May1993: Nov.1993
Researcher Assistant	National Research Center	Dec.1993: April 1998
Assistant Researcher	National Research Center	Apr. 1998: June 2002
Researcher	National Research Center	June 2002:2007
Associate Professor	National Research Center	Aug. 2007- Oct. 2008
Visitor Assistant professor	LDL Lab., Gatech., USA.	Sept.2008-July 2009
Associate Professor	National Research Center	Aug. 2009-Oct.2009
Associate Professor	Umm Al Qura University	Sept.2009-2012
Professor	Umm Al Qura University	2012- to now

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2014-2018	Improve the Conversion Efficiency of Organic	215000
2013-2015	Preparation and investigation of nanostructure materials	298000

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. R. Seoudi1, H. A. Althagafi, Dependence of Copper Phthalocyanine Photovoltaic Thin Film on the Sizes of Silver Nanoparticles, Silicon (2018) 10:2165–2171
2. R. Seoudi, F. A. Al-Marhaby, Synthesis, Characterization and Photocatalytic Application of Different Sizes of Gold Nanoparticles on 4-Nitrophenol**,** World Journal of Nano Science and Engineering, 2016, 6, 120-128
3. F. A. Al-Marhaby, R. Seoudi, Preparation and Characterization of Silver Nanoparticles and Their Use in Catalytic Reduction of 4-Nitrophenol, World Journal of Nano Science and Engineering, 2016, 6, 29-37
4. S. H. A. Allehyani, R. Seoudi, D. A. Said, A. R. Lashin & A. Abouelsayed, Synthesis, Characterization, and Size Control of Zinc Sulfide Nanoparticles Capped by Poly(ethylene glycol), Journal of Elec Materi (2015) 44:4227-4235
5. R. Seoudi, S.H.A. Allehyani, D.A. Said, A.R. Lashin, and A. Abouelsayed, Preparation, Characterization, and Size Control of Chemically Synthesized CdS Nanoparticles Capped with Poly(ethylene glycol) Journal of ELECTRONIC MATERIALS, Vol. 44, No. 10, 2015
6. R. Seoudi, M. G. Khafagi, A. Abouelsayed, A. R. Lashin, D. A. Said, M. Boustimi, Optical Properties of Phthalocyanine and its Metal Complexes Thin Films Prepared by Nd-YAG

Laser Deposition Technique Journal: JOURNAL OF ADVANCES IN PHYSICS , 8 (2015) 2189-2196**.**

7. R. Seoudi , A. A. Shabaka, M. Moharm, N. Abd Al-Hakeem, W.Eisa, B. Anis, "Synthesis of Fullerene and its Additive Concentrations Effects on The Spectroscopic and Dielectric Properties of Polystyrene and Poly Methyl Methacrylate Films", The 5th National Conference on Optical Spectroscopy, Laser Their Applications, (2014)

8. Samir Y. Marzouk , Roshdi Seoudi , Doaa A. Said , Mai S. Mabrouk, " Linear and non-linear optics and FTIR characteristics of borosilicate glasses doped with gadolinium ions", Optical Materials 35 (2013) 2077–2084

Experience:

Teach Assistance, Mansoura University, 1992-1993, Faculty of Science, Ein Shams University, 1997-1998, Faculty of Engineering, Menufia University, 1998-1999, Lecturer of Physics, Faculty of Education, Helwan University, 2006-2007, Faculty of Science Ismailia, Sues Canal University; (Course; Electrodynamics, X-Ray diffraction; Spectroscopy, Laser Physics, Advanced Optics, Organic and inorganic Nanostructure material, Renewable energy, 2004-2007, Teaching courses, National Research Center, Egypt; (Infrared, ultraviolet, visible and near IR spectroscopy) for analysis of chemical compounds, 1995-2007, Lecturer of Physics, Faculty of Science, Umm Al-Qura University, KSA(Course; General Physics, Optics, Electromagnetism 1, Electromagnetism 2, Nuclear Technology, Laser in Medicine, Quantum Mechanics I, Mathematical Physics 2 Undergraduate student: Electrodynamic, Organic and inorganic nanostructure materials, Spectroscopy, Characterization Techniques Postgraduate student, 2009-2018, Supervision of Research Students (3 PhD and 7 MSc) thesis

Training Programs:

1. Many of training courses for the faculty staff and engineering in Egypt of the using Infrared, ultraviolet, visible and near IR spectroscopy for analysis of chemical compound
2. Preparation of metal and semiconductor nanoparticle in Chemical method

3/1/6/7

Name:	**Walid Altaf**	
Degree:	**Associate Professor**	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Neutron interaction	Surrey University (U.K)	1989
M.Sc.	Radiation and Environmental Protection	Surrey University (U.K)	1985
B.Sc.	Physics	Umm Al-Quraa University	1983

Employment:

Position	Employer	Period
Dean of Faculty of Applied Science	Umm Al-Qura University	2016-2018
Dean of Admission and Registration	Umm-Al-Qura University	2009-2011
Head of Physics department	Umm-Al-Qura University	1996-2001

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2015	Technique for evaluating eye lens radiation doses received by medical staff	250000

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. W.Altaf T.M.Taha, R.A.Hassan and Y.Bahchwan " Calibration of TLD in Eye Lens Dosimeter using wide energy X-ray , Vo;.5, No.2 . 2017 .

2.W Altaf, O Akanle, L Admans, D Beasley, C Butler, N Spyrou,.The University of Surrey database of elemental composition of human hair.,2004, Journal of radioanalytical and nuclear chemistry, Volume 259Issue 3 Pages 493-498

3.WJ Altaf., Botanical environmental monitors for zinc pollution resulting from vehicular traffic.,2007, Journal of radioanalytical and nuclear chemistry, Volume 271 Issue 3, Pages 665-670

4.Arshad Kamal, Waleed J Altaf, M Zafar, N Ahmad, M Tariq., Study of Phase Transition in Multiparticle Production in 14.5A GeV/c Si-Nucleus Interactions in terms of Takagi Moments., (2013),.DAE Symp. Nucl. Phys. Volume 58, Pages 702-703

3/1/6/8

Name:	Ahmed Mohamed El-hadi	
Degree:	Associate Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Polymer science and polymer technology	University of Halle - Wittenberg-Germany	2002
M.Sc.	Polymer physics	University of Belfield	1998
B.Sc.	physics	Zagazig - Egypt	1986

Employment:

Position	Employer	Period
Higher Institute of Eng. and Tech. 10 Ramadan city - Egypt	Assist. Prof. Dr.	2003-2006
Higher Institute of Eng. and Tech. El Arish- Egypt	Assist. Prof. Dr.	2006-2008
Umm Al Qura University- Saudi Arabia	Assoc. Prof. Dr.	2008-

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2011	Fabrication of Biopolymers nanofibers by electrospinning for medical applications and industries. (SABIC company for petrochemicals, Research & Consulting Center).	40.000 S. R.
2012	Improvement the physical properties of Poly lactic acid PLLA for medical applications and films for food packaging sectors (Institute of Scientific Research, project No. 43005001).	120.000 S. R.
2017	Manufacturing electrospun membranes from bioplastics for seawater desalination and wastewater treatment.	117.000 S. R.

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. Ahmed M. El-Hadi, Ahmed M. Abd Elbary. Design of the electrically conductive PHB blends for biomedical applications in Journal of Materials Science: Materials in Electronics (2018), DOI 10.1007/s10854-018-9743-3
2. Ahmed M. El-Hadi, Biopolymer blend with semiconductivity for next generation in electronic devices, Applied Physics A (2018) 124:445.
3. Ahmed M. El-Hadi, Miscibility of Crystalline/Amorphous/Crystalline Biopolymer Blends from PLLA/PDLLA/PHB with Additives., POLYMER-PLASTICS TECHNOLOGY AND ENGINEERING 2018, VOL. 00, NO. 00, 1–9, DOI: 10.1080/03602559.2018.1455863.
4. Ahmed M. El-Hadi, Fatma Y. Al-Jabri, Waleed J. Altaf: Higher dielectric properties of semiconducting biopolymer composites of poly(3-hydroxy butyrate) (PHB) with polyaniline (PANI), carbon black,and plasticizer, Polym. Bull. (2018) 75:1681–1699.

5. Ahmed M. El-hadi: Increase the elongation at break of poly (lactic acid) composites for use in food packageing films, scientific Reports7:46767 | DOI: 10.1038/srep46767, (2017) nature.
6. Ahmed M. El-Hadi, Fatma Y. Al-Jabri: Influence of Electrospinning Parameters on Fiber Diameter and Mechanical Properties of Poly(3-Hydroxybutyrate) (PHB) and Polyanilines (PANI) Blends. Polymers 8 (3), 97, (2016).
7. GR Mitchell, SD Mohan, FJ Davis, K Ahn, M Al-Azab, A El Hadi, D Elliott, .: Structure Development in Electrospun Fibres, RSC Polymer Chemistry Series 14, 136-171 (2015).
8. Ahmed M. El-Hadi: Development of novel biopolymer blends based on poly(L-lactic acid)(PLLA), poly((R)-3-hydroxybutyrate) (PHB) and plasticizer, in Polymer Engineering and Science 54 (6), 1394–1402, (2014).
9. Ahmed M. El-Hadi, Saeed D. Mohan, Fred J. Davis, Geoffrey R. Mitchell Enhancing the crystallization and orientation of electrospinning poly (lactic acid) (PLLA) by combining with additives, J. Poly. Res 21:605 (2014).
10. Ahmed M. El-Hadi: Investigation of the effect of nanoclay type on the non-isothermal crystallization kinetics and morphology of poly(3(R)-hydroxybutyrate) PHB/clay nanocomposites, polymer bulletin 71:1449–1470 (2014).
11. Ahmed M. El-Hadi: The Effect of Additives Interaction on the Miscibility and Crystal Structure of Two Immiscible Biodegradable Polymers, Polímeros 24 (1), 9-16 (2014).
12. Ahmed M. El-Hadi: Influence of microcrystalline cellulose fiber (MCCF) on the morphology of poly(3-hydroxybutyrate) (PHB), Colloid Polym Sci 91:743-756, (2013)
13. Ahmed M. El-Hadi: Effect of processing condition on the development of morphology features banded and non banded spherulites of poly (3-hydroxybutyrate) PHB and poly(lactic) PLLA blends. Polymer Engineering and Science 51 (11), 2191-2202, (2011).

Experience:

Research and Teaching Experience

1. Physics 101, 102 and 103, Radiation Physics, Medical physics, Biomaterials, Physics of Membrane and Macromolecules for medical physics students, Solid state Physics, Thermodynamics, Statistical thermodynamics, Nuclear physics, Electromagnetic, Polymer Physics and Polymer Technology.
2. I am reviewer for several scientific journals and research projects: Polymer Engineering & Science; polymer bulletin, European Polymer Journal; Polymer International Journal; Journal of Vinyl and Additive Technology, polymers journal. Many high-impact factor journals.
3. I am one of developer's specialists in bioplastics in the world (label:bioplastics).

Supervision of Master Students:

1. Nour Basfer : Study of some Mechanical, Electrical and optical Properties of Silicon (2013).
2. Fatma Al-gabri : Biodegradable Conductive Composites: Preparation, Characterization and Applications (2015).
3. Hanan makallawi: Effect of Plasticizers type and concentration on mechanical Properties and Biodegradability of Cellulose Blends (2017).

3/1/6/9

Name:	Dr. Abdelrahman Lashin	
Degree:	Associate Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Physical and Materials Engineering	Brno University of Technology- Czech Republic	2008
M.Sc.	Experimental physics	Mansoura University-Egypt	2002
B.Sc.	Physics	Mansoura University-Egypt	1995

Employment:

Position	Employer	Period
Adminsterator	Faculty of Science, Mansoura University-Egypt	1996-2002
Lecturer	Faculty of Science, Mansoura University-Egypt	2002-2008
Assistant professor	Faculty of Science, Mansoura University-Egypt	2008-2016
Assistant professor	Faculty of Applied Science, Umm Al-Qura University-Saudi Arabia	2011-2016
Associate Professor	Faculty of Science, Mansoura University-Egypt	2016-up to now
Associate Professor	Faculty of Applied Science, Umm Al-Qura University-Saudi Arabia	2017-up to now

Supported research and development projects related to specialization:

Date	**Project title**	**Amount of funding**
2013-2015	Production of Nanostructure Materials used as Light Emitting Materials (43305026)	280000 SAR

Patents and Copyright:

Title	Date

Publications (published papers and books):

-Mustafa Kamal, A. El-Bediwi, A.R. Lashin, A.H. El-Zarka Room temperature indentation Creep and mechanical properties of rapidly solidified Sn-Sb-Pb-Cu alloys, Journal of Materials Engineering and Performance 25 (2016) 2084-2090

-S.H.A. Allehyani, R. Seoudi, D.A. Said, A.R. Lashin and A. Abouelsyed, Synthesis, Characterization, and Size Control of Zinc Sulfide Nanoparticles Capped by Poly(ethylene glycol), Journal of Electronic Materials 44 (2015) 4227-4235.

-R. Seoudi, S.H.A. Allehyani, D.A. Said, A.R. Lashin, and A. Abouelsyed, Preparation, Characterization, and Size Control of Chemically Synthesized CdS Nanoparticles Capped with Poly(ethylene glycol), Journal of Electronic Materials 44 (2015) 3367-3374.

-R. Seoudi, M. G. Khafagi, A. Abouelsayed, A.R. Lashin, D. A. Said, M. Boustimi, Optical Properties of Phthalocyanine and its Metal Complexes Thin Films Prepared by Nd-YAG Laser Deposition Technique, Journal of Advances in Physics 8 (2015) 2189-2196.

-A.R. Lashin, Oxidation of silicon from an Fe–6 at% Si alloy, Journal of Alloys and Compounds 567 (2013) 54–58.

-A.R. Lashin, M. Mossa, A. El-Bediwi, M. Kamal, Study of some physical properties of the rapidly solidified Sn–Sb–Cu–Zn alloys, Materials & Design 43 (2013) 322–326.

Experience:

Supervisor of M.Sc thesis, for 2 students (Mr. M. Shalaby, and Mr. A. Abdelrahman)

Training Programs:

Doctorate scholarship from the ministry of education of Czech Republic, Sept. 2004- June 2008.

Scholarship from France (CNRS) (Stay in Poitiers, from Mach to August 2002) “Numerical Simulation of Diagenetic Processes” (Collaboration Institut de Physique du Globe de Paris/ Laboratoire de Combustion et de D’etonique).

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3/1/6/10

Name:	JALEL AL NASER OUERFELLI	
Degree:	Associate Professor	

Academic Career:

Degree	Specialization	Institution		Year
Ph.D.	Solid state Physics	University of Nantes	FRANCE	1997
M.Sc.	Solid state Physics	University of Nantes	FRANCE	1993
B.Sc.	Physics	Aix Marseille II	FRANCE	1991

Employment:

Position	Employer	Period
Associate Professor	Umm Al-Qura university	Since 2012

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2015	Synthesis and characterization of thin films of palladium (II) phthalocyanine by the thermal evaporation technique	160.000 SR
2014	Effects of gamma irradiation on optical and electrical properties of F-SnO_2 thin film	140.000 SR

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. Synthesis and characterization of thin films of palladium (II) phthalocyanine and its derivatives using the thermal evaporation technique, Timoumi, A., Turkestani, M.K.A., Alamri, S.N., (...), Ouerfelli, J., Jamoussi, B., Journal of Materials Science: Materials in Electronics , 2017 ,28(10), pp. 7480-7488
2. Effect of heat treatment under sulfur atmosphere on physical properties of pyrite (FeS_2) sprayed thin films, Mars, A., Essaidi, H., ouerfelli, J., 2016, Journal of Alloys and Compounds 688, pp. 553-564
3. Optical and electrical measurement of FeSe2 thin films obtained at low temperature, Materials Science in Semiconductor Processing, A. Mars, H. Essaidi, *J. Ouerfelli*, D. Gherouel ,Volume 40, December 2015, Pages 319-324

4. Structural and optothermal properties of iron ditelluride layered structures in the framework of the lattice compatibility theory, Ben Messaoud, K., Gantassi, A., Essaidi, H., (...), Boubaker, K., Amlouk, M., Advances in Materials Science and Engineering , 2014,534307

5. Structural properties of FeTe2 thin films synthesized by tellurization of amorphous iron oxide thin films, Materials Science in Semiconductor Processing, K. Ben Messaoud, *J. Ouerfelli*, K. Boubaker, M. Amlouk, Volume 16, Issue 6, December 2013, Pages 1912-1917

6. Investigation of structural and optical properties of the sulfosalt SnSb4S7 thin films N. Drissi, A. Gassoumi, H. Boughzala, *J. Ouerfelli*, M. Kanzari , Journal of Molecular Structure, Volume 1047, 5 September 2013, Pages 61-65

Experience:

1. Reviewer in scientific journals
2. Supervisor and advising in Master and PHD

Training Programs:

1. E learning training

3/1/6/11

Name:	Dr. Fahad Alhashmi	
Degree:	Assistance Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D	University of Connecticut	USA	2013
M.Sc.	University of Connecticut	USA	2011
M.Sc.	Umm AL-Qura University	K.S.A	2009
B.SC	Umm AL-Qura University	K.S.A	1999

Employment:

Position	Employer	Period
Vice Dean of Academic development and Community Service	UQU	2013
Head of Physics Department	UQU	2014-2015
Vice Dean of Foundation Year	UQU	2014-now

Supported research and development projects related tospecialization:

Date	Project title	Amount of funding
2016-2017	Investigation Electrodes' Conductivities Effect on the Electro- Optic Properties of Solid-State Electrochromic devices	*100000SAR*

Patents and Copyright:

Title	Date
1- (UCT0204US 14-013) Method of infusing fibrous substrate with CONDUCTIVE ORGANIC PARTICLES and conductive polymer; and conductive fibrous substrates prepared therefrom	2013
2- (449910US-325159-325159-8) Method Of Making Conductive Cotton Using Organic Conductive Polymer	2014

Publications (published papers and books):

1-Preparation of conductive graphene/graphite infused fabrics using an interface trapping method, SJ Woltornist, FA Alamer, A McDannald, M Jain, GA Sotzing, Carbon 81, 38-42, 2015

2-Dependency of polyelectrolyte solvent composition on electrochromic photopic contrast, FA Alamer, MT Otley, Y Zhu, A Kumar, GA Sotzing, Solar Energy Materials and Solar Cells 132, 131-135, 2015

3-A simple method for fabricating highly electrically conductive cotton fabric without metals or nanoparticles, using PEDOT: PSS, FA Alamer, Journal of Alloys and Compounds 702, 266-273, 2017

4-Phase Segregation of PEDOT:PSS on Textile to Produce Materials of >10 A mmâ 2 Current Carrying Capacity, MT Otley, FA Alamer, Y Guo, J Santana, E Eren, M Li,J Lombardi, Macromolecular Materials and Engineering 302 (3), 1600348, 2017

5-The effects of temperature and frequency on the conductivity and dielectric properties of cotton fabric impregnated with doped PEDOT: PSS FA Alamer, Cellulose 25 (10), 6221-6230, (2018)

6-Method of infusing fibrous substrate with conductive organic particles and conductive polymer; and conductive fibrous substrates prepared therefrom, G Sotzing, D Adamson, S Woltornist, F Alamer US Patent App. 10/002,686, 2018

3/1/6/12

Name:	Afaf
Degree:	Assistant professor

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Experimental physics	Mansoura university	2009
M.Sc.	Experimental physics	Mansoura university	2003
B.Sc.	physics	Mansoura university	1999

Employment:

Position	Employer	Period
Assistant professor	Umm Al-Qura university	2012
Lecture	Mansoura university	2009
Assistant lecture	Mansoura university	2003
Administrator	Mansoura university	1999

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2016	Determination the 3D Opto-mechanical and geometrical profiles of iPP fiber with necking deformation	100000

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. Afaf M. Ali, Nuha Felelmban, and M.A. El-Bakary "Characterization of the 3Dimension optical, geometrical and mechanical profiles of iPP fiber with necking deformation. Journal of microscopy research and technique, 2018
2. T. Z. N. Sokkar, K. A. El-Farhaty , M. A. El-Bakary, A. M. Ali and A. A. Ahmed, "The effect of short heat treatment on different properties of PET fiber using double beam interference microscopy" Journal of microscopy research and technique, 2018
3. Afaf , M. Ali, Some Structural Properties of Dynamically Drawn iPP Fibers. Journal of optics and photonics, 2017

4. T.Z.N. Sokkar , M.A. El-Bakary and A.M. Ali , "The influence of mechanical cold drawing and drawing velocity on the molecular structure of isotactic polypropylene fiber. Journal of applied polymer science,2013

5. A.A.Hamza, T.Z.N.Sokkar, M.A.El-Bakary, and A.M.Ali, " On line Interferometric Investigation of the neck propagation phenomena of stretched Polypropylene fibre, Optics and Laser Technology, 2009

6. A.A.Hamza, T.Z.N.Sokkar, M.A.Elmorsy, A.M.Ali and M.I. Raslan , "3D Refractive Index Profile for the Characterization of Necking Phenomenon along stretched Polypropylene Fibres., Optics Communications,2010

7. A.A.Hamza, T.Z.N.Sokkar, M.A.El-Bakary, and A.M.Ali, " On line Interferometric Investigation of the neck propagation phenomena of stretched Polypropylene fiber. Optics and Laser Technology,**2010**

Experience:

1. Reviewer in some scientific journals

Training Programs:

1. R language workshop
2. lateX language workshop

3/1/6/13

Name:	Tasnim Azim
Degree:	Assistance Professor

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Quantum Optics	Quaid-i-Azam University, Islamabad, Pakistan	2002
M.Sc.	Physics	Quaid-i-Azam University, Islamabad, Pakistan	1986
B.Sc.	Physics, Math, Statistics	Punjab University	1983

Employment:

Position	Employer	Period
Lecturer	Islamabad College for Girls, F-6/2, Pakistan	May 1986 - Dec 1996
Assistant Professor	Islamabad College for Girls, F-6/2, Pakistan	Dec 1996 - Dec 2004
Assistant Professor	Quaid-i-Azam University, Islamabad	Dec 2004 - Aug 2011
Assistant Professor	Umm Al-Qura University, Makkah, KSA	Aug 2011 - date

Supported research and development projects related to specialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

Experience:

1. Co-Chaired session: International Science Conference, Umm Al-Qura University, Makkah, KSA, 2012.
2. Poster presentation: 'Entanglement Dynamics of a Pure Bipartite System in Dissipative Environments', First Scientific Meeting, Dec. 21-22, 2016, Al-Abdiya, Umm Al-Qura University, Makkah, KSA, Dec. 20-21, 2016.
3. Reviewer for: Journal of Modern Optics

Training Programs:

1. Conducted training workshop: 'Mathematica', May 15 & 22, 2017, Al-Shesha, UQU.
2. Attended lecture: 'E-Exam', Dec. 12, 2016, Al-Shesha, UQU.
3. Attended Workshop: 'Safety First', Feb. 13, 2017
4. Attended workshop: 'E-Learning', Al-Abdiya, Feb. 22 & 25, 2017

5. Attended workshop: ‘E-Learning’, Dec. 12, 2016, Al-Shesha, UQU.
6. Attended workshop: ‘Flipped Cassroom’, April 18, 2017, Al-Abdiya, UQU.
7. Guide and mentor for group 603: Position holder in Physics Project Competition, ‘Physics Day’, Al-Shesha campus, April 4, 2018.
8. Attended lecture: "تطوير و العافية للاينام", March 6, 2018, Al-Shesha campus, UQU.
9. Participated in Art Exhibition, "3 لريشتي حكاية", Al-Shesha campus, April 3-4, 2018.
10. Attended lecture: ‘Building Self-Confidence’, April 8, 2018, Al-Shesha, UQU."بناء الثقة"

3/1/6/14

Name:	Mongi Ben Moussa	
Degree:	Assistant professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Physics	Almanar University	2007
M.Sc.	Pysics	Almanar University	2002
B.Sc.	Fundamental Physics	Monastir University	2000

Employment:

Position	Employer	Period
Assistant	Tunis University	2002-2007
Assistant Professor	Monastir University	2008-2012
Assistant Professor	Umm alqura University	At 2012-

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2015	Elaboration and characterization of materials for Fu cell SOSC	126000.00 SR

Patents and Copyright:

Title	Date

Publications (published papers and books):

1) Study of Structural, Thermodynamic and Electrochemical Properties of MmNi3.55Mn0 Compounds A. Ben Fradj, M. Ben Moussa, M. Abdellaoui, J. Lamloumi American Journal of Energy and Power Engineering : Dec. 17, 2015, Pages: 79-91

2) Investigation on the structure, thermodynamic and electrochemical properties of the… compound used as negative electrode in Ni–MH batteriesM. Ben Moussa, M. Abdellaoui, J. Lamloumi, A. Percheron Guégan, Journal of Alloys and Compounds, Volume 575, 25 October 2013, Pages 414-418

3/1/6/15

Name:	Dr. Mehrez LOULOU	
Degree:	Assistance Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Physics	University of Tunis- Elmanar	2009
M.Sc.	Physics	University of Tunis	2003
B.Sc.	Electrical Engineering	University of Tunis	1999

Employment:

Position	Employer	Period
Assistant Professor	College of Appli. Siences (Umm AlQuraa University)	2012 -2018
Assistant Professor	ISSAT Gafsa (University of Gafsa)	2011-2012
Technologue	ISET Rades (University of Tunis)	2008-2011

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2014	No linear electrical model of solar cells	77500

Patents and Copyright:

Title	Date

Publications (published papers and books):

•Current dependence of series and shunt resistances of solar cells (The 9th International Renewable Energy Congress **(IREC 2018)** - 978-1-5386-0998-9/18/$31.00 ©2018 IEEE
•Van der Waals dispersion energy between atoms and nanoparticles (Conference Paper). Volume 869, Issue 1, **11 July 2017**, Article number 012057 International Conference Frontiers in Theoretical and Applied Physics, FTAPS 2017; American University of Sharjah.
•A linear interpolation method to extract the solar cell series resistance and the quality factor Journal of Nanoelectronics and Optoelectronics. Vol 11, pp 425-429. 1-5, **(2016).**
•Sensibility of Electrical Parameters to the Illumination Intensity in solar cells". Journal of Optoelectronics and Advanced Materials 16 **(2014)** 1121-1125..

Experience:

Training Programs:

•Attending workshop entitled "Research Capacity Development in the Kingdom"
•Attending workshop entitled "writing research in English using End Note"
•Attending workshop entitled "Course Management System"
•Attending workshop entitled "Testing tools and electronic evaluation"
•Attending workshop entitled "Virtual Classroom System"
•Attending workshop entitled "E-learning environment and content building"
•Attending workshop entitled "The basics of e-learning"
•Attending workshop entitled "how to prepare and formulate research proposals"

3/1/6/16

Name:	Atif Ismail	
Degree:	Assistant Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Theoretical Phys.-Superconductors	Hamburg Uni., Germany	2008
M.Sc.	Solid State Physics	Tanta University, Egypt	1997
B.Sc.	Physics	Tanta University, Egypt	1989

Employment:

Position	Employer	Period
Demonstrator	Physics Dept., Faculty of Education, kafrelsheikh, Tanta Univ.	1991-1997
Assistant Lecturer	Physics Dept., Faculty of Education, kafrelsheikh, Tanta Univ.	1998-2008
Lecturer	Physics Dept., Faculty of Education, kafrelsheikh Univ., Egypt	2009-2010
Lecturer	Physics Dept., Faculty of Science, kafrelsheikh Univ.,	2010-2014
Lecturer	Physics Dept., Faculty of Applied Science, Umm Al-Qura Univ., KSA	2014-present

Supported research and development projects related to specialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. A quantum Monte Carlo study of Lanthanum, World journal of condensed matter physics, 2013, Vol. 3, No. 4
2. Study of the Lanthanides Ce to Eu by Means of Quantum Monte Carlo Methods, JCMP 2013, 1(2):13-16
3. Pseudopotential Calculations on Actinium and Thorium by Quantum Monte Carlo, IJMPSR, 2014, Vol. 1, Issue 1, pp: (25-29)
4. Diffusion Monte Carlo Calculations for Rare-earths: Hartree-Fock, Hybrid B3LYP, and Long-range Corrected LC-BLYP Functional, Universal Journal of Physics and Application 10(1): 5-10, 2016

5. Diffusion Monte Carlo Calculations for Rare-earths: Applying the Long-range Corrected Scheme toMinnesota M06 Functional, Universal Journal of Physics and Application 10(3): 80-83, 2016
6. The Total Ground State Energies and First Ionization Energies of the Incomplete 3d-Transition Metal-Elements Atoms, Universal Journal of Physics and Application 11(3): 85-90, 2017
7. Diffusion Monte Carlo study of actinide monohydrides and monofluorides, Revista Mexicana de Fsica 63 (3), 297-302, 2017
8. Diffusion Monte Carlo calculations on LaB molecule, Chin. Phys. B Vol. 27, No. 9 (2018)

Experience:

1. Manager of the Maintenance Unit (2011-2014),Physics Dept., Faculty of Science, kafrelsheikh Univ., Egypt
2. Informal Co-supervisor for 2 M.Sc. students, one in Egypt and the other in Umm Al-Qura, 1 Ph.D. student in Egypt.

Training Programs:

1. International Publishing of Research. 2. Research Ethics.
3. Communication Skills. 4. Quality standard.
5. Academic Lecturer preparation. 6. Time and Conference Management.
6. Legal and Financial Aspects in University Environment.
7. Teaching strategy
8. Active learning methods
9. Evaluation methods
10. Introduction to Stochastic Differential Equations with Applications – Workshop – Math. Department.

3/1/6/17

Name:	TIMOUMI ABDELMAJID	
Degree:	Assistant Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Solid State Physics	University of Tunis	2010
M.Sc.	Quantum Physics	University of Tunis	2004
B.Sc.	Science Physics	University of Monastir	2001

Employment:

Position	Employer	Period
Assistant professor	ISEFC Tunis University	2011-2012
Assistant professor	UQU University	2012 - now

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2013	Manufacture of rare new phthalocyanine derivatives to create advanced organic solar cells.	**290 000.00 SAR**
2015	Manufacture and characterization of graphene oxide and anhydrous carbide compound / GO for application in solar cells.	**175 000.00 SAR**
2017	The developments of TiO_2/graphene oxide nanocomposite thin films for solar cells	**125 000.00 SAR**

Patents and Copyright:

Title	Date

Publications (published papers and books):

1- PropertiesofIn2O3 films obtained by therma loxidation of sprayed In2S3 M. Kraini, N. Bouguila, I. Halidou, A. Timoumi, S. Alaya, Materials Science in Semiconductor Processing 16 (2013) 1388 –1396.

2- Molar ratio S/In effect on properties of sprayed In2S3 films, Nourredine Bouguila, Abdelmajid Timoumi, Hassen Bouzouita, Emmanuelle Lacaze, Habib Bouchriha, and Bahri Rezig, Eur. Phys. J. Appl. Phys. (2013) 63: 20301.

3-Vacuum annealing temperature on spray In2S3 layers, Nourredine Bouguila, Abdelmajid Timoumi, and Hassen Bouzouita, Eur. Phys. J. Appl. Phys. (2014) 65: 20304.

4-Sn Doped In2S3 Films Elaborated by Spray Technique, M. KRAINI, N. BOUGUILA, A. TIMOUMI, S. ALAYA, Sensors & Transducers, Vol. 27, Special Issue, May 2014, pp. 221-224.
5-Structural, morphological and optical properties of sprayed ZnS thin films on various substrate nature, K. Ben Bacha, A. Timoumi, N. Bitri, H. Bouzouita, Optik 126 (2015) 3020 – 3024.
6-Structural, morphological and optical properties of annealed ZnS thin films deposited by spray technique, N. Bouguila, D. Bchiri, M. Kraini, A. Timoumi, I. Halidou, K. Khirouni, S. Alaya, J Mater Sci: Mater Electron (2015) 26:9845 – 9852.
7-AFM and Optical Study of Graphene Oxide and In2S3/GRO: Effect of Thickness, A. Timoumi, M. K. AL Turkestani, J. Ouerfelli, International Journal of Science and Research (IJSR) ISSN (Online): 2319 7064, 5 Issue 4, April 2016.
8-Electrical and dielectric properties of In2S3 synthesized by solid state Reaction, A. Timoumi , N. Bouguila, M. Chaari, M. Kraini, A. Matoussi, H. Bouzouita, Journal of Alloys and Compounds 679 (2016) 59-64.
9-Synthesis and characterization of thin films of palladium (II) phthalocyanine and its derivatives using the thermal evaporation technique, A. Timoumi, M. K. AL Turkestani, S. N. Alamri, H. Alamri, J. Ouerfelli, B. Jamoussi, J Mater Sci: Mater Electron, DOI 10.1007/s10854-017-6438-0.
10-Theoretical Study of the AC Conduction in b-In2S3, H. ABASSI, N. BOUGUILA and A. TIMOUMI, Journal of ELECTRONIC MATERIALS, https://doi.org/10.1007/s11664-018-6107-y.
11-The development of TiO2-graphene oxide nano composite thin films for solar Cells, A. Timoumi, S. N. Alamri, H. Alamri, Results in Physics 11 (2018) 46 – 51.
Experience:
1. Coordination of academic accreditation programs and academic guidance in the department.
2. Contribution on the discussion of a master's student in the department.
3. Participation on international scientific conference in Malaysia.
Training Programs:
1. Participating in some courses and training programs organized by the university.

3/1/6/18

Name:	Dr. El hussieny Mohamad	
Degree:	Assistance Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Radiation Physics	University of Ain shams	2010
M.Sc.	solid	South vally University	2000
B.Sc.	physics	Asyut	1992

Employment:

Position	Employer	Period
Adminsterator	Occupational safety and health specialist	1995-2002
Assistant Lec.	High Center for Comprehensive Occupations	2003-2009
Assistant Professor	Al Azhar university	2010-2011
Assistant Professor	Umm AlQuraa University	2011- --

Supported research and development projects related tospecialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

1.H.T. Mahdy, Study of Trapping Parameters of Ge2Te3 by Computerised Glow-Curve Deconvolution(CGCD). Taif University,KSA,13-15 fep/(2012).

2.A. El-Taher1, 2, H.T. Mahdy3 and J.H. AlZahrani,. Determination of Thermoluminescence Kinetic Parameters of Bauxite by Computer Glow Curve Deconvolution Method (CGCD) Life Science Journal (2013);10(2).

1. مبادئ الإحصاء الكيميائي والبيئي، تأليف أ.د / يسرى مصطفى، أ.د/ محمد سرور الشهاوي، د. / الحسيني الطاهر، د./ طه محمد الفوال، دار عبيد للطباعة والنشر والتوزيع، القاهرة، 1439 هـ – 2018 م.
2. الفيزياء العامة لغير المتخصصين وطلاب قسم التربية الخاصة، تأليف أ.د / يسرى مصطفى، د./ الحسيني الطاهر، د./ عفاف معوض، و د. / دعاء محمود، دار النوارس للدعاية والنشر، الإسكندرية، 1437ه - 2016.
3. الفيزياء العامة وتطبيقاتها في المجال الحيوي والطبي، تأليف أ.د / يسرى مصطفى، د./ الحسيني الطاهر، د. / رمضان على، و أ.د. / وليد ألطف، دار النوارس للدعاية والنشر، الإسكندرية، 1438ه - 2017.
4. مقدمة في فيزياء أشباه الموصلات، تأليف أ.د / يسرى مصطفى، و د. / الحسيني الطاهر، النوارس للدعاية والنشر، الإسكندرية، 1438ه - 2017.
5. أساسيات كيمياء الجوامد، تأليف أ.د / يسرى مصطفى، و د. / الحسيني الطاهر، النوارس للدعاية والنشر، الإسكندرية، 1438ه - 2017.
6. ديوان شعري همس النوارس تاليف الحسيني الطاهر واخرون النوارس للدعاية والنشر2016

3/1/6/19

Name:	Walid Belhadj	
Degree:	Doctor of Philosophy	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Theoretical Physics	Faculty of Sciences of Tunis, University of Tunis El – Manar, Tunisia.	2006
M.Sc.	Quantum physics	Faculty of Sciences of Tunis, University of Tunis El – Manar, Tunisia.	2001
B.Sc.	Physical Sciences	Faculty of Sciences Bizerte, University of Cartage, Tunisia.	1998

Employment:

Position	Employer	Period
Assistant Professor	Faculty of Applied Science, Umm Al – Qura University, Saudi Arabia	September 2012–Present
Assistant Professor	Faculty of Sciences Bizerte, University of Cartage, Tunisia.	July 2009 – September 2012
Teaching Assistant	Faculty of Sciences Bizerte, University of Cartage, Tunisia.	September 2006 – July 2009
Teaching Assistant	National institute of applied sciences and technology, Tunisia.	September 2003 – September 2006

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
June 2007 – Mai 2008	Numerical and experimental studies of cavity resonance tuning by near field interaction between a SNOM Nanometric tip and nanocavities integrated in sub-micron sized waveguides.	100.000 Euros

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. W. Belhadj, N. Saïdani and F.AbdelMalek, "All-optical logic gates based on coupled heterostructure waveguides in two dimensional photonic crystals", Optik - International Journal for Light and Electron Optics, Vol. 168, pp. 237–243, (2018).

2. F. U. Y. Al-sheqefi and W. Belhadj, "Photonic band gap characteristics of one-dimensional graphene-dielectric periodic structures", Superlattices and Microstructures, Vol. 88, p. 127-138, (2015).
3. N. Saïdani, W. Belhadj, and F.AbdelMalek, "Novel design of all-optical logic gates based photonic crystal waveguide using self imaging phenomena", Opt. Quant. Electron. 47:1829–1846 (2015).
4. N. Saïdani, W. Belhadj, F.AbdelMalek, and H.Bouchriha, "Detailed investigation of self-imaging in multimode photonic crystal waveguides for applications in power and polarization beam splitters", Optics Com., Vol. 285(16), (2012), pp. 3487–3492
5. D. Khadri, W. Belhadj, D. Gamra, F.AbdelMalek, and H.Bouchriha, "On the Validity of the Effective Index Method for Long Period Grating Photonic Crystal Fibers", Materials Sciences and Applications, Vol.3 No.5, (2012).
6. F. AbdelMalek, W. Belhadj, S. Haxha and H. Bouchriha, "Realization of High coupling Efficiency by Employing a concave Lens Based on Two-Dimensional Photonic Crystals with Negative Refractive Index", IEEE Journal of Lightwave Technology, Vol. 25, No. 10, (2007).
7. W. Belhadj, D. Gamra, F. AbdelMalek, S. Haxha and H. Bouchriha, "Design of 2D Photonic Crystal Structure based in All-Angle Negative Refractive Effect for Application in Focusing Systems", IET Optoelectronics, Vol. 1 No. 2, pp. 91–95, (2007).
8. W. Belhadj, F. AbdelMalek, and H. Bouchriha, "Characterisation of optical losses in holey fibers with bends", Materials Science & Engineering C, MSC-01677, (2006).
9. F. Ouerghi, W. Belhadj, F. Abdelmalek, M. Mejatty, H. Bouchriha, "Polymer thin films and Bragg grating structures based temperature and pressure integrated effects", Thin Solid Films, Volume 485 (1-2), pp. 176-181, (2005).
10. F. AbdelMalek, W. Belhadj and H. Bouchriha, "FDTD Study of Subwavelength Imaging by a Photonic Crystal Slab", P.N.F.A., Vol. 3(1), pp. 19-24, (2005).
11. W. Belhadj, D. Gamra, F. AbdelMalek and H. Bouchriha, "Design of Photonic Crystal Superlens with Improved Image Resolution", Op. Quant. Elec., Vol. 37(6), pp. 575, (2005).
12. W. Belhadj, O. Boukari, D. Gamra, F. AbdelMalek, and H. Bouchriha, "Thermal properties of photonic crystals", Synthetic Metals, Volume 151, pp. 6 – 9, (2005).

Experience:

1. Supervisor of 8 Msc. Students and Co-Supervisor of 2 Ph.D. Students.
2. Expertise in using several Computational Software such as Origin, Excel, Matlab, Mathematica, Mathcad, Maple, Soft & Lumerical softwares (For Photonic Device & Optical Communications System Design).
3. Programming languages: FORTRAN, Python, Matlab, C, C++.
4. Serving as a Reviewer in several Scientific Journals (Optics Communications, Optical & Quantum Electronics, Optics and Laser Technology….).

Training Programs:

3/1/6/20

Name:	Badie Ewis	
Degree:	Assistant Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Astrophysics	Cairo University	2005
M.Sc.	Astrophysics	Cairo University	1999
B.Sc.	Astronomy and space science	Cairo University	1992

Employment:

Position	Employer	Period
Researcher assistant	National research institute of Astronomy and geophysics	*1994-1999*
Assistant Researcher	National research institute of Astronomy and geophysics	*1999-2005*
Researcher	National research institute of Astronomy and geophysics	2005-2009
Assistant Professor	Umm Al-Qura University	2009-

Supported research and development projects related to specialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. X-ray warm absorber variability of the Seyfert Galaxy Arakelian 564 (in editing) Astrophysical Bulletin journal (2018)
2. Nouh, M. I.; Saad, A. S.; Elkhateeb, M. M.; Korany, B "White Dwarf Stars as a Polytropic Gas Spheres "2016Ap.....59..540N
3. M. M. Elkhateeb, M. I. Nouh, E. Elkholy, and B. Korany "An Extensive Photometric Investigation of the W UMa System DK Cyg" Journal of Astrophysics, Volume 2015, Article ID 590673, 8 pages
4. Nouh, M. I.; Saad, S. M.; Korany, B.; Elkhamisy, M. A. Spectroscopic Analysis of the Eclipsing Binary α CrB , 2013JApA...34..193N
5. Hassan, M. A.; Korany, B. A.; Misra, R.; Issa, I. A. M.; Ahmed, M. K.; Abdel-Salam, F. A. "X-Ray Spectral Study of AGN Sources Content in Some Deep Extragalactic XMM-Newton Fields" 2012Ap&SS.339..355H

6- B. A. Korany, E. El kholy, R. K. Smith and M. I. Nouh. NRIAG Journal of Astronomy and Astrophysics pp. 555-561 (2008). “Chandra High Resolution Spectroscopic Analysis of AM Herculis”
7. B. A. Korany, H. Brunner, G. Hasinger , I.A. M. Issa and Gamal B. Ali. NRIAG Journal of Astronomy and Astrophysics pp. 341-364 (2008).“ serendipitous X-ray Sources in the XMM-Newton Field of MKN 205”.
8. Alawy, A. El-Bassuny; Korany, B. A.; Haroon, A. A.; Ismail, H. A.; Sharaf, M. A. Journal of the Korean Astronomical Society, vol. 37, no. 3, pp. 119-129 9/2004 “Binaries in Open Star Clusters: Photometric Approach with Application to the Hyades”
9. Sharaf, M.A.; Bassuny,A.A. and Korany,B.A. :2000 Astrophysical Letter and Communications 40,39-61 “ An error controlled method to determine parameteters of moving clusters with application to Hyades”
10. Sharaf, M.A.; Bassuny,A.A. and Korany,B.A 1999ASSL..240..405S “Computational Developments for Moving Clusters with Application to Hyades”
Experience:
1. X-Ray data analysis for the observation form X-mm newton (ESA satellite) and CHANDRA (NASA satellite)
2. AGN study in X-ray
3. The warm absorber in X-ray spectra of AGN
Training Programs:
1. Workshop in how we can write paper by LATEX
2. Attending a workshop entitled "Using the Matlab Program"
3. Attending a workshop entitled "Photoshop Program"
4. Attending a workshop entitled "Information Technology and Database Creation"

3/1/6/21

Name:	Dr.Mona Moheseb	
Degree:	Assistance Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Biophysics	Kazakh National University (Alfarabi	2012
M.Sc.	Biophysics	Beni-suef -University	2007
B.Sc.	physics	Cairo University	2000

Employment:

Position	Employer	Period
Demonstrator	Cairo University –Beni-Suef branch	2002
Assistant lecturer	Beni-Suef University	2007
lecturer	Beni-Suef University	2012
Assistant Professor	Umm AlQuraa University	2012

Supported research and development projects related tospecialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. **Tuleukhanov, S.T., Desoukey, O.S., Mohaseb, M.A.** The influence of infrasound on the immunological properties of rat's blood // Biophysical Romanian Journal.-***Bucharest, Romania,*** 2010.- Vol.20, № 3.- P. 245-255.

2. **Tuleukhanov, S.T., Desoukey, O.S., Mohaseb, M.A.** Change in the permeability of erythrocytes membrane under the effect of infrasound // Collection of Scientific works, Nauka i studia. - ***Przemysl, Poland***, 2010. – Vol.30, N. 6. - P.127- 134.

3. **Tuleukhanov, S.T., Desoukey, O.S., Mohaseb, M.A.** Effect of infrasound on blood cells // Collection of Scientific works, Nauka i studia. - ***Przemysl, Poland***, 2010. - Vol. 30, N. 6. – P. 104- 115.

4. **Mohaseb, M.A.** Immunobiological activity under the action of infrasonic waves // international congress of young scientists and students «World of Science», ***Almaty, Kazakhstan***, 2010. – P.46-47.

5. **Mohaseb, M.A.** Impact of infrasonic waves on the red blood cells // international congress of young scientists and students «World of Science», ***Almaty, Kazakhstan***, 2010. – P.48-49.

6. **Tuleukhanov, S.T., Desoukey, O.S., Mona, M.A.** Infrasound hazard on the immune system // materials of international scientific-practical conference "Modern Issues of Ecology and Sustainable Development of Society", ***Almaty, Kazakhstan***, 2010. – P. 309-311.

7. **Tuleukhanov, S.T., Desoukey, O.S., Mona, M.A.** Infrasound hazard on the permeability on the membrane // Vestnik KazNU. Almaty, Kazakhstan, 2010. - Vol.45, N.3. - P. 209-211.

8. **Mohaseb, M.A., Desouky,O.S., Tuleukhanov, S.T.** Electrical conductivity of rat's blood under the direct and indirect effect of infrasonic waves // American Index of Central Asian Scholarship(AICAS). -

Wyoming, USA, 2010 -Vol.1, N.2 (11). - P. 41-46.

9. **Mohaseb, M., Desouky, O., Tuleukhanov, S.** Biomechanical and bioelectrical properties of rat's blood under the effect of infrasound at different durations of time // materials of international scientific-practical conference "Biotechnology, nanotechnology and Physical-Chemical Biology "***Almaty, Kazakhstan***, 2011.- Vol.48,N.3.- P.94-98.

10. **Tuleukanov, S.T., Mohaseb, M.A., Desouky,O.M.** Study the biological effect of infrasound treated water on the erythrocyte membrane permeability // International journal of Biology and Chemistry. ***Almaty-Kazakhstan.*** , 2011. - №.1. - P.45-51**.**

Experience:

Training Programs:

3/1/6/22

Name:	Dr. Thamer Salman Alomayri	
Degree:	Assistance Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Curtin University	Australia	2015

Employment:

Position	Employer	Period
	Research and development projects over the last 5 years	

Supported research and development projects related tospecialization:

Date	Project title	Amount of funding
	Industry collaborations over the last 5 years	

Patents and Copyright:

Title	Date
3- Patents and proprietary rights	

Publications (published papers and books):

1. Assaedi1, H., **Alomayri, T.,** Shaikh, F.U.A., & Low, I.M (2015). Characterisation of thermal and mechanical properties in flax fabric-reinforced geopolymer composites. *Journal of Advanced Ceramics,*
2. **Alomayri, T.,** Vickers, L., Shaikh, F. A., & Low, I.-M. (2014). Mechanical properties of cotton fabric reinforced geopolymer composites at 200–1000 °C. *Journal of Advanced Ceramics, 3*(3), 184-193.
3. **Alomayri, T.,** Assaedi, H., Shaikh, F. U. A., & Low, I. M. (2014). Effect of water absorption on the mechanical properties of cotton fabric-reinforced geopolymer composites. *Journal of Asian Ceramic Societies, 2*(3), 223-230.
4. **Alomayri, T.,** Shaikh, F. U. A., & Low, I. M. (2014). Mechanical and thermal properties of ambient cured cotton fabric-reinforced fly ash-based geopolymer composites. *Ceramics International, 40*(9, Part A), 14019-14028.
5. **Alomayri, T.,** Shaikh, F. U. A., & Low, I. M. (2014). Effect of fabric orientation on mechanical properties of cotton fabric reinforced geopolymer composites. *Materials & Design, 57*(0), 360-365.
6. **Alomayri, T.,** Shaikh, F. U. A., & Low, I. M. (2014). Synthesis and mechanical properties of cotton fabric reinforced geopolymer composites. *Composites Part B: Engineering, 60*(0), 36-42.
7. **Alomayri, T.,** & Low, I. M. (2013). Synthesis and characterization of mechanical properties in cotton fiber-reinforced geopolymer composites. *Journal of Asian Ceramic Societies, 1*(1), 30-34.
8. **Alomayri, T.,** Shaikh, F. U. A., & Low, I. M. (2013). Characterisation of cotton fibre-reinforced geopolymer composites. *Composites Part B: Engineering, 50*(0), 1-6.
9. **Alomayri, T.,** Shaikh, F. U. A., & Low, I. M. (2013). Thermal and mechanical properties of cotton fabric-reinforced geopolymer composites. *Journal of Materials Science, 48*(19), 6746-6752

3/1/6/23

Name:	Dr.Mohamed AL-Turkestani	
Degree:	Assistance Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.d	Durham University	UK	2010
M.Sc	King Abdulaziz University	KSA	2005
B.Sc	Umm Al-Qura University	KSA	2000

Employment:

Position	Employer	Period
Assistence Professor	*Umm Al-Qura University*	*2010*

Supported research and development projects related tospecialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

1-M.Loulou, M.K. Al Turkestani , M. Abdelkarim , J-P.Charls. Sensibility of electrical parameters to the illumination intensity in solar cells. JOURNAL OF OPTOELECTRONICS AND ADVANCED MATERIALS Vol. 16,No.9-10 September-October 2014,p.1121-1125.

2-Sensibility of electrical parameters to the illumination intensity in solar cells, Loulou, M., Al Turkestani, M.K., Abdelkrim, M., Charles, J.-P., 2014, Journal of Optoelectronics and Advanced Materials

3-In-depth analysis of chloride treatments for thin-film CdTe solar cells, Major, J.D., Al Turkestani, M., Bowen, L., (...), Treharne, R.E., Durose, K., 2016, Nature Communications

4-A linear interpolation method to extract the solar cell series resistance and the quality factor, Loulou, M., Al Turkestani, M.K., Abdelkrim, M., 2016, Journal of Nanoelectronics and Optoelectronics

5-Structural and electrical characterisation of MgCl2-treated CdTe solar cells, Major, J.D., Al Turkestani, M.K., Durose, K., 2015, 2015 IEEE 42nd Photovoltaic Specialist Conference, PVSC 2015

6-J.D., Phillips, L.J., Al Turkestani, M., (...), Dhanak, V.R., Durose, K., 2017, Solar Energy Materials and Solar Cells Synthesis and characterization of thin films of palladium (II) phthalocyanine and its derivatives using the thermal evaporation technique, A Timoumi, MKAL Turkestani, SN Alamri, Journal of Materials, 2017, Springer

3/1/6/24

Name:	Mohamed BOUSTIMI	
Degree:	Assistance Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Atomic physics Atom interferometer	Paris-Nord university - FRANCE	2000
Ph.D.	Molecular physics	University Chouaib doukkali - Morocco	1997
M.Sc.	Waves and Matter	University ben Msik – Casablanca- Morocco	1994
B.Sc.	Solid state physics	University Chouaib doukkali - Morocco	1992

Employment:

Position	Employer	Period
Lecturer	Paris-Nord University	*1998-2000*
Post-doc position	Universita di Perugia- Italy	*2000-2001*
Assistante-professor	ENSSAT College- France	2001-2003
Post-doc position	ITA Institute – Cork - Ireland	2003-2005
Ass. Professor	Umm Al-Qura University- KSA	Since 2008

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
2012	Atomic Interferometry for nanoparticles	1.700.000

Publications (published papers and books):

1."Negative-Index Media for Matter-Wave Optics"J. Baudon, M. Hamamda, J. Grucker, M. Boustimi, F. Perales, G. Dutier, M. Ducloy **Physical Review Letters *102***, *140403 (2009)*

2."Dynamics of evanescent matter waves in negative-index media" M. Hamamda, V. Bocvarski, F. Perales, J. Baudon, G. Dutier, C. Mainos, M. Boustimi and M Ducloy **Journal of Physics B.** *At. Mol. Opt. Phys.* ***43*** (2010)

3."Anisotrpic atom-surface interactions in the Casimir-Polder regime" T. Taillandier-Loize, J. Baudon, G. Dutier, F. Perales, M. Boustimi and M. Ducloy **Phys. Rev. A** 89 (2014) 052514

4.Focusing properties of radially polarized Bessel-like beam with radial cosine phase wavefront by a high numerical aperture objective,El Halba, E.M., Boustimi, M., Ez-zariy, L., Belafhal, A. **Optical and Quantum Electronics *, 49(6), (2017) 220***

3/1/6/25

Name:	NUHA FELEMBAN
Degree:	Assistant Professor

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Theoretical physics	King Saud University	2014
M.Sc.	Nuclear Physics	Umm Al-Qura University	2007
B.Sc.	Physics	Umm Al-Qura University	1999

Employment:

Position	Employer	Period
Assistant professor	Umm Al-Qura university	2015
Teaching assistance	Umm Al-Qura university	2004

Supported research and development projects related to specialization:

Date	Project title	Amount of funding
1 July 2010	Comparative analysis of Geant4 hadronic cascade model with UrQMD	King Abdul Aziz city for science and technology

Patents and Copyright:

Title	Date

Publications (published papers and books):

1. Effects of shadowing in Pb + Pb collisions at energies available at the CERN Large Hadron Collider within the HIJING code	2018	Eur.Phys.J. A54 (2018) no.9, 155
2. Nucleon shadowing effects in Cu + Cu and Au + Au collisions at RHIC within the HIJING code	2018	Journal of Physics G45 (2018) no.2, 025104
3. Kinematic constrains on interacting nucleons in Pb+Pb collisions at $\sqrt{s_{NN}}$ =2.76 TeV within the HIJING code	2016	Physical Review C93 (2016) no.2, 024910
4. Lightening-like interactions in nuclear collisions at CERN large hadron collider, Proceedings of Science (EPS-HEP2015) 190 (2015).	2015	Proceedings of Science (EPS-HEP2015) 190 (2015)
5. Interpretation of charged-particle spectra in p+p and p+Pb collisions at energies available at the CERN large hadron collider..	2015	Physical Review C 91, 034908

6. Atomic mirror for Λ–type three-level atom.	2014	Journal of physics B: At. Mol. Opt. Phys. **47** 185005

Experience: Courses taught by the member**:**

Mathematical physics 1	Mathematical physics 2	Mathematical physics 3
Quantum mechanics 1	Quantum mechanics 1	Graduation project

Training Programs:

1. U-Board	Deanship of eLearning and distance learning	20/12/2017
2. Motion graphics	Deanship of eLearning and distance learning	15/11/2017
3. MOOCs	Deanship of eLearning and distance learning	8/11/2017
4. Plagiarism in scientific research and how to avoid it (presentation on the use of specialized plagiarism programs	Deanship of scientific research	1/11/2017
5. How to professionally design a scientific poster	Deanship of scientific research	25/10/2017
6. Applying iPad applications in education	Deanship of eLearning and distance learning	30/7/2015
7. E-Learning System	Deanship of eLearning and distance learning	18-19/10/2015

3/1/6/26

Name:	Khalid Themer Althagafy	
Degree:	PhD in Engineering - Nanotechnology	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Engineering / Nanotechnolgy	Warwick University - UK	2015
M.Sc.	Advanced Mechanical Engineering -Nanotechnolgy	Warwick University - UK	2008
B.Sc.	Mechanical Engineering	Umm AL-Qura University- KSA	2003

Employment:

Position	Employer	Period
Assistant Professor	Umm Al-Qura University	*2015-Present*
Technical Engineer	Umm Al-Qura University	*2004-2015*

Supported research and development projects related to specialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date
Heidenhain_GMBH scholar award from the European Society for Precision Engineering and Nanotechnology, Germany	2013
Global Advantage Award, UK	2011

Publications (published papers and books):

1. Khalid Althagafy, An Investigation into very low cost Sensors Technologies for Nanometrology application having restricted ranges, MSc, Warwick University, 2008
2. Khalid T. Althagafy, Chetwynd DG. Simulation of Stylus contact Patterns in Profilometry, styli. Proc. 26th ASPE Annual Meeting, Denver, US, November 2011.
3. Khalid T. Althagafy, Chetwynd DG. Investigations of Probe-Surface Interactions in Nanotopographic Measurements. 6th SIC international conference, London, UK, 2012.
4. Khalid T. Althagafy, Chetwynd DG. Simulation Studies of Sub-Micrometer Contact of Topography, Styli Proc. 27th ASPE Annual Meeting, San Diageo, US, 2012.
5. Khalid T. Althagafy, Chetwynd DG. Investigation of stylus tip-size effects in surface contact profilometry.Proceedings of the 13th euspen International Conference,Berlin,2013

6. Khalid Althagafy, Modeling of Probe-Surface Interactions in Nanotopographic Measurements, PhD, University of Warwick, 2015
Experience:
1. Tribology
2. Material science
3. Surface characterization
4. Modeling
Training Programs:
1. MATLAB
2. LabVIEW

3/1/6/27

Name:	**Dr. RABAB SENDI**	
Degree:	**Assistance Professor**	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Nano Physics	University Science Malaysia (USM)	2016
M.Sc.	Solid state physics	University Science Malaysia (USM)	2010
B.Sc.	Bachelor of Science (Physics)	College of education for girls Jeddah	2002

Employment:

Position	Employer	Period
Umm Al-Qura University	Lecturer	2013-2016
Umm Al-Qura University	Assistant Professor	2016-

Supported research and development projects **related to specialization:**

Date	Project title	Amount of funding
2018	Grain Size Effects on the Mechanical Properties of ZnO nanoparticles- Based Varistor Ceramics.	**100,000**

Patents and Copyright:

Publications (published papers and books):

1. Rabab Sendi; Electric and Dielectric Behaviors of (Ca, Ta)-doped TiO_2 Thick Film Varistor Obtained by Screen Printin; Results in Physics, vol 8, pp. 758-763, 2018
2. Rabab Sendi; Effects of Different Compositions from Magnetic and Nonmagnetic Dopants on Structural and Electrical Properties of ZnO nanoparticles-Based Varistor Ceramics; Solid State Sciences, vol 77, pp. 54-61, 2018.
3. Rabab Sendi and Shahrom Mahmud; SnO_2 Doping Effect on the Microstructural and Electrical behaviour of ZnOnanoparticles-Bi_2O_3Based Varistor Ceramics; Journal of Alloy and Compounds, Accepted in Press, 2018.
4. Rabab Sendi; Impact of Processing Parameters on Conduction Behaviors for ZnO nanoparticles- and MnO- Doped SnO_2- Based Thick Film Varistors Obtained by Screen Printing; Superlattices and Microstructures, Accepted in Press, 2018.
5. Rabab Sendi; A Comparative Study on Degradation Characteristics of ZnO Nanoparticles- Bi_2O_3-Mn_2O_3Varistors at Various Ambient Sintering Processes; Chinese Journal of Physics; vol 55, pp. 2605-2613, 2017.
6. Rabab Sendi and Ayman Munshi;Borosilicate Frit Addition Impact on the Structure and Electric Behavior of ZnO Nanoparticle-Based Varistors; Applied mechanics and materials, vol. 835, pp. 9-14, 2016.
7. Ahmad Hajidi, Shahrom Mahmud and Rabab Sendi; Effect of Frit Addition on the Surface Morphology and Structural Properties of ZnO-Bi_2O_3-Mn_2O_3 Discs; Advanced Materials Research, vol 627, pp. 858-864, 2015.
8. Rabab Sendi and Shahrom Mahmud; Particle size and Annealing Ambient Effect on Properties of ZnO-Bi_2O_3-Mn_2O_3Varistor Derived from ZnO Micro-and Nanoparticle Powders; Superlattices and Microstructures; vol 69, pp. 212-225, 2014.
9. Rabab Sendi, Shahrom Mahmud, and AmnaSirelkhatim; Comparative Study Between the Effects of Oxidizing and Reducing Atmosphere on the Properties of ZnO-Bi_2O_3-Mn_2O_3Varistor Fabricated from Micro and Nanoparticles of ZnO; Advanced Materials Research, vol 925, pp. 428-432, 2014.
10. Rabab Sendi and Shahrom Mahmud; Post-growth Annealing Effects on the Photoluminescence of ZnONonoparticles-Based Disc; Advanced Materials Research, vol 626, pp. 844-848, 2013.

11. Rabab Sendi, Shahrom Mahmud and Azman Seeni; In Vitro Cytotoxicity Tests of ZnO-Bi_2O_3-Mn_2O_3-Based Varistor Fabricated from ZnO Micro and Nanoparticle Powders on L929 Mouse Cells; AIP Proceedings, vol 1621, pp. 663-669, 2014.
12. Rabab Sendi, Shahrom Mahmud and Amna Sirelkhatim; A Comparative Study Between the Effects of Oxidizing and Reducing Atmospheres on the Properties of ZnO-Bi_2O_3-Mn_2O_3Varistor Fabricated from Micro and Nanoparticles Size of ZnO; Advanced Materials Research, vol 727, pp. 958-964, 2014.
13. AmnaSirelkhatim, Shahrom Mahmud and Rabab Sendi; Physico-Chemical Characteristics of ZnO Nanoparticles-Based Discs and Toxic Effect on Human Cervical Cancer HeLa Cells; AIP Proceedings, vol 1661, pp. 673-678, 2014.

Experience:

1. Nanostructured materials synthesis (Nanoparticles, nanorods, nanowires...)
2. Scanning Electron Microscopy (SEM)
3. Scanning Probe Microscopy (AFM)
4. X-ray Diffraction (XRD)
5. Electron spectroscopy: (XPS)
6. Surface energy measurements (Contact angle method)
7. Optical Spectroscopy (PL, Raman, Infrared)
8. Electrical measurements
9. Conventional Thermal Annealing and Rapid Thermal Annealing processes.
10. Biomedical-Optoelectronic Properties of Nano ZnO.
11. 5 years hands-on experience in conventional ceramic processing method involving ball milling, drying, pressing, and sintering.
12. In vitro biocompatibility study.

Training Programs:

1. **Dec 2014:** Masterclass on Laser Diffraction.
2. **Dec 2014:** Workshop on Dynamic Light Scattering: In-depth understanding of Nano Particle Size and Zeta Potential Analysis.
3. **Feb 2012:** Workshop on Fabrication and Advanced Characterization Methods for Nanomaterials.
4. **May 2011:** Workshop on Academic Publications - How to Apply Theory to Practice And to your Data.
5. **Feb 2008:** Intensive English Course.
6. **Jan 2007:** Computer Course in Windows, WinWord, Power Point and Excel.
7. **Optical:** WVASE32
8. **Crystallography:** CarIne, Diamond
9. **Data analysis:** Origin, Omnic, CasaXPS
10. **General:** Microsoft Office, ImageJ, Photoshop, etc.

3/1/6/28

Name:	Dr. Zinab Matar	
Degree:	Assistance Professor	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Nuclear Physics	Cairo University	2011
M.Sc.	Nuclear Physics	Cairo University	2007
B.Sc.	Physics	King Abdul Aziz university	2000

Employment:

Position	Employer	Period
Assistant Professor	Umm AlQuraa University	2011-Now

Supported research and development projects related to specialization:

Date	Project title	Amount of funding

Patents and Copyright:

Title	Date

Publications (published papers and books):

-Analysis of Fast and Slow Particles Production from the Interaction of ^{24}Mg with Emulsion Nuclei at 4.5A GeV/c (ARAB JOURNAL OF NUCLEAR SCIENCE AND APPLICATIONS (46,1, 2013)

-Multiplicity Characteristics of Fragments produced in 4.5 A GeV/c ^{24}Mg – Emulsion interaction (ARAB JOURNAL OF NUCLEAR SCIENCE AND APPLICATIONS (46(1) 104 – 115 , 2013)

.

Experience:

Taught different courses (nuclear physics – nuclear technology – classical mechanics 1 – radiation physics – thermodynamics – solid)

Training Programs:

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3/1/6/29

Name:	Saleh Alluqmani
Degree:	Assistance Professor

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Nanomaterials and Nanotechnology	Durham University	2015
M.Sc.	Nuclear Physics	King Abdulaziz University	2008

Employment:

Position	Employer	Period
Head of Physics Department	**Umm Al-Qura University**	2017-Now

Supported research and development projects related to specialization:

Project title	Date	Project code
Nitrogen Doped Carbon Quantum Dots derived from Oil Fly Ash For Green Solar Cells, Deanship of Scientific Research-Umm Al Qura University.	2018	17-SCI-1-01-0042

Prizes:

Title	Date
Best poster award winner: Center of Materials Physics Symposium, Durham University, UK.	September 2012
Best poster award winner: Postgraduate symposium on nanotechnology, Birmingham University, UK	December 2013

Publications (published papers and books):

13. Nanotechnology Summer Course, 1-5 July 2010, Oxford, UK
14. Semiconductor Nanowires: Synthesis and Physical Properties, 5-6 December 2010, Durham, UK
15. X-ray Photoelectron Spectroscopy and Raman Spectroscopy Workshop, Thermo Fisher Scientific, 6 March 2010, Manchester, UK.
16. Nano Science and Technology Workshop, 8-9 February 2011, Durham, UK
17. The Future of Renewable Energy, 15 November 2016, Makkah CII, KSA
18. Strategies of Effective teaching, 11-12 May 2016, Makkah, KSA.
19. Optics and Atomic Force Microscopy and Its Applications, February 2017, Umm Al Qura University, KSA

Experience:

7. Set up of ultra-high vacuum (UHV).
8. Set up of atmospheric atomic force microscopy (AFM).
9. Set up of hot chemical vapor deposition (HCVD).

Teaching experience:

5. Nanophysics 477
6. General Phys. 101
7. General Phys. 102
8. Electronics Lab. 423
9. Nuclear Models 463
10. Electricity and Magnetism Lab. 121

3/1/6/30

Name:	**Ameenah N. AlAhmadi**	
Degree:	**Assistance Professor**	

Academic Career:

Degree	Specialization	Institution	Year
Ph.D.	Solid state theory	Ohio University, USA	**2006**
M.Sc.	physics	Ohio University, USA	**2002**
B.Sc.	Pure physics	Umm Al-Qura University, KSA	**1991**

Employment:

Position	Employer	Period
Teacher Assistant (TA)	UQU	1997
Assistance Professor	UQU	2006

Publications (published papers and books):

1. Coherent coupling and energy transfer enhancement via multi-exciton levels in semiconductor nanocrystals, Ameenah N. Al-Ahmadi and Sergio E. Ulloa, contributed talk given at APS March meeting 2008 (March 10-14, 2008 in New Orleans, Louisiana).
2. Coherent manipulation of Excitons in a Pair of Quantum Dots Coupled by the Dipole-Dipole Interaction, Ameenah N. Al-Ahmadi, the 5th International Conference on Semiconductor Quantum Dots (QD2008) in Gyeongju, Korea, from May 11th to 16th, 2008, Conference Proceedings, Phys. Status Solidi C, 6, No. 4, 910-911 (2009).
3. Signatures of energy transfer and multi-exciton states on Exciton Rabi oscillation in semiconductor nanocrystals, Ameenah N. Al-Ahmadi, International Conference on Nanotechnology Opportunities and Challenges, KSA, Jeddah, King Abdul Aziz University, from June 17th to 19th, 2008, Conference Proceedings in the International Journal of Nanoparticles (accepted for publication).
4. Effect of Förster Interaction on the Rabi Oscillations of multiexciton in double quantum dot, Ameenah N. Al-Ahmadi, at seeing at the Nanoscale VI Conference, Berlin, Germany (2008).
5. 1D exciton fine structure in Single Walled carbon nanotubes, Ameenah N. Al-Ahmadi, at Nanotech Europe 2009, Berlin, Germany.

Experience:

10. Referee of 5th International Conference on Semiconductor Quantum Dots May 11 - 16, 2008, in Gyeongju, Korea.
11. Referee of 5th International Conference on science, 2011, UQU, Makkah, KSA.

12. Editor of three books in Nanotechnology and Nanomaterials for InTech open access publisher.2010
13. Master Adviser for Huda Al-Zuhrani, 2008-2011, M. Sc. 2012
14. Member of Master Defense Committee for Reim Almotiri, Kng Abdul Aziz University, 2010
15. Member of Master Defense Committee for Afaf Al-Gorashi, 2009
16. Member of Master Defense Committee for Hanan Al-Thobiati, 2012.
17. Graduated project advisor for many B. S. students.
18. Vice-Dean of Applied science College for, the Academic Development and Community Service
19. Supervisor of preparing the strategic plan for the Faculty of Applied Science.
20. Faculty of Applied science coordinator.
21. Director of enrichment summer program for Giftedness & Creativity_ Sense the word_ 2010.
22. Chairman of Female Committee of the Fifth Saudi Science Conference held on 16-18/04/2012, Umm Al-Qura University.
23. Vice Chairman of the Scientific Committee of the Fifth Saudi Science Conference held on 16-18/04/2012, Umm Al-Qura University.
24.
25. Graduate student advisor of Faculty of Applied science.
26. Coordinator for first and second forum of International Center for Total Quality and Academic Accreditation for Islamic studies and Arabic – 2012, 2013
27. Vice-Dean of Academic Development & Quality at Umm Al-Qura University 2011-2015.
28. Vice-Dean of Library Affiars at Umm Al-Qura University 2017- present.

Training Programs:

1. Workshop on "Nanotechnology: Towards Future Prospects" King Abdulaziz University, 2008 -
2. Workshop on "preparation of the annual program report according to the NCAAA template" 2009 -
3. Workshop "the system for accreditation and quality assurance" - Umm Al Qura University --2010
4. Workshop on "strategic planning" – Al-Nafia Center in collaboration with Umm Al-Qura University.
5. Training program entitled "Success strategy in writing research proposals" - King Abdulaziz City for Science and Technology --2010
6. Workshop on "preparation of the Strategic Plan for faculty of Applied Science" - Umm Al Qura University --2010
7. Workshop on "the development of the preparation and implementation of the budget of academic and administrative leaders in Saudi universities," Umm al-Qura University - 2012 Skills
8. Workshop "preparing self-study," NCAAA - 2012
9. Workshop on "the essential of academic leadership" - Academic Leadership Center - 2013
10. Workshop "personal productivity effective for higer management leaderships" work LMI- Center 2013
11. Workshop "Analyzing the results of the tests" - Umm Al Qura University --2013
12. Workshop on "active learning" - Umm Al Qura University --2013
13. Workshop on "Women Leadership in Higher Education," Academic Leadership Center -2014

14. Workshop on "conflict management in the higher education environment" –Academic Leadership Center –2014
15. Workshop on "Advanced Women Leadership forum in Higher Education," Academic Leadership Center -2018
16. Online course on "strategic planning and Execution" – University of Virginia - 2018
17. The training program of “Qualification of auditors of registered applications in SAQF at Education Evaluation Commission” – king Abdul Aziz University, 2018.

8/10 Course Specification

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Common Course

Course Title: Research methodology

Course Code: 403643-3

(C-0)

Date: 5-10-2018.	**Institution:** UMM AL– QURA UNIVERSITY
College: : Faculty of Applied Science	**Department:** Physics Department

A. Course Identification and General Information

1. Course title and code: **Research methodology - 403643-3**			
2. Credit hours: **3 hrs Lectures**			
3. Program(s) in which the course is offered. **: M.Sc in 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: **1st Year / Level 2**			
6. Pre-requisites for this course (if any): Academic guide			
7. Co-requisites for this course (if any):			
8. Location if not on main campus: **Main campus and Al-Zaher Branch**			
9. Mode of Instruction (mark all that apply):			
a. Traditional classroom	√	percentage?	100%
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

A Preliminary report on the research project (2000 words) is graded in this course.

B Objectives

1.The main objective of this course: The overall goal is to write in a traditional format, which is also referred to as the **IMRaD** format (**I**ntroduction, **M**aterials and methods, **R**esults, **a**nd **D**iscussion) that cites and uses appropriate literature, analyzes and displays data, demonstrates writing in a science style, and makes reasoned conclusions.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online 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 the program's bulletin or handbook)

Course Description: This course provides a comprehensive introduction to research proposal writing, research methodologies, and foundational research theories and protocols. Students in the course learn about the cyclical nature of applied research and the iterative process of research writing (Periodical, dissertation, thesis, posters, ...etc). The course teaches students how to write a proposal, helping students to identify a study topic, organize a literature review, and select appropriate research designs and methodologies. This course, also, is designed to develop the ability to use the Internet to do legitimate research and to teach the methods for locating and evaluating sources and the creation of effective search strategies.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
Course overview and introduction to the Study: Introduction (why the study was selected, background and setting), Statement of Problem, Purpose of the Study, Importance of the Study, Definition of Terms (if needed)	1	3
Review of Related Literature: This chapter should contain a concise presentation of literature and research (periodicals, dissertation abstracts, books, etc.) relevant to the problem.	2	6
Developing a bibliography and properly citing sources within text Online Reading: Citing Sources	2	6

SCIENCE GRAPHICS: Discussion and illustration of the importance of clear graphical presentation of data. Review basic guidelines and critically examine good and bad examples from the literature. Producing effective and publishable figures using a suitable software	2	6
WRITING AN IMRaD MANUSCRIPT: INTRODUCTION & METHODS. Review the functions, writing style, and content of Introduction and Methods sections.	2	6
Research Presentations: - Making scientific posters; Detailed instructions will be given on the design and development of a poster in class. - Making scientific papers; Detailed instructions will be given on the design and development of a paper in class. - students will present material to the class.	2	6
Library Research & Resources Practice (class in the library): Organization of Knowledge: Metadata and searching for information Online Reading: Library Catalog, Keyword Searching, and Subject Searching.	2	6
Evaluating Web Sites Online Reading: Evaluate Web Sites (reliable website with information related to your research topic.). Information ethics: Copyright, plagiarism Online Reading: Plagiarism	2	6
Total number	15 hrs	45 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45 hrs			45 hrs		90 hrs
	Actual	45 hrs			45 hrs		90 hrs
Credit	Planned	45 hrs			45 hrs		90 hrs
	Actual	45 hrs			45 hrs		90 hrs

3. Individual study/learning hours expected for students per week. 8

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
	Upon successful completion of this course the student will be able to:		
1.1	-Develop a greater understanding of scientific processes	-a summary of existing research on the subject. - explain what we know, and what we are uncertain about - explain and summarize, -ask questions, clarify, compare..etc.	-Oral presentation -Reports
1.2	-Research a given topic and select appropriate websites		
1.3	-Accurately collect, analyze and report data		
1.4	-Create and present a proposal for their senior thesis research		
2.0	**Cognitive Skills**		
	Having successfully completed the course students should be able to:		
2.2	use a web browser to navigate the Internet to find relevant and useful web materials with appropriate search engines.	-Applying valid and reliable methods. -Present the findings -Organize, classify and analyze	-Oral presentation -Reports
2.3	-identify and select keywords and search terms that represent an information need or research question.		
2.4	-write an IMRaD manuscript that cites and uses appropriate literature.		

2.5	-write an **IMaAD** manuscript that analyzes and displays data.	-Explain and interpret differences between various studies -Assess and evaluate. -Make comparisons with other studies. -Make recommendations - draw any conclusions with a summing up	
2.6	-write an **IMaAD** manuscript that demonstrates writing in a science style.		
2.7	-write an **IMRaD** manuscript that makes reasoned conclusions.		
3.0	**Interpersonal Skills & Responsibility**		
	At the end of the course, the student will be able to:		
3.2	Access and use information ethically and legally		
4.0	**Communication, Information Technology, Numerical**		
	Description of the skills to be developed in this domain. At the end of the course, the student will be able to:		
4.2	-improve scientific thinking skills		
5.0	**Psychomotor(if any)**		
5.1	Not applicable		

5. Assessment Task Schedule 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	Oral presentation (1)	6th week	10%
2	First Report (1)	6th week	15%
3	Oral presentation (2)	10th week	10%
4	Second Report (2)	10th week	15%
5	Scientific project report related to thesis	14th Week	50 %
	Total		100%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per 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.

E Learning Resources

1. List Required Textbooks 1- John W. Creswell , J. David Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, SAGE Publications, Inc; Fifth Edition (2018) ISBN-13: 978-1506386706 2- Ron Iphofen, Martin Tolich Handbook of Qualitative Research. Sage, (2018) ISBN-13: 978-1473970977 3- Contemporary Field Research: Perspectives and Formulations. Prospect Heights, IL: Waveland Press (2001) ISBN-13: 978-1577661856 4- William Strunk Jr., Virginia Campbell , "The Elements of Style: Simplified and Illustrated for Busy People" (2018) ISBN-13: 978-1980205197. 5- William Badke, Research Strategies:6th edition (2018) ISBN-13: 978-1532018039
2. List Essential References Materials (Journals, Reports, etc.)
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. (http://www3.selu.edu/adunnington/LS102/.)
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.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Class room is already provided with data show • Computer Lab provided with data show • The area of class room is suitable concerning the number of enrolled students and air conditioned. • King Abdulah Library (Umm Al-Qura University)
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computer room.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching

• Questionaries' using the e-learning gate of Umm Al-Qura university • Open discussion in the class room using the e-learning gate of Umm Al-Qura university.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Revision of student answers by another staff member.
3. Procedures for Teaching Development • Preparing the course as PPT. • Using the e-learning gate of umm Alqura university • Using scientific movies.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • After the agreement of Department and Faculty administrations
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Periodical revision by Quality Assurance Units in the Department and institution

Name of Course Instructor: Badie

Signature: _____ **Date Completed:** _____

Program Coordinator: Khaled Abdel-Waged

Signature: _____ **Date Received:** _____

Elective Courses

Course Title: Advanced programming

Course Code: 403647-3

(E-1)

Date: 5.-10-2018	**Institution: UMM AL– QURA UNIVERSITY**
College: Faculty of Applied Science	**Department: Department of Physics**

A. Course Identification and General Information

1. Course title and code: **Advanced programming (403647-3)**
2. Credit hours: **3 hrs**
3. Program(s) in which the course is offered. **MSc in 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: **1st Year / Level 1**
6. Pre-requisites for this course (if any): **Academic guide**
7. Co-requisites for this course (if any):
8. Location if not on main campus: **Main campus and Al-Zaher Branch**
9. Mode of Instruction (mark all that apply): a. Traditional classroom ✓ percentage? 80% b. Blended (traditional and online) ☐ percentage? ☐ c. E-learning ✓ percentage? 20% d. Correspondence ☐ percentage? ☐ f. Other ☐ percentage? ☐
Comments:

B Objectives

1. The main objective of this course

After completing this course student should be able to:

1. Grasp the idea of Object oriented Programming
2. Learn how to create Classes.
3. Write Programs in C++.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online 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 the program's bulletin or handbook)

Course Description: Object oriented programming (OOP) is becoming more and more important, and this course will address this. OOP offers a new and powerful way to cope with complexity. In this course, the student will learn how to write a program as a group of objects that have certain properties and can take certain actions, instead of viewing a program as a series of steps to be carried out. At the end of the course, the programs that the student shall write will be clearer, more reliable and easy to maintain.

C++ is quite similar to other languages with two or three grand ideas thrown in. These new ideas are fascinating in themselves and they are becoming part of the programming culture.

In particular, the student will learn C++ algorithms and will enable to perform

- Write Object Oriented Programming.
- Use Pointers and Classes.
- Solve real Programming problems.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Basics- Program construction, Output using "cout", Header files, when to use comments, Integer variables, variable names, integer constants the "endl" manipulator, exercises.	1	3
Basics- Character variables, character constants, escape sequence, input with "cin", floating point type, type bool, "setw" manipulator, the "iomanip" header file, arithmetic operation, library functions, exercises.	1	3

Loops and decisions – Relational operators, Loops, the "for" loop, the "while" loop, the "do" loop, Decisions, the "if" statement, the "if else" statement, the "switch" statement, the conditional operator	1	3
Loops and decisions- Logical operators, logical "AND" operator, logical "OR" operator, logical "Not" operator, the "break" statement, the "continue" statement, exercises	1	3
Structures- A simple structure, Defining the structure, accessing structure members, Structure within Structures, Structures and Classes, Enumeration, examples, exercises	1	3
Functions- Simple functions, the function declaration, calling the function, the function definition, passing arguments to functions, passing constants, passing variables, passing by value, Returning values from functions, the return statement, Returning structure variables	1	3
Functions- Reference arguments, Passing Data types by reference, Passing more complex pass by Reference, Passing Structures by Reference, Overloaded functions, inline functions, Returning by References.	1	3
Objects and Classes- A simple class, classes and objects, defining the class, using the class, calling member functions	1	3
Objects and Classes- Constructors, Destructors, objects as function arguments, overloaded constructors, Member functions defined outside the class, Static class data, const and classes.	1	3
Arrays- Array fundamentals, arrays as class member data, arrays of objects and exercises	1	3
Pointers– Addresses and pointers, Pointers and arrays, examples	1	3
Pointers- Pointers and functions, the "new" and "delete" operators examples.	1	3
Inheritance- Derived class and base class, Derived class constructors, class inheritance, Public and private inheritance.	1	3
Virtual functions- Normal member functions accessed with pointers, virtual member functions accesses with pointers, friend functions, static functions, examples	2	6
Total number	15	45

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45 hrs			45 hrs		90 hrs
	Actual	45 hrs			45 hrs		90 hrs
Credit	Planned	45 hrs			45 hrs		90 hrs
	Actual	45 hrs			45 hrs		90 hrs

3. Individual study/learning hours expected for students per week.	8

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	**NQF Learning Domains And Course Learning Outcomes**	**Course Teaching Strategies**	**Course Assessment Methods**
1.0	**Knowledge**		
	Upon successful completion of this course. The student will be able to:	-Demonstrating the basic information and principles through lectures and the achieved applications. -Discussing C++ statements with illustrating pictures and diagrams	- Online quizzes -Midterm's exam. -Assignments
1.1	-learn the syntax of the C++ programming language.		
1.2	-understand the concept of arrays.		
1.3	-apply fundamental syntax rules for identifiers, declarations, expressions, statements, and functions		

1.4	-understand the concept of pointers and dynamic memory allocation.		
1.5	-apply techniques of structured (functional) decomposition to decompose problem.		
1.6	-create and call functions that use parameter passing and return values.		
1.7	-learn how to design C++ classes		
1.8	-learn how to handle private and protected members of a class		
1.9	-understand the concept of data abstraction and encapsulation		
1.10	-learn how to overload functions and operators in C++		
1.11	-learn how inheritance and virtual functions work.		
1.12	-learn how to design and implement generic classes with C++ templates.		
2.0	**Cognitive Skills**		
	Having successfully completed the course students should be able to:		.
2.1	-explain how an existing C++ program works	-Demonstrating the basic information and principles through lectures and the achieved applications. -Discussing C++ statements with illustrating pictures and diagrams	- Online quizzes -Midterm's exam -Assignments
2.2	-discover errors in a C++ program and describe how to fix them		
2.3	-critique a C++ program and describe ways to improve it		
2.4	-analyze a problem and construct a C++ program that solves it.		
2.5	-modify and extend short programs that use standard conditional and iterative control structures and functions		
2.6	-choose and apply the required Linux commands to develop C++ programs in a command-line environment		

3.0	**Interpersonal Skills & Responsibility**		
3.1	**At the end of the course, the student will be able to:** Do calculations independently. Make programs in a form of classes.	-Extensive use of C++ library. -Lab work. -Case Study. -Small group discussion. -Learn independently and take up responsibility. -Develop their interest in programming. -Give students tasks of duties	-Evaluate the efforts of each student by online quizzes. -Evaluate the scientific values of solving specific physical problem. -Evaluate the work in team -Evaluation of the role of each student in lab group assignment
3.2			
4.0	**Communication, Information Technology, Numerical**		
4.1	**At the end of the course, the student will be able to:** -Enhance the ability of students to use computers and internet. -Computation -Problem solving -Data analysis and interpretation. Feeling physical reality of results	Small project	-Evaluation of presentations -Evaluation of reports Practical exam -Online quizzes -Research.
5.0	**Psychomotor(if any)**		
5.1	Not applicable		

5. Assessment Task Schedule 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	Exercises & Home works	All weeks	5%
2	Online quizzes	All weeks	5%
3	Oral exam	5th Week	5%
4	Participation in activities lectures and labs	All weeks	5%

5	Test (1)	6th week	10%
6	Test (2)	13th week	10%
7	Scientific project	14th Week	10 %
8	Final Exam	15th week	50%
	Total		100%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

Each student will be supervised by an academic adviser and the time table will be given to the student each semester.

E Learning Resources

1. List Required Textbooks

1- Object oriented programming in C++, Robert Lafore, fourth edition, Pearson and Sam Publishing (2002), ISBN 0-672-32308-7.
2- Object oriented programming using C++, Joyce Farrel, fourth edition, 2009, ISBN-13: 978-1-4239-0257-7.
3- Bjarne Stroustrup, The C++ Programming Language, 4th Edition (2013), ISBN-13: 978-0321563842.
4- -"Applied Computational Physics 1st Edition" Joseph F. Boudreau, Eric S. Swanson ISBN-13: 978-0198708643 (2018).

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

-Siddhartha Rao, "C++ in One Hour a Day, Sams Teach Yourself (8th Edition)", (2016) ISBN-13: 978-0789757746.

-Bjarne Stroustrup, "A Tour of C++ (C++ In-Depth Series)" , (2018), ISBN-13: 978-0134997834.

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

(eg. www.youtube.com.)

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.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- Class room is already provided with data show

• Computer Lab provided with data show • The area of class room is suitable concerning the number of enrolled students and air conditioned. • King Abdulah Library (Umm Al-Qura University)
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computer room. • C++ software.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Questionaries using the e-learning gate of Umm Al-Qura university • Open discussion in the class room using the e-learning gate of Umm Al-Qura university.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Revision of student answers by another staff member. Analysis the grades of students using the e-learning gate of Umm Al-Qura University..
3. Procedures for Teaching Development • Preparing the course as PPT. • Using the e-learning gate of umm Alqura university • Using scientific movies. • Coupling the theoretical part with laboratory part • Periodical revision of course content.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • After the agreement of Department and Faculty administrations
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. Periodical revision by Quality Assurance Units in the Department and institution

Name of Course Instructor: Badie

Signature: _____ Date Completed: _____

Program Coordinator: Khaled Abdel-Waged

Signature: _____ Date Received: _____

Course Title: Advanced Research lab.

Course Code: **403651-3.**

(E-2)

Date: 20....-.....-.....	**Institution:** UMM AL – QURA UNIVERSITY.
College: **Faculty of Applied Science**.	**Department:** **Department of physics**.

A. Course Identification and General Information

1. Course title and code: advanced Research lab. **403651-3**			
2. Credit hours: 3 hrs.			
3. Program(s) in which the course is offered. **M.Sc. 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: **1nd Year / Level 1**			
6. Pre-requisites for this course (if any): **Solid State Physics 403662**			
7. Co-requisites for this course (if any):			
8. Location if not on main campus: **Main campus**			
9. Mode of Instruction (mark all that apply):			
a. Traditional classroom	✓	percentage?	30
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other	✓	percentage?	70
Comments:			

B Objectives

1. The main objective of this course Students in this laboratory will learn experimental techniques, data, collection, data handling, and data interpretation and analysis. This course consists of two parts: a laboratory for preparation any material (nano materials, thin films, polymer films, metals, glass and ceramics and laboratory characterization of these materials. During the semester, students will work in alone or group to complete experimental to make individual reporting. To enable the student to understand various device characterization techniques.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field). This course and its contents are designed to obey most current learning experimental arising from learning and cognitive sciences as well as the teaching strategy outlined in this course. Any development will be made by qualified faculty members that teaching this course based on their assessment of the skills and needs of their students and the techniques.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description: Materials science lab. is concerned with preparation, processing, structure, and properties of polymers, and thin film materials. Work experience that combines the theoretical in the tutorial room and the practical knowledge of materials manufacturing to provide students with the background of professional knowledge.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
Introduction of material science laboratory.	1	3
Preparation of nanomaterial by chemical method and Preparation of nanomaterial by ball milling method and measurement it by UV-visible spectroscopy.	3	9
Preparation of thin films by spin coating and study their electrical conductivity by temperature-four probe method	2	6

Preparation of biopolymer material and study the morphology and crystal growth rate by polarized optical microscopy (POM).	2	6
Determination of the elongation at break and Young's modulus of polymer film by Tensile test.	1	3
Determination of dielectric constant, dielectric loss and Electrical conductivity of some material by impedance analyzers.	2	6
Preparation of thin film by vacuum thermal evaporation of and study the morphology by SEM.	1	3
Study of crystal size by using XRD and the cell Scherrer formula for some crystalline material.	1	3
Study the Surface morphology for some material by atomic force microscopy (AFM).	1	3
Study the I-V characteristics for solar cell temperature-two probe method	1	3
	15 weeks	**45 hrs.**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned		----------	14	14	-------	14
	Actual						
Credit	Planned		--------	3	3		3
	Actual						

3. Individual 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 Strategies

- ✓ To introduce the characteristics of Nanoscale fabrication thin films and polymer material techniques.

- ✓ The students are trained in electrical methods, optical methods, tensile testing methods, XRD methods, POM, SEM and AFM.
- ✓ To make the students understand the principle involved in preparation and characterization of materials. To teach the principle and fabrication of materials.
- ✓ At the end of the course, the students will be able to understand the various techniques.

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Understand crystalline systems from XRD and POM.	Components of the laboratory reports require students to discuss and explain the theories of the experiment. Lecture notes Foils Blackboard Laptop presentations. Time is also included to allow for student discussions during lab time.	. The student classifies the physical properties of material in the laboratory report after examination of the material.(42%) Final exam (40%) Seminar (18%)
	Investigate of the mechanical properties of materials by Tensile tester.		
1.6	Introduce various methods available for characterizing the materials like electrical and UV-spectroscopic methods		
	Apply know-how for materials science by means of instrumental-measurement experiments		
	Investigation the surface morphology by SEM and AFM.		
2.0	**Cognitive Skills**		
	Writing understandable and detailed lab reports	Laboratory lab manual for all experiments that encourage students to think about scientific research and in the future produce new materials that reflect the needs of the industry. A testing framework is to identify unknown material or	Laboratory reports require students to use these skills to successfully complete reports and these skills are assessed.
	Data analysis		
	data interpretation and graphical Representation		
	Working in a team with different backgrounds		

		new material, collect data about the material to solve the problem,	
3.0	**Interpersonal Skills & Responsibility**		
3.1	Cooperation and collective participation, patience during the experiment, professional development and independent learning.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Oral and written communication, word processing and information retrieval.	.	.
5.0	**Psychomotor(if any)**		
5.1	Not applicable.	Not applicable.	Not applicable.

5. Assessment Task Schedule 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	During the examination period following the module, an oral exam (duration: 30 min.) on "certain experimental" is held.	14th week	20 %
2	Experimental reports	Each week	40 %
3	Final exam	15th week	40%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

E Learning Resources

1. List Required Textbooks

During the lab course, a set of references is given for each experiment. Manuals are available for all experiments; they contain individual literature references for all experiments.

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

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

.Electronic Materials, Web Sites etc.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

measurement equipment. Lecture notes Foils Blackboard Laptop presentations.

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.) Lab. room , tools and a board to write and explain the experimental.
2. Technology resources (AV, data show, Smart Board, software, etc.) Computer Lab..

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Questionnaires • Open discussion in the lab room at the end of the experimental.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Revision of student answer paper by another staff member. • Analysis the grades of students.
3. Procedures for Teaching Development • Course report. • Program report and Program self-study and a Lab. Room.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Periodical revision by Quality Assurance Units in the Department and institution

Name of Course Instructor: Ahmed El-Hadi

Signature: _____ Date Completed: _____

Program Coordinator: Adel-Madani

Signature: _____ Date Received: _____

Course Title: **Semiconductor device modeling**

Course Code: **403649**-3

(E-3)

Date: 27/9/2018	**Institution:** Umm AL – Qura University
College: College of Applied Science	**Department:** Department of Physics

A. Course Identification and General Information

1. Course title and code: **Semiconductor device modeling (code: 403649)**
2. Credit hours: **3Hrs**
3. Program(s) in which the course is offered. **Master of Physics;** (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course: **Walid Belkacem Belhadj**
5. Level/year at which this course is offered: **1st Year / Level 1**
6. Pre-requisites for this course (if any): **Academic guide**
7. Co-requisites for this course (if any):
8. Location if not on main campus: **Main campus and Alzaher**
9. Mode of Instruction (mark all that apply):

a. traditional classroom	✓	What percentage?	90
b. blended (traditional and online)		What percentage?	
c. e-learning	✓	What percentage?	10
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

The course provides students with deep theoretical background, as well as a broad knowledge about the benefits and different applications for numerical simulation of semiconductor devices. By implementing simulating codes, students will learn the fundamental structures (physical models and numerical techniques) for macroscopic (drift-diffusion) as well as microscopic (Monte Carlo) simulation of semiconductor devices and materials. Students will also learn how to use Computer Aided design (CAD) tools for semiconductor device design.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field):

1- Collaborate with other educational institutions to reveal how they deal with the subject.

2- Renew and update the course references periodically.

3- Frequently check the latest discovery in science to improve the course objectives.

4- Posting some course material on the websites to help the students.

5- Assigning presentations to students to improve their research skills.

6- Focusing on generic skills.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

This course deals mainly with physical device models which are developed from the carrier transport physics and device geometry considerations. It gives an in-depth knowledge in simulation of device physics for advanced semiconductor devices for all application areas. The main topics are: physics of electron transport in semiconductor devices, Numerical methods for attaining solutions to transport equations, Introduction to Computer Aided design (CAD) tools for semiconductor device design.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**

❖ **Semiconductor Carrier Transport Equations:** Semiconductor bandstructure, Simplified bandstructure models, Carrier dynamics, Semiconductor effective mass, Semiclassical transport theory, Boltzmann transport equation, Maxwell's equations, Drift-Diffusion Transport Model, equations, Boundary conditions, Generation-recombination, Scattering processes, Relaxation time approximation, Thermal Conductivity and Heat flow.	**3**	**9**
❖ **Analytical modeling and analysis of semiconductor Devices:** Techniques for solving Semiconductor equations, closed – form analysis, Mobility modeling, Analysis of pn Junction Diode, Analysis of Field Effect Transistor operation, , Analysis of MOSFET operation, limitation of the closed – form analysis.	**2**	**6**
❖ **Numerical solution of the Semiconductor equations:** Finite-Difference Schemes: Discretization of Semiconductor equations, methods for solving finite difference equations, Boundary Conditions, Simulation examples. Finite Element Method: Galerkin Method, Derivation of the Finite Element equations, Simulation examples. Modeling Heterojunction Devices: Semiconductor equations for Heterojunction, High Electron Mobility Transistors, Analytical solutions, Numerical Models, Heterojunction Bipolar Transistors, and Monte Carlo Simulations.	**4**	**12**
❖ **Monte Carlo Method:** Modeling carrier transport in Semiconductors, Equations of motion, Energy band structure, Application Monte Carlo Method for transport Characteristics and device modeling.	**2**	**6**
❖ **Introduction to Quantum transport theory:** Quantum theoretical foundations, state vectors, Schroedinger and Heisenberg picture, Band structure, Bloch theorem, one dimensional periodic potential, density of states, Pseudopotential theory, crystal symmetries, reciprocal lattice, Brillouin zone, Semiclassical transport theory, Quantum Transport Theory, limits of semiclassical transport theory, quantum mechanical derivation Boltzmann transport equation, Markov-Limes.	**4**	**12**
	15 weeks	**45 hrs**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact	Planned	**30**	**15**	**0**	**0**	**0**	**45**

Hours	Actual	30	15	0	0	0	45
Credit	Planned	2	1	0	0	0	3
	Actual	2	1	0	0	0	3

3. Individual study/learning hours expected for students per week.	**6**

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Write the fundamental equations of determining the device current based on each of the following: Schrodinger equation, Newton's second law and Boltzmann Transport Equation (BTE).	**1.** Lectures. **2.** Discussions **3.** Slides and computer simulation software may be used by the teachers to clarify concepts. **4.** Problems solving **5.** Students may be asked to solve problems and to write simple programs in MATLAB language.	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams
1.2	Outline Analytical and numerical Techniques for solving Semiconductor transport equations.		
1.3	Describe the charge distribution in the pn diode and the MOS transistor for different bias voltages		
1.4	Describe why the electrical conductivity is different for different materials.		
1.5	Recognize how the electrical conductivity varies with temperature, light and doping		

	concentration for the semiconductors Si and GaAs.		
1.6	Describe the advantages and disadvantages as well as the limitations of each studied numerical method.		
2.0	**Cognitive Skills**		
2.1	Analytical and numerical Techniques for solving Semiconductor transport equations.	**1.** Lectures. **2.** Discussions. **3.** Problems solving. **4.** Encourage the student to look for the information in different references. **5.** Ask the student to attend lectures for practice solving problem.	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams
2.2	Criticizethe strengths and limitations of numerical simulations.		
2.3	Differentiate between analytical and numerical modeling techniques.		
2.4	Implement a one-dimensional drift-diffusion simulator to obtain the potential and carrier distributions in a pn-diode.		
2.5	Develop and Implement a one-particle Monte Carlo simulator to analyze the velocity and energy distributions vs. external electric field in compound semiconductor materials.		
2.6	Calculate the current in the pn diode, the MOS transistor and the bipolar transistor using simplified device models based on the physical phenomena that influence the current.		
2.7	Analyze how different physical phenomena influence the current in semiconductor devices		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics	**1.** Ask the students to search the internet and use the library.	**1.** Evaluate the scientific values of solutions. **2.** Evaluate the work in team

3.2	Ability to choose the best numerical method to simulate a given semiconductor device and so can analyse a transport problem by using suitable numerical method.	**2.** Encourage them how to attend lectures regularly by assigning marks for attendance. **3.** Small group discussion. **4.** Give students tasks of duties	**3.** Evaluation of the role of each student in group Project assignment **4.** Evaluation of student's presentations. **5.** Direct contact during office hours.
3.3	Work effectively both individually and in teams.		
3.4	Communicate effectively with peers.		
3.4	Illustrate the interrelationships among numerical design, technology, and global society, and of the societal implications of new developments in science.	**1.** Discussion in class	**1.** Direct contact during office hours.
4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrating capability in performing research as well as an effective oral and written communication.	**1.** Communicate effectively in writing, orally and through scientific diagrams. **2.** Preparing a report on some topics related to the course depending on web sites.	1. Evaluation of presentations 2. Evaluation of reports & Project assignment.
4.2	Acquire a working knowledge of basic research methodologies, data analysis and interpretation.	**1.** Independent study. **2.** Problem solving.	**1.** Homework **2.** Assignments.
4.3	Demonstrate effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.	**1.** Oral Presentations. **2.** Problem solving.	**1.** Homework. **2.** Assignments.
4.4	Use of the internet to research solution for relevant scientific problems.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments
4.5	Demonstrate enough knowledge in evaluating published works.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments.
5.0	**Psychomotor(if any)**		

5.1	N/A	N/A	N/A
5.2			

5. Assessment Task Schedule 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	Exercises & Home works	At the end of each chapter	10%
2	Participation in activities during lectures	All weeks	10%
3	Practical group projects	At the end of each chapter	10%
4	1st Periodic Exam	8th week	10%
5	2nd Periodic Exam	11th week	10%
6	Final Exam	16th week	50%
7			

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

Students are supervised by academic advisers in physics Department and the time tables for academic advices were given to the student each semester. (8hrs per week).

E Learning Resources

1. List Required Textbooks

- D. Vasileska, S. M. Goodnick, G. Klimeck, “Computational Electronics: Semiclassical and Quantum Device Modeling and Simulation 1st Edition”, CRC Press, 2010.
- C. Snowden, “Introduction to Semiconductor Device Modeling”, World Scientific, 1998.
- Fundamentals of Carrier Transport 2nd Edition, Cambridge University Press (2000).
- Carlo Jacoboni and Paolo Lugli, "The Monte Carlo Method for Semiconductor Device Simulation", Springer, 2002.

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.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Lecture room with 25 seats, equipped with a Smart Board, projector, computers and internet connection.
2. Technology resources (AV, data show, Smart Board, software, etc.) **1.** Data Show. **2.** AV Presentations. **3.** Matlab software
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) NA

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching **1.** Discussions on coverage, preferred activity, approach. **2.** Student course evaluation at the end of the course.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Revision of student answer paper by another staff member. • Analysis of the grades of students. • Periodic self- assessment of the program. • Departmental council meetings.
3. Procedures for Teaching Development **1.** Sharing teaching experience during the department meetings. **2.** Constant update with the best teaching practices in case methodology. **3.** Attending workshop on effective teaching methods presented by experts on the teaching methodologies.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members 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 developing it.

The following points may help to get the course effectiveness

- Reviewing student's formal and informal feedback.
- Evaluating relevancy of the teaching methods on a regular basis.
- Discussing the results with the industry experts.
- Program Self study.

According to the above points the plan of improvement should be given.

Name of Course Instructor: _ Walid Belkacem Belhadj _____

Signature: _____ Date Completed: _____

Program Coordinator: Taha El-Fawal

Signature: _____ Date Received: _____

Nuclear Track

Course Title: Introduction to Nuclear and High Energy Physics

Course Code: **403638**-3

(N-1)

Date: 20....-.....-.....	**Institution:** Um Al – Qura University
College: Science	**Department:** Physics

A. Course Identification and General Information

1. Course title and code: Introduction to Nuclear and High Energy Physics (**403638**-3)
2. Credit hours: 3
3. Program(s) in which the course is offered: M.Sc in physics
4. Name of faculty member responsible for the course
5. Level/year at which this course is offered: 1st Year / Level 1
6. Pre-requisites for this course (if any): Quantum Mechanics (1) (B.Sc.)
7. Co-requisites for this course (if any): Non
8. Location if not on main campus: Main Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	☐	percentage?	90%
b. Blended (traditional and online)	☐	percentage?	10%
c. E-learning	☐	percentage?	
d. Correspondence	☐	percentage?	
f. Other	☐	percentage?	

Comments: 2. In this course, the student should also evaluate problems and plot graphs by a computer.

B Objectives

1. The main objective of this course

This course aims to review the key concepts in Nuclear and Particle Physics. These include fundamental nuclear properties, nuclear Binding energy, nuclear transmutation and decay, and simple nuclear models. Fundamental particles, forces, decays and conservation laws, and unification schemes are also reviewed.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online 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 Nuclear concepts, theories 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. Discussing some selected problems in each chapter.
6. Cooperate with different institution to find how they deal with the subject.
7. Frequently check for the latest discovery in science.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:		
1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
1- Properties of Nuclei	2	6
1- Masses, Sizes		
2- Nuclear Spins		
3- dipole moments.		
4- Stability and instability.		
5- Nuclear Force		
2- Nuclear Models	3	9
1- Liquid Drop Model		
2- Shell Model		
3- Collective model		
3- Strong, Weak and Electromagnetic interactions at work	4	12
1- Alpha Decay		
2- Beta Decay		
3- Gamma Decay		
4-Intoduction to Elementary Particles	3	9
1- Historical introduction to elementary particles		
2- How do we produce elementary particles		

3- How do we detect elementary particles		
4- The eight fold way		
5- The Quark model		
6- The Standard model		
5- Elementary Particle Dynamics	3	9
1- The four forces		
2- Quantum Electrodynamics		
3- Decays and conservation laws		
4- Unification schemes		

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45 hrs	45 hrs				90 hrs
	Actual	45 hrs	45 hrs				90 hrs
Credit	Planned	45 hrs	45 hrs				90 hrs
	Actual	45 hrs	45 hrs				90 hrs

2. Individual study/learning hours expected for students per week. [8]

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form 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	Explain nuclear properties. .	1. Demonstrating the basic information and principles through lectures and the achieved applications 2. Discussing phenomena with illustrating pictures and diagrams 3. Start each chapter by general idea and the benefit of it; 4. Learn the student background of the subject;	1. Solve some example during the lecture. 2. Exams: • Online Quizzes • First mid-term exam • Second Midterm exam • Oral exams • Final exams
1.2	Explain the different forms of radioactivity and account for their occurrence		
1.3	Master relativistic kinematics for computations of the outcome of various reactions and decay processes		

		5. Show the best ways to deal with problem; 6. Keep the question "why" or "how" to explain always there; 7. Build a strategy to solve problem.	3. Discussions with the students. 4. Ask the student to clear the misunderstanding of some mathematical principle. 5. Ask quality question.
2.0	**Cognitive Skills**		
2.1	Ability to describe the nuclear and particle phenomena.		
2.2	Classify elementary particles according to their quantum numbers and draw simple reaction diagrams	**1.** Preparing main outlines for teaching **2.** Following some proofs **3.** Define duties for each chapter **4.** Homework assignments **5.** Encourage the student to look for the information in different references **6.** Ask the student to attend lectures for practice solving problem **7.** Ask the student to do small research .	1. Midterm's exam. Exams, short online 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
2.3	Classify different kinds of reactions between elementary particles		
2.4	Master the use of invariant mass for kinematical computations		
3.0	**Interpersonal Skills & Responsibility**		
3.1	. Demonstrate understanding and respect for scientific values like openness, precision and reliability. Be able to analyse scientific problems in general and participate in discussion about different ways to address and solve problems	1. Learn how to search the internet and use the library. 2. Learn how to cover missed lectures. 3. Learn how to summarize lectures or to collect materials of the course. 4. Learn how to solve difficulties in learning: solving problems – enhance educational skills. 5. Develop her interest in Science through :(lab work, field trips, visits to scientific and research. Encourage the student to attend lectures regularly by: ▪ Giving bonus marks for attendance ▪ Assigning marks for attendance. ▪ give students tasks of duties	1. Online Quizzes on the previous lecture 2. Creating reports 3. Discussion 4. The accuracy of the result gained by each group will indicate good group work 5. Presenting the required research on time and the degree of the quality will show the sense of responsibility.
4.0	**Communication, Information Technology, Numerical**		
4.2	Communicate scientific problems, analyses and conclusions within nuclear physics, both to specialists and the general public.		
4.3	Data analysis and interpretation.		
4.4	Feeling physical reality of results		
5.0	**Psychomotor (if any)**		

5. Assessment Task Schedule 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	Midterm 1	5th week	15 %
2	Midterm 2	10th week	15 %

3	Online quizzes	every week	10 %
4	Homework	Every week	5 %
5	Oral exam	Every week	5 %
6	Final exam	End of semester	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

8 office hours per week

E Learning Resources

1. List Required Textbooks

1) A. Das and T. Ferbel, Introduction to nuclear and particle physics (second edition) World Scientific (2003) ISBN 981-238-744-7.
2) R.C. Verma & S.C. Gupta, V.K. Mittal, Introduction to nuclear and particle physics 4th Edition, Kindle Edition (2018) ISBN-13: 978-9387472617
3) Books Wagon, Basic Ideas And Concepts In Nuclear Physics: An Introductory Approach 3Rd Edition (Series In Fundamental And Applied Nuclear Physics) (2017). ISBN 0 7503-0534 7 hbk, 07503 0535 pbk.
4) Burcham, Nuclear and Particle Physics: An Introduction 2nd Edition (2009) ISBN-13: 978-0470742754.
5) Kenneth S. Krane , Introductory nuclear Physics, first edition, Jone Wily & Sons Inc. (2008) ISBN 0 - 471-80553-X .
6) Saverio D'Auria, Introduction to Nuclear and Particle Physics, Springer; 1st ed (2018) **ISBN-13:** 978-3319938547.

7) Alessandro De Angelis, Mário Pimenta, Introduction to Particle and Astroparticle Physics: Multimessenger Astronomy and its Particle Physics Foundations (2018) ISBN-13: 978-3319781808.

8) Irving Kaplan, Nuclear Physics, Narosa Publishing House (2002). **ISBN-13:** 978-8185015897

9) K. Langanke, J. A. Maruhn, Steven E. Koonin, Computational Nuclear Physics 1: Nuclear Structure (1991) ISBN-13: 978-0387535715.

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.

- Power points (use e-learning gate of Umm Al-Qura university)
- YouTube videos (use e-learning gate of Umm Al-Qura university)

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 is already provided with data show • The area of class room is suitable concerning the number of enrolled students and air conditioned. • Lab with for 20 students
2. Technology resources (AV, data show, Smart Board, software, etc.) • Providing class rooms with computers and labs with data show.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Questionaries' (using of e-learning gate of Umm Al-Qura university) • Online Quizzes (using of e-learning gate of Umm Al-Qura university) • Open discussion (using of e-learning gate of Umm Al-Qura university)
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Revision of student answer paper by another staff member if evaluable Analysis the grades of students.
3. Procedures for Teaching Development • Preparing the course as PPT. • Using scientific movies. • Coupling the theoretical part with laboratory part • Periodical revision of course content.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • After the agreement of Department and Faculty administrations • 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.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. 1- The following points may help to get the course effectiveness ▪ Student evaluation ▪ Course report ▪ Program report ▪ Program Self study ▪ E-learning

Name of Course Instructor: Walid Altaf
Signature: _____ **Date Completed:** _____
Program Coordinator: Khaled Abdel-Waged

Signature: _____**Date Received:** _____

Course Title: **Nuclear Reactions**

Course Code: **403640-3**

(N-2)

Date: 17.10.2018.	**Institution: UMM AL - QURA UNIVERSITY.**
College: Faculty of Applied Science	**Department: Physics**

A. Course Identification and General Information

1. Course title and code: **Nuclear Reactions** **403640-3**		
2. Credit hours: **3hrs**		
3. Program(s) in which the course is offered. **M.Sc. in 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: **2nd Year / Level 1**		
6. Pre-requisites for this course (if any): **Introduction to nuclear and particle physics (403638-3) (M.Sc)**		
7. Co-requisites for this course (if any): --		
8. Location if not on main campus: **Main campus**		
9. Mode of Instruction (mark all that apply):		
a. Traditional classroom	√ percentage?	75
b. Blended (traditional and online)	√ percentage?	15
c. E-learning	√ percentage?	10
d. Correspondence	percentage?	
f. Other	percentage?	

Comments: 2. **In this course, the student should also evaluate problems and plot graphs by a computer.**

B Objectives

1. The main objective of this course This course, together with "Introduction to nuclear and particle physics" prepares the students with the background for research in Nuclear Physics, for instant in terms of a M.Sc. Project. In this course, focus is on nuclear reactions, fission and fusion.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field) 1. Review the course description frequently and rewrite it according to modern data. 2. Develop learning strategies to increase student understanding of physical phenomena. 3. Encourage the student to use massive open online courses (MOOCs). **4.** Increased student understanding by mentioning the applications of physical principle.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

1. Topics to be Covered **1- Chapters 11-14 of K. S. Krane, Introductory nuclear physics (see references below)**		
List of Topics	**No. of Weeks**	**Contact hours**
1. Kinematics in Nuclear Reactions: 1- Types of reactions and conservation laws 2- Energetics of nuclear reactions 3- Reaction cross sections 4- Coulomb scattering 5- Nuclear scattering 6- The Optical model 7- Direct and compound nuclear reactions **8-** Resonance and Heavy-ion reactions	**5**	**15**
2- Neutron Physics 1- Neutron sources 2- Absorption and moderation of neutrons 3- Neutron reactions and cross sections 4- Neutron capture 5- Interference and diffraction with neutrons	**4**	**12**

3-Nuclear fission 1- Characteristics of fission 2- Energy in fission 3- Fission and nuclear structure 4- Controlled Fission reactions **5-** Fission reactors	**3**	**9**
4-Nuclear fusion 1- Basic Fusion processes 2- Characteristics of fusion 3- Solar Fusion 4- Controlled Fusion reactors	**3**	**9**
Total	**15**	**45**

Lecture : 45 hrs	**Tutorial:**	**Lab:**	**Total:** 45 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	**45 hrs**	**45 hrs**				**90 hrs**
	Actual	**45 hrs**	**45 hrs**				**90 hrs**
Credit	Planned	**45 hrs**	**45 hrs**				**90 hrs**
	Actual	**45 hrs**	**45 hrs**				**90 hrs**

3. Individual study/learning hours expected for students per week. **8**

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Explain nuclear reactions	1. using the achieved applications to Demonstrating the basic information and principles 2. Discussing phenomena using pictures and diagrams. 3. Diversity in lecturing method: • e-learning	1. Exams: • Online Quizzes • mid-term exam • Oral exams • Final exams 2.Discussions with the students
1.2	Explain nuclear fission		
1.3	Explain nuclear fusion		
1.4	Explain the direct and compound nuclear reactions.		
2.0	**Cognitive Skills**		
2.1	-can write types of reactions and conservation laws. -can write energies of observable products -can express the threshold energy. -can express reaction cross section	1. Define duties for each chapter. 2. Homework assignments. 3. Encourage the student to look for the information in different references. 4. Ask the student to attend lectures and work out to solving problem.	1. Exams of various kinds 2. Writing reports on selected parts of the course. Discussions of how to simplify or analyze some phenomena.
2.2	-can write characteristics of fusion -can state activation and excitation energies -can tell basic elements of nuclear reactor		
2.3	-can state basic fusion processes -can write characteristics of fusion -can write cycles in solar fusion -can express the basic principles and laws on criterion -can write basic heating methods of plasma		
3.0	**Interpersonal Skills & Responsibility**		

	1. Ability to take responsibility and take the course instructions seriously. 2. Be able to analyze scientific problems in general and participate in discussion about different ways to address and solve problems. 3. Respect other opinions. 4. Ability to motivate and encourage others, and help a team achieve success.	1. Learn how to cover missed lectures. 2. Learn how to summarize lectures or to collect materials of the course. 3. Learn how to solve difficulties in learning: solving problems and enhance educational skills.	**1.** Discussion. **2.** The accuracy of the result gained by each group will indicate the good group work. 3. Presenting the required research on time and the degree of the quality will show the sense of responsibility.
4.0	**Communication, Information Technology, Numerical**		
	1. Demonstrate understanding and respect for scientific values like openness, precision and reliability 2. Problem solving 3. Data analysis and interpretation 4. Ability to listen to others, communicate, motivate the team, and resolve any conflicts that may come up.	1. Encourage the student to ask for help if needed. 2. Focusing on some real results and its physical meaning.	1. Homework, problem solutions, assignment and. 2.Comments on some resulting numbers
5.0	**Psychomotor(if any)**		
5.1	**NA**		

5. Assessment Task Schedule 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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	In-Class Problem Solving	7th,13th week	10%
4	Midterm 1	6th week	15%
5	Midterm 2	10th week	15%
6	Final Exam	16th week	50%
	The Total		100%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week) 1. - Allocate academic advisor for each student 2. Allocate the contact hours in each teacher's schedule 3. Declaration of teacher's schedule

E Learning Resources

1. List Required Textbooks 1. Kenneth S. Krane , Introductory nuclear Physics, first edition, Jone Wily & Sons Inc. (2008) ISBN 0 - 471-80553-X . 2. Hans Paetz gen. Schieck, "Nuclear Reactions: An Introduction (Lecture Notes in Physics) 2014th Edition" ISBN-13: 978-3642539855. 3. C.A. Bertulani , P. Danielewicz , "Introduction to Nuclear Reactions (Graduate Student Series in Physics) 1st Edition" (2004) ISBN-13: 978-0750309325. 4. Karlheinz Langanke, J.A. Maruhn , S.E. Koonin , "Computational Nuclear Physics 2: Nuclear Reactions " (1993) ISBN-13: 978-0387979540.
1. List Essential References Materials (Journals, Reports, etc.) - Edmund Storms, The Explanation of Low Energy Nuclear Reaction: An Examination of the Relationship Between Observation and Explanation (2014) ISBN 978-1-892925-10-7 . -Ian J. Thompson, Filomena M. Nunes , "Nuclear Reactions for Astrophysics: Principles, Calculation and Applications of Low-Energy Reactions", ISBN-13: 978-0849385483 (2009)
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. 1. Power points (use e-learning gate of Umm Al-Qura university 2. Youtube videos(use e-learning gate of Umm Al-Qura university)

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.) • Lecture rooms must be around 20 students. • Library • Boards • Suitable lightening system • Fiber optic networks and wireless • Air condition units • Computers
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computer Lab for Physics students. • Providing numbers of computers for students

- Updating the computer programs each year

2. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

- Checked later if needed

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching

- Course reports
- Course evaluation

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

- Revision of student answer paper by another staff member.
- Analysis the grades of students.

3. Procedures for Teaching Development

- Preparing the course as PPT.
- Using scientific flash and movies.
- Annual updating of course content

4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)

- The course should be developed periodically to ensure that it contains the latest developments in the field of study.
- Development could be put as an objective in the report of the course to be achieved each semester

4. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

1- The following points may help to get the course effectiveness
   - Student evaluation
   - Course report
   - Program report
   - Program Self study
   - E-learning
2- According to point 1 the plan of improvement should be given.
3- Contact the college to evaluate the course and the benefit it add to other courses.

Add some subject and cut off others depending on the new discoveries in physics.

Name of Course Instructor: Khaled Abdel-Waged

Signature: _____ **Date Completed:** _____

Program Coordinator: Khaled Abdel-Waged

Signature: _____ **Date Received:** _____

Course Title: Quantum Field Theory

Course Code: 403642-3

(N-3)

Date: 2018-7-10	**Institution:** Umm Al-Qura University
College: Faculty of Applied Science	**Department:** Physics

A. Course Identification and General Information

1. Course title and code: **Quantum Field Theory (403642-3)**
2. Credit hours: **3 hrs**
3. Program(s) in which the course is offered.

   (If general elective available in many programs indicate this rather than list programs)

   M. Sc. Physics
4. Name of faculty member responsible for the course: **One of the academic staff member**
5. Level/year at which this course is offered: **1st Year /1st Level**
6. Pre-requisites for this course (if any): **Quantum Mechanics B.Sc**
7. Co-requisites for this course (if any):--
8. Location if not on main campus: **Main and Al-Zaher campus**
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	✓	percentage?	100%
b. Blended (traditional and online)		percentage?	
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course The Course provides the basic physics and formalism of quantum field theory. In particular, this course will provide the students with the ability to understand the concept of relativistic quantum field theory and be full proficient in perturbation theory calculations of Feynman diagrams for different processes within QED.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field) • Review the course description frequently and rewrite it according to modern data. • Develop learning strategies to increase student understanding of physical phenomena. • Encourage the student to use massive open online courses (MOOCs). • Increased student understanding by mentioning the applications of physical principle

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
1. Electromagnetic Field • Particles and fields • Electromagnetic field in the absence of charges • Electric dipole interaction • Electromagnetic field in the presence of charges	**1**	**3**
2. Lagrangian Field theory • Relativistic notation • Classical Lagrangian and Hamiltonian equations. • Quantized Lagrangian field theory • Symmetries and conservation laws	**2**	**6**
3. Spin-0 Fields: The Klein Gordon Equation • The neutral Klein Gordon Field • The Charged Klein Gordon Field • The invariant commutation relation	**2**	**6**
4. Spin-1/2 Fields: The Dirac Equation • The Dirac equation • Canonical quantization of the Dirac Field • The Fermion propagator	**3**	**9**

5. Photons: Covariant theory • The classical fields • Covariant quantization • The photon propagator	**2**	**6**
6. The S-matrix expansion • Natural dimensions and units • The S-matrix expansion • Wick's theorem	**2**	**6**
7. Feynman diagrams and rules in QED • Feynman Diagrams in configuration space • Feynman Diagrams in momentum space • Feynman rules for the S-Matrix • Feynman rules for QED	**3**	**9**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45 hrs	45 hrs				90 hrs
	Actual	45 hrs	45 hrs				90 hrs
Credit	Planned	45 hrs	45 hrs				90 hrs
	Actual	45 hrs	45 hrs				90 hrs

3. Individual study/learning hours expected for students per week. **8**

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
	Upon successful completion of this course The student will be able to: **1.** Recognize the basic formalism of quantum field theory. **2.** Describe the calculations of electromagnetic interactions by Feynman diagrams. **3.** Reproduce the calculations in terms of field quantization. **4.** Describe the quantization of relativistic particles of spin ½ and Klein and Dirac field Equation and its relation to non-relativistic quantum mechanics	**4.** using the achieved applications to Demonstrating the basic information and principles **5.** Discussing phenomena using pictures and diagrams. **6.** Diversity in lecturing method: • Blackboard • Power point • e-learning	2. Exams: • Online Quizzes • mid-term exam • Oral exams • Final exams 3. Discussions with the students.
2.0	**Cognitive Skills**		
	Upon successful completion of this course The student will be able to: **1.** Quantize the electromagnetic field by Fourier analyzing the classical field in the absence and presence of charges. **2.** Impose harmonic oscillator commutation relations. **3.** Learn the interaction occurring via the electric dipole moment of the system of charges. **4.** Calculate the transition probability per unit time between initial and final states. **5.** Quantize the system of moving charges in an electromagnetic field. **6.** Illustrate the application of the theory for radiative transition and Thomson scattering. **7.** Identify relativistic notations. **8.** Develop the classical Lagrangian field theory. **9.** Quantize the Lagrangian field theory	**5.** Preparing main outlines for teaching. **6.** Asking about physical laws previously taught and Following some proofs **7.** Define duties for each chapter. **8.** Homework assignments. **9.** Encourage the student to look for the information in different references. **10.** Ask the student to attend lectures and work out to solving problem. **11.** clearing the misunderstanding of some mathematical principle by discussing with the student	**3.** Exams of various kinds **4.** Writing reports on selected parts of the course. **5.** Discussions of how to simplify or analyze some phenomena.

	10. Introduce all symmetry properties and the conservation energy which contained in the Lagrangian density. **11.** Describe spin-0 particle by real and complex klein-Gordon equation. **12.** Analyze the field operator by Fourier analysis. **13.** derive Absorption and creation operator and impose its commutation relations **14.** Identify the normal product (normal ordering of operators) **15.** Illustrate the covariance of the commutation relations by calculating the commutator for two arbitrary space-time points. **16.** Apply canonical quantization formalism to relativistic material particles of spin 1/2 (Dirac equation). **17.** Conclude the anti-commutation relation between absorption and creation operator. **18.** Derive the number representation for fermions. **19.** Interpret and derive the fermion propagator **20.** Develop a covariant theory from an covariant formulation of classical electrodynamics. **21.** Apply the canonical formalism to quantize the free electromagnetic field. **22.** Interpret and derive the photon propagator. **23.** Introduce the natural dimensions and units. **24.** Derive the S-matrix expansion by study the equation of motion of the interacting fields in the interaction picture. **25.** Apply the wicks theorem to obtain the transition amplitude for a particular transition. **26.** Introduce the transition amplitude from the S-matrix expansion in a given order of perturbation theory.		

	27. Evaluate the transition amplitude in momentum space. **28.** Interpret the terms in the Wick expansion as Feynman diagram. **29.** Summarize the terms and diagrams as Feynman rules. **30.** Write down transition amplitudes directly from Wicks theorem. **31.** Apply the Feynman rules for QED.		
3.0	**Interpersonal Skills & Responsibility**		
	1. Ability to take responsibility and take the course instructions seriously. 2. The ability to be an effective member of the working group and communicate clearly. 3. Be able to analyze scientific problems in general and participate in discussion about different ways to address and solve problems. 4. Demonstrate understanding and respect for scientific values like openness, precision and reliability.	4. Working in small groups. 5. Learn how to search the internet and use the library. 6. Learn how to cover missed lectures. 7. Learn how to summarize lectures or to collect materials of the course. 8. Learn how to solve difficulties in learning: solving problems and enhance educational skills. 9. Develop the interest in Science through :(lab work, field trips). 10. Encourage the student to attend lectures regularly 11. Give students' tasks of duties	**3.** Discussion. **4.** The accuracy of the result gained by each group will indicate the good group work. **5.** Presenting the required research on time and the degree of the quality will show the sense of responsibility.
4.0	**Communication, Information Technology, Numerical**		
	5. Give good written and oral presentation of scientific topics and results. 6. Communicate scientific problems, analyses and conclusions within particle physics, both to specialists and the general public 7. Ability to listen to others, communicate, motivate the team, and resolve any conflicts that may come up.	3. Use the web for research. 4. Discuss with the student. 5. Exams to measure the numerical skill. 6. Encourage the student to ask for help if needed. 7. Focusing on some real results and its physical meaning. 8. Lectures for Computational analysis and data representation	2. Their interaction with the lectures and discussions. 3. The reports of different asked tasks. 4. Homework, problem solutions, assignment and exam should focus on the

		9. Encourage the student to ask good questions to help solve the problem. 10. Display the lecture note and homework assignment on the web. 11. Working in small groups.	understanding the results of computations and analysis. 5. Comments on some resulting numbers. 6. Research.
5.0	**Psychomotor(if any): NA**		

5. Assessment Task Schedule 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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	In-Class Problem Solving	7th,13th week	10%
4	Midterm 1	6th week	15%
5	Midterm 2	10th week	15%
6	Final Exam	16th week	50%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

4. Allocate academic advisor for each student
5. Allocate the contact hours in each teacher's schedule
6. Declaration of teacher's schedule

E Learning Resources

1. List Required Textbooks

- Graham Shaw and Franz Mandl, Quantum Field theory, John Wiley and Sons (2016), **ISBN-13:** 978-8126565061

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

- Bipin R. Desai, Quantum Mechanics with basic field theory (2010) Cambridge university press, ISBN 978-0-521-87760-2
- Andrei Smilga, Quantum Field Theory for the Gifted Amateur (2015) ISBN-13: 978-0199699339.
- Andrei Smilga Digestible Quantum Field Theory 1st ed. (2017) Edition" ISBN-13: 978-3319599205.
- Hagen Kleinert, "Particles and Quantum Fields ", (2016) ISBN-13: 978-9814740906 .

• Eberhard Zeidler , Quantum Field Theory I: Basics in Mathematics and Physics: A Bridge between Mathematicians and Physicists 2nd printing 2009. ISBN-13: 978-3540347620.
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.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Lecture room for 30 students. • Library • Classroom • Student Lounge • Computer lab
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computer room. • data show • High speed network connection
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Procedures

Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Questionaries' (using of e-learning gate of Umm Al-Qura university) • Online Quizzes (using of e-learning gate of Umm Al-Qura university) • Open discussion (using of e-learning gate of Umm Al-Qura university)
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • At the end of term, Students fill an evaluation Sheet (without names). • Analysis the grades of students.
3. Procedures for Teaching Development • Strategies are modified each term according to the student feedback • Periodical revision of course content.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) After the agreement of Department and Faculty administrations • 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.

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

4- The following points may help to get the course effectiveness
   - Student evaluation
   - Course report
   - Program report
   - Program Self study

5- According to point 1 the plan of improvement should be given.

6- Contact the college to evaluate the course and the benefit it add to other courses.

Add some subject and cut off others depending on the new discoveries in physics

Name of Course Instructor: Nuha Felemban

Signature: _____ Date Completed: _____

Program Coordinator: Khaled Abdel-Waged

Signature: _____ Date Received: _____

Course Title: **High Energy Physics**

Course Code: **403639-3**

(N-4)

Date: 20....-.....-.....	**Institution:** UMM AL –QURA UNIVERSITY
College: Faculty of Applied Science	**Department:** Physics

A. Course Identification and General Information

1. Course title and code: **High Energy Physics (403639-3)**		
2. Credit hours: **3hrs**		
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) **M.Sc. in Physics**		
4. Name of faculty member responsible for the course: **One of the academic staff member**		
5. Level/year at which this course is offered: **1st Year / Level 2**		
6. Pre-requisites for this course (if any): **Quantum Field (403642-3) (M.Sc)**		
7. Co-requisites for this course (if any):		
8. Location if not on main campus: **Main and Al-Zaher campus**		
9. Mode of Instruction (mark all that apply):		
a. Traditional classroom	✓ percentage?	80 %
b. Blended (traditional and online)	☐ percentage?	☐
c. E-learning	✓ percentage?	20%
d. Correspondence	☐ percentage?	☐
f. Other	☐ percentage?	☐

Comments: Tutorial Videos (plus a question library) are created by one of the Faculty members (Prof. Khaled Abdel-Waged) which covers Chapters 1 of the course. The online teaching is installed on the E-Learning Gate of Umm Al-Qura University.

B Objectives

1. The main objective of this course

This course aims to use the tools of quantum field theory to solve fundamental problems in elementary particle physics. In other words, the main goal is to guess a set of force laws, within the context of quantum field theory, to correctly describe the particle behavior. This course together with quantum field theory (**403505-3**) prepares the student with the background for research in elementary particle physics, in terms of M.Sc. thesis.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

- Review the course description frequently and rewrite it according to modern data.
- Develop learning strategies to increase student understanding of physical phenomena.
- Encourage the student to use massive open online courses (MOOCs).
- Increased student understanding by mentioning the applications of physical principle

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
1. Relativistic Kinematics • Lorentz transformation • Four vectors • Energy and momentum • Collisions • Examples and applications	2	6
2. Symmetries and invariance principles • Conservation laws • Spin and angular momentum • Flavor symmetries • Parity • Charge conjugation, CP violation, TCP theorem.	4	12
3. Feynman calculus • Life times and cross sections • The Golden rule • Toy theory • Scattering • Higher order diagrams	4	12

4. Quantum Electrodynamics • Dirac Equation • Solutions to Dirac Equation • Bilinear Covariant • The Photon • Feynman rules for QED • Cross sections and lifetimes	5	15

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45 hrs	45 hrs				90 hrs
	Actual	45 hrs	45 hrs				90 hrs
Credit	Planned	45 hrs	45 hrs				90 hrs
	Actual	45hrs	45hrs				90 hrs

3. Individual study/learning hours expected for students per week. **8**

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		

1.1	**Upon successful completion of this course The student will be able to:** 1. Classify various kinds of elementary particles, their properties such as mass, electric charge, spin, etc. 2. Determine the interaction laws of these elementary particles from scattering events, decays and bound systems. 3. Underline Feynman calculus to calculate cross sections and decay rates. 4. Understand the models and theories which explain the particle behaviour. 5. Describe the elementary particles dynamics. 6. Recognize the mathematical description of symmetry and the relation between symmetry and conservation laws (Nether's theorem) 7. Define the discrete symmetries (parity, charge conjugate and time reversal)	1. Demonstrating the basic information and principles through lectures and the achieved applications 2. Discussing phenomena with illustrating pictures and diagrams 3. Lecturing method: • E-learning gate of Umm Al-Qura university • Power point • Tutorials • Revisit concepts • Discussions • Brain storming sessions 4. Learn the student background of the subject.	4. Exams: • Online Quizzes • mid-term exam • Oral exams • Final exams 5. Discussions with the students. 6. Ask the student to clear the misunderstanding of some mathematical principle. 7. Ask quality question.
2.0	**Cognitive Skills**		
2.1	**Upon successful completion of this course The student will be able to:** 1. Analyse and explain natural phenomena. 2. Apply Lorentz transformation between two systems 3. Introduce and apply the position-time (covariant and contravariant) vector 4. Conclude the energy and momentum in relativistic domain 5. Apply conservation of energy and momentum in collisions 6. Describe the mathematical description of symmetry and the relation between symmetry and	1. Preparing main outlines for teaching 2. Following some proofs 3. Define duties for each chapter 4. Homework assignments 5. Encourage the student to look for the information in different references 6. Ask the student to attend lectures for practice solving problem 7. Ask the student to do small research 8. Explain the idea with the student own words.	1. Midterm's exam. Exams, short online 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

	conservation laws (Neither's theorem) 7. Learn rotational symmetry and its relation to angular momentum and spin 8. Calculate the total angular momenta (addition) for different system 9. Understand the discrete symmetries (parity, charge conjugate and time reversal) 10. Calculate decay rates and scattering cross section by using Golden rules 11. Sketch the Feynman diagram for any process 12. Determine the transition amplitude using the Feynman rules 13. Conclude and solve the Dirac equation 14. Illustrate how Dirac spinor transform under change inertial system 15. Calculate the wave function of photon 16. Calculate cross section and life time of scattering and annihilation	9. Show the best ways to deal with problem 5. Build a strategy to solve problem. • How to use physical laws and principles to understand the subject • How to simplify problems and analyze phenomena	
3.0	**Interpersonal Skills & Responsibility**		
3.1	1. Give good written and oral presentation of scientific topics and results. 2. The students learn independently and take up responsibility	1. Learn how to search the internet and use the library. 2. Learn how to cover missed lectures. 3. Learn how to summarize lectures or to collect materials of the course. 4. Learn how to solve difficulties in learning: solving problems and enhance educational skills. 5. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.	1. Online Quizzes on the previous lecture 2. Creating reports 3. Discussion 4. The accuracy of the result gained by each group will indicate good group work 5. Presenting the required research on time and the degree of the quality will show the sense of responsibility.

		6. Encourage the student to attend lectures regularly. 7. Give students tasks of duties	
4.0	**Communication, Information Technology, Numerical**		
4.1	1. Communicate scientific problems, analyses and conclusions within particle physics, both to specialists and the general public. 2. Problem solving 3. Data analysis and interpretation. 4. Feeling physical reality of results	1. Know the basic physical principles. 2. Use the web for research. 3. Discuss with the student. 4. Clear the weakness point that should be eliminated. 5. Encourage the student to ask for help if needed. 6. Focusing on some real results and its physical meaning. 7. Lectures for Computational analysis and data representation 8. Encourage the student to ask good question to help solve the problem. 9. Display the lecture note and homework assignment at the web.	1. Online quizzes 2. Interaction the student with the lectures and discussions. 3. The reports of different asked tasks. 4. Homework problem solutions assignment and exam should focus on the understanding the results of computations and analysis. 5. Comments on some resulting numbers. 6. Research.
5.0	**Psychomotor(if any)**		
5.1			

5. Assessment Task Schedule 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	Online quizzes	every week	5 %
2	Homework	Every week	10 %
3	Midterm 1	7th week	15 %
4	Midterm 2	14th week	15 %

5	Interactive discussions	Every week	5 %
6	Final exam	End of semester	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

7. Allocate academic advisor for each student
8. Allocate the contact hours in each teacher's schedule
9. Declaration of teacher's schedule

E Learning Resources

1. List Required Textbooks

1. David Griffiths, Introduction to elementary particles (2008) Wiley-VCH Verlag GmbH and Co. K GaA, Weinheim, ISBN-13: 978-3527406012.
2. Robert Purdy, "Particle Physics: An Introduction (Essentials of Physics Series)", (2018) ISBN-13: 978-1683921424.
3. Brian R. Martin and Graham Shaw, "Particle Physics (Manchester Physics Series) 4th Edition" (2017) ISBN-13: 978-1118912164.
4. Francis Halzen and Alan D. Martin, Quarks and Leptons: an introductory course in modern particle physics (2008) John Wiley and Sons, Inc. **ISBN-13:** 978-8126516568

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.

- Power points (use e-learning gate of Umm Al-Qura university)
- Youtube videos(use e-learning gate of Umm Al-Qura university)

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 is already provided with data show.
- Classroom
- Library
- Student Lounge
- Computer lab

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

- Providing class rooms with computers and labs with data show.

• High speed network connection
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Questionaries' (using of e-learning gate of Umm Al-Qura university) • Online Quizzes (using of e-learning gate of Umm Al-Qura university) • Open discussion (using of e-learning gate of Umm Al-Qura university)
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • At the end of term, Students fill an evaluation Sheet (without names). • Analysis the grades of students.
3. Procedures for Teaching Development • Strategies are modified each term according to the student feedback • Periodical revision of course content.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) After the agreement of Department and Faculty administrations • 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.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. 1. The following points may help to get the course effectiveness • Student evaluation • Course report • Program report • Program Self study • E-learning 2. According to point 1 the plan of improvement should be given.

Name of Course Instructor: Nuha Felemban

Signature: _____ Date Completed: _____

Program Coordinator: Khaled Abdel-Waged

Signature: _____ Date Received: _____

Course Title: Detector Physics

Course Code: 403641-3

(N-5)

Date: 27-1-1440....-	**Institution: UM AL – QURA UNIVERSITY**.
College: Faculty of Applied Science	**Department:** . **Physics** .

A. Course Identification and General Information

1. Course title and code: **Detector physics 403641-3**		
2. Credit hours: **3hrs**		
3. Program(s) in which the course is offered. **M.Sc. in 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: **1st year/ 2nd level**		
6. Pre-requisites for this course (if any):): Introduction to Nuclear and High Energy Physics (**403638**)		
7. Co-requisites for this course (if any): --		
8. Location if not on main campus: **Main campus**		
9. Mode of Instruction (mark all that apply):		
a. Traditional classroom	**√** percentage?	**75**
b. Blended (traditional and online)	**√** percentage?	**15**
c. E-learning	**√** percentage?	**10**
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course The goal of the course is to convey an understanding of how detectors in particle physics, heavy-ion physics work.

Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field) -Encourage the student to use massive open online courses (MOOCs). -Increased student understanding by mentioning the applications of physical principle

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

2. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
1- Interactions of electrons and charged heavy particles in matter - Cross section, mean free path, surface density units. - Bohr's calculations - The Bethe-Bloch formulae - Energy dependence -Scaling law for dE/dx -Mass stopping power -Limitations on the Bethe-Bloch Formula and other effects. - Channeling -Range	**3**	**9**
2- Counting statistics and error prediction		

-Characterization of data -Statistical models -Applications of statistical models -Error propagation -Optimization of counting experiments -Limits of detectability -Distribution of time intervals	3	9
3- Radiation detectors		
-Simplified detector model -Modes of detector operation -Pulse Height spectra -Counting curves and plateaus -Energy resolution -Detection efficiency -Dead time	2.5	7.5
4- Ionization Detectors		
-Gaseous ionization detectors -Ionization and transport phenomena in Gases -Transport of electrons and ion in Gases -Proportional counter -Drift chamber -Liquid ionization detectors	2.5	7.5
5-Gamma ray detectors		
-The Photon-cathode -Photomultiplier tube characteristics -Scintillation pulse shape analysis - Germanium detector configurations	2	6
6-Neutron detection		

-Nuclear reactions of interest in neutron detection - Detectors based on boron reaction - counters based on neutron moderation - Detectors based on fast neutron induced reactions	**2**	**6**
Total	**15**	**45**

Lecture : 45 hrs	**Tutorial:**	**Lab:**	**Total: 45 hrs**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45 hrs	45 hrs				90 hrs
	Actual	45 hrs	45 hrs				90 hrs
Credit	Planned	45 hrs	45 hrs				90 hrs
	Actual	45 hrs	45 hrs				90 hrs

3. Individual study/learning hours expected for students per week. **8**

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code	NQF Learning Domains	Course Teaching	Course Assessment

#	And Course Learning Outcomes	Strategies	Methods
1.0	**Knowledge**		
	The student will know		
1.1	all basic interaction processes of electrons, heavy charged particles and photons in matter and electromagnetic fields.	1.Demonstrate the basic information and principles 2.Diversity in lecturing method: • Blackboard • Power point • e-learning	Exams: • Online Quizzes • mid-term exam • Oral exams • Final exams -Discussions with the students
1.2	which experimental technique is best for measuring a specific particle property		
1.4	the statistical analysis required to process the results of nuclear experiments.		
2.0	**Cognitive Skills**		
2.1	will have sufficient background to read detector papers.	-Define duties for each chapter. -Homework assignments. -Encourage the student to look for the information in different references.	-Writing reports on selected parts of the course. -Discussions
2.2	will have sufficient background to understand how most detectors in nuclear physics work.		
2.3	will have sufficient background to understand how most detectors in particle physics work.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	-Be able to analyze scientific problems in general and participate in discussion about different ways to address and solve problems -The ability to be an effective member of the working group and communicate clearly. -Ability to motivate and encourage others, and help a team achieve success.	-Working in small groups. -Learn how to search the internet and use the library. -Learn how to summarize lectures or to collect materials of the course. -Develop the interest in Science through : (lab work, field trips).	-Discussion. -Presenting the required research on time and the degree of the quality will show the sense of responsibility.
4.0	**Communication, Information Technology, Numerical**		
	-Be able to reflect over central scientific problems in his/her own work and other people's work. -Problem solving -Data analysis and interpretation	-Exams to measure the numerical skill. -Focusing on some real results and its physical meaning.	-Their interaction with the lectures and discussions. -The reports of different asked tasks.

	-Ability to listen to others, communicate, motivate the team, and resolve any conflicts that may come up.	-Display the lecture note and homework assignment on the web. -Working in small groups.	-Comments on some resulting numbers. -Research Project
5.0	**Psychomotor(if any)**		
5.1	**NA**		

5. Assessment Task Schedule 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	Exercises & Home works+ quizzes	All weeks	5%
1	Assay	15th week	5%
3	Report	All weeks	20 %
4	Written Test (1)	6th week	10%
5	Written Test (1)	11th week	10%
6	Final examination	16th week	50%
	The Total		100%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

-Three contact hours/week.

-Four office hours/week.

E Learning Resources

1. List Required Textbooks

1. William R. Leo, Techniques for nuclear and particle physics, Springer Verlag (1987) ISBN 3-540-17386-2 Springer Verlag Berlin Heidelbergy New York
2. Glenn F. Knoll, Radiation Detection and Measurement, John Wiley & Sons, Inc. (1999) ISBN 0-471-07338-5.
3. Stefaan Tavernier, Experimental Techniques in Nuclear and Particle Physics 2010th Edition, ISBN-13: 978-3642008283.

4. Lucio Cerrito , Radiation and Detectors: Introduction to the Physics of Radiation and Detection Devices (Graduate Texts in Physics) 1st ed. (2017) Edition, ISBN-13: 978-3319531793.
5. Claus Grupen and Boris Shwartz , Particle Detectors (Cambridge Monographs on Particle Physics, Nuclear Physics and Cosmology) 2nd Edition (2011) ISBN-13: 978-0521187954.
6. Olaf Behnke , Kevin Kroninger, Gregory Schott, Thomas Schorner-Sadenius , Data Analysis in High Energy Physics: A Practical Guide to Statistical Methods (2013) ISBN-13: 978-3527410583.

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

1. Journal :Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment.
2. Geoffrey G Eichholz and John W.Poston, Principles of Nuclear Radiation Detection, Ann Arbor Science Publishers (April 1, 1980) ISBN-13: 978-0250402632

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.

3. Power points (use e-learning gate of Umm Al-Qura university
4. Youtube videos(use e-learning gate of Umm Al-Qura university)

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.)

3. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- Lecture rooms must be around 20 students.
- Library
- Boards
- Suitable lightening system
- Air condition units
- Computers

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

- Computer Lab for Physics students.
- Providing numbers of computers for students
- Updating the computer programs each year

4. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

- Checked later if needed

G Course Evaluation and Improvement Procedures

5. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching

- Course reports
- Course evaluation

6. Other Strategies for Evaluation of Teaching by the Instructor or the Department

- Revision of student answer paper by another staff member.

- Analysis the grades of students.

7. Procedures for Teaching Development

- Preparing the course as PPT.
- Using scientific flash and movies.
- Annual updating of course content

4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)

- The course should be developed periodically to ensure that it contains the latest developments in the field of study.
- Development could be put as an objective in the report of the course to be achieved each semester

8. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

7- The following points may help to get the course effectiveness
   - Student evaluation
   - Course report
   - Program report
   - Program Self study

8- According to point 1 the plan of improvement should be given.

9- Contact the college to evaluate the course and the benefit it add to other courses.

Name of Course Instructor: Walid Altaf

Signature: _____ **Date Completed:** _____

Program Coordinator: Khaled Abdel-Waged

Signature: _____ **Date Received:** _____

Material Science track

Course Title: Solid State Physics

Course Code: **403662-3.**

(M-1)

Date: 20....-.....-.....	**Institution:** UMM AL – QURA UNIVERSITY.
College: Faculty of Applied Science.	**Department:** of physics.

A. Course Identification and General Information

1. Course title and code: Condensed Matter Physics and **403662-3.**		
2. Credit hours: 3 h.		
3. Program(s) in which the course is offered. **M.Sc. 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: **1st Year / Level 1**		
6. Pre-requisites for this course (if any):		
7. Co-requisites for this course (if any):		
8. Location if not on main campus: **Main campus**		
9. Mode of Instruction (mark all that apply):		
a. Traditional classroom	✓ percentage?	75
b. Blended (traditional and online)	✓ percentage?	15
c. E-learning	✓ percentage?	10
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course

- To explain the basic concepts of the structures in solids and physical properties of crystalline substances by using XRD.
- To review on the electron theories in solid state material and its role in physical properties such as: electrical, thermal, magnetic and dielectrics and semiconducting …
- To study the physical properties of non-crystalline material (conduction mechanisms and optical properties).
- To use physical models to achieve calculations of the properties of solids.
- To study the transport phenomena and theory in sold state materials.
- To study the phase diagram of materials and alloys.
- To study the science of some solid materials such as glasses, polymers, semiconductors…
- To understand the various electric field and magnetism related concepts of condensed matter physics.
- To enhance the knowledge in understanding advanced topics such as superconductivity.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field).

This course and its contents are designed to obey most current learning theories arising from learning and cognitive sciences as well as the teaching strategy outlined in this course. Any development will be made by qualified faculty members that teaching this course based on their assessment of the skills and needs of their students and the techniques.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

The course gives the mathematical treatment of the basic properties of the condensed materials especially in solids. The structure of materials is the main factor which controls the physical properties, such as thermal, electrical, optical, magnetic, dielectric etc. In this course we will learn the structure as well as physical properties of some materials such as glasses, polymers and semiconducting materials.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**

Lattice Vibrations and Thermal Properties:: Vibrations of monatomic and diatomic lattices - acoustic and optical modes - Quantization of lattice vibrations - Phonon Momentum - Inelastic scattering of neutrons by phonons. Lattice Heat Capacity - Einstein model, Density of modes in one and three dimensions -Debye model of lattice heat capacity – Debye's T3 law -Anharmonic crystal Interactions - Thermal Expansion - Thermal conductivity.	3	9
Band Theory: Energy levels and density of orbitals in one dimension - Free electron gas in three dimensions - Heat capacity of the electron gas - Electrical conductivity and Ohm's law - Motion in magnetic fields - Hall effect-Thermal conductivity of metals - Wiedemann-Franz law - Nearly free electron model- Wave equation of electron in a periodic potential - Number of orbitals in a band - Construction of Fermi Surfaces -Calculation of Energy Bands -Experimental methods in Fermi surface studies.	3	9
Transport Phenomena in solid materials: **DIFFUSION AND DRIFT:** Flux of particles. Fick's equation. -Time-dependent case. Solutions of the diffusion equation (or Fick's second law) . Thin layer or instantaneous source. The Boltzmann transformation. Relation between drift and diffusion. The Nernst-Einstein equation. Diffusion with phase change. Multiphase diffusion. The nature of the driving force. A variety of diffusion processes and generalization of Fick's law **DIFFUSION MECHANISMS AND CORRELATION EFFECTS** Mechanisms of diffusion. Direct interchange. Mechanisms involving point defects. Definition of the correlation factor. The encounter model. A simple simulation of self-diffusion and electro migration. Methods of calculating the correlation factor. Types of correlation factors. Dynamic correlations. Physical correlation. Meaning of the physical correlation factor. Compounds with a high concentration of defects. The potential-barrier model. Some simple applications of the potential-barrier model **SOLUTE DIFFUSION IN PURE MATERIALS. DIFFUSION IN ALLOYS** Solute diffusion at infinite dilution**.** Interstitial solid solutions Ionic crystals**.** Semiconductors Dilute alloys Diffusion in homogeneous concentrated alloys Superionic conductors Amorphous materials .	3	9
Non-crystalline solid materials Introduction to non-crystalline and amorphous materials (polymers, glasses, etc.) -Structure and chemistry of amorphous and non-crystalline materials: molecular structure of polymers; polarization and defects; thermoplastic and thermosetting polymers; crystallinity and elastomers -Glass: formation, structure and transition temperature, -Thermodynamics of glass formation; kinetics of glass formation -Properties of amorphous and non-crystalline materials: mechanical, electrical, thermal, dielectric, and optical	3	9

Phase diagrams: Basic concept. Phase and phase equilibrium Phase structures in solids Phase transitions and classification Single component phase diagram and solidification of pure crystals. Phase rule and phase equilibrium conditions Liquid structure, cooling curve Pure metal crystallization conditions Binary phase diagram and solidification of its alloy The conditions of phase equilibrium, the application of the phase rule. Lever law and its application Crystallization and nucleation conditions of solid solution alloys Types of phase diagram. Phase change kinetics Phase transformation process Phase change kinetics. Ternary phase diagrams Basis of ternary phase diagrams. Types of ternary phase diagrams Method for determination of phase diagram	3	9
	15 weeks	45 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45 hrs	45 hrs	----------	---------	-------	90 hrs
	Actual	45 hrs	45 hrs				90 hrs
Credit	Planned	45 hrs	45 hrs				90 hrs
	Actual	45 hrs	45 hrs				90 hrs

3. Individual study/learning hours expected for students per week. 8hrs

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

The aim of this course is to provide students with fundamental of the solid state physics. After completion of the course the students should be able to :

understand of the basic concepts on properties of materials in solid state physics.

use the physical models to perform calculations of the properties of solids,

give an general idea of an application related to the physical phenomena treated in the course.

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 targeted learning outcomes. **Third**, insert appropriate

assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Define crystal structures of solids, crystal binding and lattice dynamics.	-Solve problems -Explain key concepts; -Provide numerical examples	-Midterm exams -Homework and Activities -Quizzes
1.2	Express the problem of electrons in a periodic potential, examine its consequence on the band-structure of solids.		
1.3	Explain the behaviour of solid matters by solid state theory, principles and used mathematical methods to solve physics problems..		
1.4	Describe the electronic properties of conductors, insulators, semiconductors and the interfaces between materials (metal/semiconductor).		
1.5	Describe the details of magnetism and superconductivity.		
2.0	**Cognitive Skills**		
2.1	Understand the structure of crystalline solid materials, and dynamics of electrons in solids.	-Asking questions during lectures. -Discussion	-Exam must contain questions that can measure these skills.
2.2	Theoretical descriptions of crystal and electronic structure, lattice, electrical and optical properties of different materials (metals, semiconductors, dielectrics, magnetic materials and superconductors) based on classical and quantum physics		
2.3	Get familiar with basic mathematical models of solid state and data analysis.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	The ability to hard work independently and with groups.	Small group discussion.	
4.0	**Communication, Information Technology, Numerical**		

4.1	know how to use computer codes in solid state physics.	. -Seminars. Presentation.	.
5.0	**Psychomotor(if any)**		
5.1	Not applicable.	Not applicable.	Not applicable.

5. Assessment Task Schedule 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	Midterm 1	5th week	15 %
2	Midterm 2	10th week	15 %
3	quizzes	During the semester	10%
4	Home works	During the semester	10%
5	Final exam	15th week	50%
6	Total		100 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

E Learning Resources

1. List Required Textbooks

-Kittel, C., Introduction to Solid State Physics, John Willey, (2007).

-H. Ibach, H. Luth "Solid-state physics : an introduction to theory and experiment" spring verlag 1991

-J.R. Hook, H.E. Hall "Solid state physics" 2nd edition 1995 Kindle Edition.

-Atom Movements—Diffusion and Mass Transport in Solids .J.Philibert , 2012 Publisher: EDP Sciences

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

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

.Electronic Materials, Web Sites etc.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. **The student used any Mathematical program, Maple, Matlab, to draw and solve the problems.**

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.) The area of class room is suitable concerning the number of enrolled students (30) and air conditioned.
2. Technology resources (AV, data show, Smart Board, software, etc.) • Computer Lab..
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • Questionnaires • Open discussion in the class room at the end of the lectures
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Revision of student answer paper by another staff member. • Analysis the grades of students.
3. Procedures for Teaching Development • Course report. • Program report and Program self-study and a tutorial lecture
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) • After the agreement of Department and Faculty administrations
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. • Periodical revision by Quality Assurance Units in the Department and institution

Name of Course Instructor: Dr. Ahmad Al Hadi_____

Signature: _____ Date Completed: _____

Program Coordinator: _____Prof. Adel Madani_____

Signature: _____ Date Received: _____

Course Title: **Advanced Crystallography**

Course Code: **403664-3**

(M-2)

Date: 20 .....-.....-....	**Institution: Umm Al-Qura University**
College: Applied Science	**Department : Physics**

A. Course Identification and General Information

1. Course title and code: **Advanced crystallography**
2. Credit hours: **3h**
3. Program(s) in which the course is offered. **M. Sc. Physics** (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course
5. Level/year at which this course is offered: **1st Level/1st Year**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any):
8. Location if not on main campus: **Main campus and Al-Zaher Branch**
9. Mode of Instruction (mark all that apply): a. Traditional classroom [√] percentage? [90] b. Blended (traditional and online) [ ] percentage? [ ] c. E-learning [√] percentage? [10] d. Correspondence [ ] percentage? [ ] f. Other [ ] percentage? [ ] Comments:
Experimental demonstration will be done if necessary.

B Objectives

The main objective of this course is :

- To present the basic concepts needed to understand the crystal structure of materials.
- To study fundamental concepts including lattices, symmetries, point groups, space groups, and the relationship between crystal symmetries and physical properties will be addressed.
- To covered the theory of X-ray diffraction by crystalline matter along with the experimental x-ray methods used in order to determine the crystal structure of materials.
- To briefly discussed application of X-ray diffraction to advanced materials, electron diffraction and neutron diffraction.
- To provide to the students an overview on the most used experimental methods providing information on the structure of matter in all its forms: solids (crystalline and amorphous) liquid and gases; pure and composite materials; bulk and nanostructured materials.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

In this course we will:

- Define concepts such as lattice, point and space groups,

- Define Bragg's law and explain its relation to crystal structure

- Identify and describe different diffraction methods

- Interpret and assign X-ray and electron diffraction patterns

- Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field).

- Obtain knowledge on fundamentals of single crystal X-ray diffraction and advanced knowledge of practical steps in crystal structure determination.

- Use of crystallographic databases and crystallographic programs in the examination of modern materials: ceramics, alloys, cements, etc. Testing the relationships between crystallographic parameters and material properties.

- Use of modern crystallographic methods for the qualitative and quantitative determination of the composition of monophase and polyphase samples of various materials. Application of different programs and methods for calculating the parameters of the unit cell and microstructural parameters.

- Understand the symmetry in crystals (basic group theory, point and space groups, lattices); crystallographic computation (metrics, the reciprocal lattice, basis transformations and rotations, least squares, analysis of crystallographic results).

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
1 - Symmetry operations : **1.1.** Direct and reciprocal lattice, **1.2.** Rotation axis, inversion axis, glide planes, centrum of symmetry, **1.3.** International tables for Crystallography.	1	3
2 - Diffraction from Polycrystalline Samples and Determination of Crystal Structure : **2.1**. X-ray Diffractometer Essentials, Bragg's law, **2.2.** Estimation of X-ray Diffraction Intensity from a Polycrystalline Sample, **2.2.1**. Ewald construction, **2.2.2.** Structure Factor, **2.2.3.** Polarization Factor, **2.2.4.** Multiplicity Factor, **2.2.5.** Lorentz Factor, **2.2.6.** Absorption Factor, **2.2.7.** Temperature Factor.	2	6
3 - Factors affecting the intensity of diffraction: **3.1.** Absorption correction, **3.2.** Lorentz polarization correction, **3.3.** secondary extinction.	1	3
4 - Structure determination methods: **4.1.** Fourier transformation, **4.2.** Phase problem methods, **4.3.** Patterson synthesis, **4.4**. Direct methods.	1	3

5 - Crystal structure refinement: **5.1.** Model refinement of the crystal structure. **5.2.** Crystallographic software, disorder, modulated structure, error analysis **5.3.** Examples of structure refinement software (Rieldvelt , shelix ….)	2	6
6 - Crystallographic databases: **6.1** Cambridge structural database, statistical treatment of structural data.	1	3
7 - Analysis methods for powder: **7.1.** Quality, quantity, crystal structure from powder data **7.2.** Identification of an Unknown Sample by X-ray Diffraction (Hana Walt Method **7.3.** Determination of Lattice Parameter of a Polycrystalline Sample **7.4.** Quantitative Analysis of Powder Mixtures and determination of Crystalline Size and Lattice Strain **7.5.** Quantitative Determination of a Crystalline Substance in a Mixture **7.6.** Measurement of the Size of Crystal Grains and Heterogeneous Distortion	3	9
8. Reciprocal Lattice and Integrated Intensities of Crystals: **8.1.** Mathematical Definition of Reciprocal Lattice **8.2.** Intensity from Scattering by Electrons and Atoms **8.3** Neutron diffraction concept	1	3
9. Interpretation of the structural results: **9.1.** Interpretation and visualization of the crystal structure, **9.2.** Interpretation of publishes structural results.	1	3
10. single crystal structure refinement: **10.1.** Data collection of accurate structure factors for multipolar refinement. **10.2.** Quality of single crystal, data collection at low temperature, error analysis	1	3
11. Charge density analysis. AIM analysis: Relation of the experimental and theoretical electronic structure and their correlation to chemical and physico-chemical properties.	1	3
Total	15 weeks	45 h

2. Course components (total contact and credit hours per semester):						
	Lecture	**Tutorial**	**Laboratory/**	**Practical**	**Other**	**Total**

				Studio			
Contact Hours	Planned	45	45				
	Actual						
Credit	Planned	3	3				
	Actual						

3. Individual study/learning hours expected for students per week.	3h
2h office hours per week	

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

After successfully completing the course, the student is able to: Demonstrate knowledge of single crystal X-ray diffraction methods; experimentally perform diffraction experiment; determine and refine crystal structure; validate and interpret results of structural analysis; use Cambridge Structural Database.

Theoretical instruction: Geometry of X-ray diffraction. Braggs law. Reciprocal lattice and Evald construction. Relationship between electron density and structure factor. Four circle diffractometer. Diffraction data collection and reduction. Determination of crystal system, unit cell and space group. Solutions to the phase problem. Completing and refinement of crystal structure model. Interpretation of results. Absolute structure determination. Crystallographic information file. Crystallographic databanks. Presentation of results.

Practical instruction: Determination of crystal density. Selection and centering of crystalline specimen. Work on appropriate diffractometer. Use crystallographic programs form solution, refinement and validation of crystal structure models (Rieltveld and Shelx). Use of Cambridge Crystallographic Database. Presentation of the results.

Curriculum Map			
Code #	**NQF Learning Domains And Course Learning Outcomes**	**Course Teaching Strategies**	**Course Assessment Methods**
1.0	**Knowledge**		
1.1	Upon successful completion of this course The student will be able to: • **Describe** the theory of symmetry in crystals, crystallographic computations, X-ray diffraction, non-ideal crystals and tensor properties of solids. • **Apply** crystallographic computational methods on specific scientific questions including its implementation in software. • **Account** for the use of space groups, metrics, crystallographic computations in the description of crystal structures. • **Relate** basic crystallographic theory to given examples of crystal structure problems from literature. • **Reflect** over the connection between basic crystallographic theory and potential scientific uses. • **Give** a presentation of course material within the subject area. • **Discuss** selected literature in relation to the theory covered in the class • **Present** the above goals verbally and in writing in a scientifically clear and correct language	**1-** Demonstrating the basic information and principles through lectures and the achieved applications. **2 -** Discussing phenomena with illustrating pictures and diagrams. **3 -** Lecturing method: Blackboard Power point e-learning **4 -** Tutorials. **5 -** Revisit concepts. **6 -** Discussions. **7 -** Brain storming sessions. **8 -** Start each chapter by general idea and the benefit of it. **9 -** Learn the student background of the subject. **10 -** Show the best ways to deal with the problems. 11- Keep the question "why" or "how" to explain always there.	**1 -** Quizzes and Homework's 20% **2 -** Short exams (midterm exams) 30% 1- **3-** Long exam (final) 50%
1.2			
2.0	**Cognitive Skills**		
2.1	<u>After completing this course:</u>	- Preparing main outlines for teaching.	1) Midterm exam. Exams, short quizzes.

	The student will be: • familiar with the main aspects of the historical development of crystallography as a main method for structure determination. • able to discuss and interpret experiments that reveal the X-ray interaction with crystalline and amorphous materials. • Provide instruction on the methods and basis for determining low-molecular weight crystal structures using X-ray crystallography; • able to use crystallographic databases and crystallographic programs • able to identify crystalline phases • able to determine the content of particular crystal phases in the multiphase sample; • able to determine the microstructural parameters of each present phase; • able to determine the microstructural parameters of each present phase ; • able to determine the influence of thermodynamic, chemical and other parameters on the change in the structure and properties of the materials. • able to use Rietveld method and refine crystallographic parameters of known structures of examined crystalline phases. • able to interpret and understand assessment of the results of crystal structure analysis to be carried out; and to guide students through several actual analyses using the Fulproof or SHELX-program suite implemented on Pentium PC's. • Define, master, and interpret structure and symmetry system .	- Following some proofs. - Define duties for each chapter. - Homework assignments. - Encourage the student to look for the information in different references. - Ask the student to attend lectures for practice solving problem.	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			
3.0	**Interpersonal Skills & Responsibility**		
3.1	**At the end of the course, the student will be able to:** Work independently. The students learn independently and take up responsibility.	1- Learn how to search the internet and use the library. 2- Learn how to cover missed lectures. 3- Learn how to summarize lectures or to collect materials of the course. 4- Learn how to solve difficulties in learning: solving problems – enhance educational skills. 5 - Develop the interest in Science through : (lab work, field trips, ...). 6 - Encourage the student to attend lectures regularly by : - Giving bonus marks for attendance, - Assigning marks for attendance, - Give students' tasks of duties	1. Quizzes on the previous lecture. 2. Discussion. 3. The accuracy of the result gained by each group will indicate the good group work. 4. Presenting the required research on time and the degree of the quality will show the sense of responsibility. .
3.2			
4.0	**Communication, Information Technology, Numerical**		
4.1	**1.** Computation, **2.** Problem solving, **3.** Data analysis and interpretation.	1 - Know the basic mathematical principles and group theories. 2 - Use the web for research. 3 - Discuss with the student. 4 - Exams to measure the mathematical skill.	1. Their interaction with the lectures and discussions. 2. The reports of different asked tasks. 3.Homework, Problem solutions, assignment and exam should focus on the understanding.

		5 - Encourage the student to ask for help if needed. 6 - Computational analysis. 7 - Data representation. 8 - Focusing on some real results and its physical meaning. 9 - Lectures for problem solution. 10 - Encourage the student to ask good questions to help solve the problem. 11 - Display the lecture note and homework assignment on the web.	4. Results of computations and analysis. 5. Comments on some resulting numbers. 6. Research.
4.2			
5.0	**Psychomotor(if any) (NA)**		

5. Assessment Task Schedule 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	Exercises & Home works	All weeks	% 5
2	Participation	All weeks	% 5
3	In-Class Problem Solving	13th,7th week	10 %
4	Midterm 1	6th week	15 %
5	Midterm 2	12th week	15 %
6	Final Exam	16th week	50 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week). Each student will supervise by an academic adviser in the physics department and the time table for academic advice were given to the student each semester. (4 hrs office hours).

E Learning Resources

1. List Required Textbooks: 1.1 C. Giacovazzo et al. : Fundamentals of Crystallography, latest edition, Oxford University Press. ISBN-13: 978-0198509585
2. List Essential References Materials (Journals, Reports, etc.) : **1.** Edited by R. A. Young, (1995) The Rietveld method, IUCr monographs on Crystallography, Oxford University Press, Oxford. **2.** Bish, D. L., Post J. E. (Eds.), (1989) Modern Powder Diffraction, Reviews in Mineralogy, Vol. 20, 145 p, Mineral. Soc. America, Michigan.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. http://www.monash.edu/pubs/handbooks/units/MTE6881.html https://www.ch.cam.ac.uk/analytical/crystallography/ http://www.rgf.bg.ac.rs/predmet.php?menu=about&id=6939&lang=en
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.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) • Class room is already provided with data show • The area of class room is suitable concerning the number of enrolled students and air conditioned. • King Abdulah Library (Umm Al-Qura University)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching • 10 minutes Quiz per week. • Home works. • Term paper. • Final Exam.

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

- At the end of term, Students fill an evaluation Sheet (without names).
- Student Marks are analyzed by considering Standard Deviation.

3. Procedures for Teaching Development

- Strategies are modified each term according to the student feedback.

4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)

n case of more than one section taken this course, the instructors are cooperated to give unified Exams and they use the same marks distribution for the answer sheet. Students can see their corrected sheet and compare it with key answer sheet.

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

1- The following points may help to get the course effectiveness

- Student evaluation
- Course report
- Program report
- Program Self study

2- According to point 1 the plan of improvement should be given.

3- Contact the college to evaluate the course and the benefit it add to other courses.

4- Add some subject and cut off others depending on the new discoveries in physics.

Name of Course Instructor : Timomi

Signature: …… **Date Completed:** ……

Program Coordinator: Adel Madani

Signature: …… **Date Received:** ……

Course Title: **Characterization techniques**

Course Code: **403666-3**

(M-3)

Date 10-10-2018	**Institution:** Umm Al-Qura University .
College: Faculty of Applied Science	**Department**: Department of physics

A. Course Identification and General Information

1.Course title and code: **Characterization techniques: 403666-3**

2. Credit hours: **3 hrs**

3. Program(s) in which the course is offered. **M.Sc. physics**

(If general elective available in many programs indicate this rather than list programs)

4. Name of faculty member responsible for the course, **Prof. Dr. Roshdi Seoudi**

5. Level/year at which this course is offered: **1st Year / Level 1**

6.Pre-requisites for this course (if any): **Solid State Physics (403662-3)**

7. Co-requisites for this course (if any):

8. Location if not on main campus: **Main campus**

9. Mode of Instruction (mark all that apply):

a. Traditional classroom	✓	percentage?	70%
b. Blended (traditional and online)	✓	percentage?	20%
c. E-learning	✓	percentage?	10%
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

The characterization of materials especially their structures, chemical, physical characterization and properties is very important and useful in the area of science so this course gives an overview in many techniques to identify and characterize the new materials.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

1. Explain the strategy of the course in the beginning of the semester
2. Outlines of the physical laws and principles of each techniques under study.
3. Encourage the students to see more details in the international web sites, published papers and reference books.
4. Renew the course references frequently
5. Frequently check for the latest characterization techniques discovery in science

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

The course gives an overview of the idea, theoretical, main component, and application of many techniques specifically [ultraviolet-visible, Fourier transform infrared, Raman spectroscopy, scanning and transmission electron microscopy (SEM and TEM), scanning tunneling microscopy (STM), atomic force microscopy (AFM) and x-ray diffraction (XRD), I-V characteristic curves for solar cells , which is short for Current-Voltage Characteristic Curves or simply I-V curves of an electrical device, LRC measure; inductance (L), capacitance (C), and resistance (R) are the components of the circuits at various frequencies] to study the structural, chemical, physical characterizations and electrical properties of the new prepared materials. Principles, instrumentation and applications of instruments will be covered. Emphasis will be on developing the ability to solve problems associated with characterization and properties of materials. Particular attention is given to selection criteria used for choosing the appropriate technique specific for characterization of materials and devices.

1 Topics to be Covered

Topic	No of Weeks	Contact hours
1- **Ultraviolet visible spectroscopy (UV-VIS):** It is including basic principle, instrumentation configuration, data interpretation, analysis and studying of the optical properties	**2**	**6**

2- **Fourier-transform infrared spectroscopy (FTIR) and Raman spectroscopy:** It is including basic principle, instrumentation configuration, data interpretation and analysis, and special techniques such as attenuated total reflection (ATR), diffuse reflectance, and Polarization modulation-infrared reflection-adsorption spectroscopy (PM-IRRAS)	**2**	**6**
3- **Scanning electron microscope (SEM):** It is including introduction the basic principle and instrumentation configuration and their strengths and weaknesses	**1**	**3**
4- **The transmission electron microscope (TEM):** It is including the basic principle and instrumentation configuration, the introduction of the electron diffraction and various imaging techniques including high-resolution imaging as well as chemical analysis as performed by both transmission and scanning electron microscopy.	**2**	**6**
5- **Atomic force microscope (AFM):** It is including contact-mode, tapping-mode and lateral-force AFM, scanning tunneling microscope (STM), electrostatic force microscope (EFM), magnetic force microscope (MFM), AFM-based nano-lithography, surface force and adhesion measurement, as well as molecular recognition. Understanding of the required instrumentation and the underlying mechanism of image formation.	**1.5**	**4.5**
6- **X-ray diffraction:** It is used to describe the types of structural information that can be obtained from X-ray scattering: crystallinity, phase identification, crystallite size, orientation, cell parameters for strain and/or chemical information, the thickness of films and multilayers.	**2**	**6**
7- **X-ray photon spectroscopy (XPS):** It is including basic principle, instrumentation configuration, data interpretation and analysis, chemical shift, quantification, and depth-profiling	**1.5**	**4.5**
1.		
8- **The I-V Characteristic Curves**: It is including, basic principle, instrumentation configuration, measuring of data and interpretation of a new materials which operated within an electrical circuit.	**1**	**3**
LCR Meter: It is including, basic principle, instrumentation configuration, measuring the inductance (L), capacitance (C), and resistance (R), impedance (Z), phase angle (θ), dissipation factor (D), quality factor (Q), and equivalent series resistance (ESR) at various frequencies and data interpretation of a new materials which operated within LCR circuit.	**2**	**6**
	15 weeks	**45 hrs**

2. Course components (total contact and credit hours per semester):							
		Lecture	**Tutorial**	**Laboratory/ Studio**	**Practical**	**Other**	**Total**
Contact Hours	Planned	**45 hrs**	**15 hrs**				**60 hrs**
	Actual	**45 hrs**	**15 hrs**				**60 hrs**

3. Individual study/learning hours expected for students per week.	8

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	**NQF Learning Domains And Course Learning Outcomes**	**Course Teaching Strategies**	**Course Assessment Methods**
1.0	**Knowledge**		
1.1	Use modern characterization techniques (microscopic and spectroscopic, and electric circuits) to evaluate and analyze the data measured from these techniques.	1-Theoretical and experimental teaching is supported and identify the structure of the materials. 2-Give the students the summary of course after the end of each chapter. 3-Recommended textbooks, paper, data show, internet.	1- Midterm exams 2- Homework and Activities 3- quizzes 4- Final exam
1.2	Practice how observation, experiment and theory work together in the element analysis, chemical structure analysis, electronic structure and electrical properties measurement, depth profiling, topography imaging, surface and interface analysis.		
1.3	Translate the ability to characterize, electrical properties of the prepared materials, devices by comprehensively utilizing appropriate techniques.		

1.4	Select critical selection decisions; conduct characterization measurements; evaluate, analyze and interpret data		
1.5	Analyze the practical characterization problems by utilizing the techniques, skills, and modern analytical tools.		
2.0	**Cognitive Skills**		
2.1	Construct the course designed so the students can study it in the way that works for them.	1- Asking questions during lectures. 2- Midterm exams and quizzes. 3- Doing homework. 4-Discussion same physical method, check the solution of the problems	1-The exam must contain questions that can measure these skills. 2- Quiz and exams 3- Discussions after the lecture.
2.2	Manage the students to spend between 10 and 15 hours each week on independent study in addition to the timetabled tutorials, including all reading, writing and thinking about the course.		
2.3	Classify unit to take approximately two weeks to study. The units will make the most sense if studied in the order in which they are presented but can be studied in any order.		
2.4	Construct series of review questions designed to let students know whether they have understood a unit, whilst other activities make them draw their learning together.		
2.5	Perform work on the module level activities in parallel with studying the main materials.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Measure the ability of student and supports them to hard work independently and with groups.	1-Internet websites. 2- Library. 3- Small group discussion.	1-Evaluate the work in a team and presentations. 2-The ability to search through the library and internet to give information on the course. 3-Identification of materials structure.
3.2	Revise his English language.		
	Employ work effectively in groups and exercise leadership when appropriate		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner that incorporates the stylistic conventions used by physicists worldwide.	1-Homework 2- Seminars presentation	1-Give students tasks to measure their calculations and analysis,

4.2	Access information on a topic from a variety of sources, and be able to learn new things on one's own.		problem solving. Encourage students to seek help if necessary. 2-Encourage students to ask a good question to help solve the problem.
4.3	Review the student to use the internet communicates tools.		
5.0	**Psychomotor(if any)**		
5.1	Not applicable.	Not applicable.	Not applicable.
5.2	Not applicable.	Not applicable.	Not applicable.

5. Assessment Task Schedule 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	Midterm 1	5th week	15 %
2	Midterm 2	10th week	15 %
3	quizzes	During the semester	10%
4	Home works	During the semester	10%
5	Final exam	End of the semester	50%
	Total		100 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per 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. (2hrs per week)

E Learning Resources

1. List Required Textbooks

1- "Surface Analysis: The Principal Techniques", John C. Vickerman, Ian Gilmore, 2nd Edition, John Wiley & Sons, Inc., (2009), ISBN: 978-0470017647

2- "Organic Structural Spectroscopy" by Joseph B. Lambert, Herbert F. Shurvell, David A Lightner, Robert Graham Cooks, Prentice Hall; 1st edition, (1997), ISBN: 0132586908
3- 'Fundamentals of light microscopy and electronic imaging' Douglas B. Murphy, 2001, Wiley-Liss, Inc. USA
4- 'Encyclopedia of Materials Characterization, Surfaces, Interfaces, Thin Films,' Editors C. Richard Brundle, Charles A. Evans, Jr., Shaun Wilson, Butterworth-Heinemann, Boston, US
5- Elements of X-ray diffraction' B.D. Cullity and S.R. Stock, 2001, Prentice Hall, Inc. USA
6- 'Transmission electron microscopy" D.B. Williams and C. Barry Carter, 4 volumes, Springer, 1996. USA
7- 'Handbook of low and high dielectric constant materials and their applications' Hari Singh Nalwa (ed.), 1999, London, Academic Press, ISBN 0 12 5139071 and ISBN 0 12 5139063
8- Electrical Properties of Materials, by L. Solymar, D. Walsh, , (2004) Oxford University Press, Seven edition, ISBN-13: 978-0199267934

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

1- "Surface Analysis Methods in Materials Science" by D.J. O'Connor, Brett A. Sexton, Roger S. C. Smart, Springer; 2 edition, (2003), ISBN: 3540413308
2- Organic Spectroscopy, by Lal Dhar Singh Yadav, Springer; 1 edition, (2005), ISBN: 1402025742
1. (Surface and Thin Film Analysis: A Compendium of Principles, Instrumentation, and Applications" by Henning Bubert, Holger Jenett, Wiley-VCH, (2002), ISBN: 3527304584
2. "Scanning Probe Microscopy: The Lab on a Tip" by Ernst Meyer, Hans J. Hug, Roland Bennewitz, Springer, (2003), ISBN: 3540431802.
3. "Handbook of Surface and Interface Analysis, by John C. Riviere, CRC; 1 edition, (1998), ISBN: 0824700805
4. "Structure Determination of Organic Compounds: Tables of Spectral Data", by E. Pretsch, P. Bühlmann, C. Affolter, Springer; 3 edition, (2004), ISBN: 3540678158
5. Practical Guide to Surface Science and Spectroscopy by Yip-Wah Chung, Academic Press, (2001), ISBN: 0121746100

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

1. http://www.nanotech-america.com/dmdocuments/mironov_book_en.pdf

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

There are so many computer programs that can be used for analyses the materials using a specific program for each technique.

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.)

Lecture room and a board is suitable concerning the number of enrolled students

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

Data show, Smart Board, software of many techniques is available in the department

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching 1-Questionaries' 2-Open discussion in the class room at the end of the lectures
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department 1-Revision of student answer paper by another staff member. 2-Analysis the grades of students.
3. Procedures for Teaching Development 1- Course report 2-Program report and Program self-study and a tutorial lecture
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) After the agreement of Department and Faculty administrations
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. Periodical revision by Quality Assurance Units in the Department and institution

Name of Course Instructor: Prof. Roshdi Seoudi

Signature: **Date Completed: 11/10/2018**

Program Coordinator: Prof. Adel-Madany

Signature: _____ **Date Received: _____**

Course Title : Physical Properties of Solid Materials

Course code : 403663-3

(M-4)

Date : 19-10-2018	Institution: Um AL – Qura University
College : Faculty of Applied Science	Department : Physics

A. Course Identification and General Information

1. Course title and Code : Physical Properties of Solid Materials - 403663-3

2. Credit hours : 3hrs.

3. Program(s) in which the course is offered. **M.Sc. in 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 : **1st Year / Level 2**

6. Pre-requisites for this course (if any) : Solid State Physics **403662**

7. Co-requisites for this course (if any) :

8. Location if not on main campus : **Main campus**

9. Mode of Instruction (mark all that apply) :

a. Traditional classroom	✓	percentage?	80
b. Blended (traditional and online)	✓	percentage?	10
c. E-learning	✓	percentage?	10
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B. Objectives :

1. Summary of the main learning outcomes for students enrolled in the course. The objective of this course is to study the physical properties as electrical, magnetics, optical, mechanical, and thermal that govern the operation of conventional devices.
2. Describe briefly 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) **1.** Explain strategy of the course in the beginning of the semester **2.** Outlines of the physical properties concepts, theories 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.** Discussing some selected problems in each chapter. **6.** Cooperate with different institution to find how they deal with the subject **7.** Frequently check for the latest discovery in material science

C. Course Description: (Note : General description in the form used in the program's bulletin or handbook).

Course Description: The course gives the theoretical approach of the physical properties of the materials such as physical , thermal, electrical, optical, magnetic, dielectric etc**.**

1 Topics to be Covered :		
List of topics :	**No of Weeks**	**Contact hours**
INTRODUCTION TO PHYSICAL PROPERTIES**.**	2	6

ELECTRICAL PROPERTIES: 9- Electrical conduction in solids 10- Breakdown of the classical theory of conduction & introduction to the quantum theory and its predictions. 11- Quantum model of electrical conduction in metals; alloying effects; effect of temperature on conductivity. 12- Transport theory in solid materials. 13- Electrical conduction in non-crystalline materials. 14- The combined role of the band gap and temperature on conductivity. - Simple intrinsic semiconductor devices - Extrinsic semiconductors: doping - donor and acceptor atoms; - conductivity equations; - effect of temperature on conductivity - freeze-out curves. 15- Introduction to band-gap engineering 16- Defects theory in solid materials	3	9
ELECTROMAGNETIC PROPERTIES: 6- Basic concepts of magnetism: dipole moment and the Bohr magneton; magnetic susceptibility; magnetic induction; saturation magnetization. 7- Types of magnetic behaviour: diamagnetism; paramagnetism; ferromagnetism; anti ferromagnetism; ferrimagnetism 8- Modern theories of ferri/ferromagnetism; exchange interaction; effect of temperature on saturation magnetization (Curie and Neel temperatures) 9- Magnetic domains and Bloch walls. Generation of hysteresis loops and the definition of soft/hard ferri/ferromagnets. Magnetic anisotropy and magnetostriction. 10- Basic ferromagnetic and ferromagnetic devices such as memory devices; electrical motors, computer hard disks, transformers etc. 11- Superconductivity: Type I and II superconductors; concept of the critical temperature; high-temperature superconductors. 12- Types of superconducting materials (metals and alloys, intermetallics, polymers & ceramics). 13- BCS theory of superconductivity; effects of electrical and magnetic fields on superconductivity; Meissner effect. 14- Superconducting devices.	4	12

THERMAL AND OPTICAL PROPERTIES: 6- Thermal properties of materials: classical and quantum theories of heat capacity. 7- Thermal expansion. Thermoelectricity and the Seebeck effect.. 8- Optical properties of materials: interaction of radiation with matter; reflectivity. 9- Optical devices (lasers, modulators, switches, waveguides, optical fibres, blue ray disks) 10- Optical properties of nanomaterials	3	9
MECHANICAL PROPERTIES: 5- Stress-strain diagram ,Young modulus, Poisson ratio, Shear modulus 6- Plastic tensile test 7- Dislocation **8-** Hardness and roughness	3	9
Total :	15 weeks	45 hrs

2 Course components (total contact hours per semester):

Lecture : 45 hrs	**Tutorial : 15 hrs**	**Lab :**	**Total : 60 hrs**

3. Individual study/learning hours expected for students per week. (2h)

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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;

Code #	NQF Learning Domains and Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Recognise fundamentals in electronic and atomic structure of solids.	-Explain key concepts; formulate mathematical models	-Midterm theoretical exams -Homework and Activities
1.2	Understand the models and theories, which explain the physical properties.		

		and nurture analytical skills. -Provide numerical examples and solutions of advanced problems in solid state physics .	-quizzes
1.4	Understand the structure of crystalline solids: crystal axes and planes, lattices and defects.		
1.5	Understand microscopic and macroscopic electrical , magnetic , optical and thermal properties of solids		
2.0	**Cognitive Skills**		
3.0	**Interpersonal Skills & Responsibility**		
4.0	**Communication, Information Technology, Numerical**		
5.0	**Psychomotor (if any)**		
5.1	Not applicable.	Not applicable.	Not applicable.
5.2			

5. Assessment Tasks Schedule 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	Midterm 1	5th week	15%
2	Midterm 2	10th week	15%
3	Online quizzes	every week	10%
4	Homework	Every week	5%
5	Interactive discussions	Every week	5%
6	Final exam	End of semester	50%
	Total		100 %

D. Student Academic AND Counselling Support

E. Learning Resources

List Required Textbooks:

Text book :

1) Physical Properties of Materials, Second Edition Mary Anne White (2011) Publisher: CRC Press (1642) ASIN: B01K0TTZ3I
2) W. D. Callister, Jr., "Materials Science and Engineering, An Introduction" Wiley - 8th Edition (2013) ISBN-13: 978-1118324578

3) S. O. Kasap, "Principles of Electronic Materials and Devices," McGraw Hill, 3rd edition (2017) ISBN-13: 978-0078028182
4) Electronic Properties of Materials Hummel, Rolf E. 4th ed. Springer. (2011) ISBN: 978-1441981639

Recommended Reading List :

1) The Structure and Properties of Materials: Volume IV – Electronic Properties: R. M. Rose, L. A. Shepard and J. Wulff, John Wiley and Sons, 1966.
2) • Lectures on the Electrical Properties of Materials: L. Soymar and D. Walsh, Oxford, 1988.
3) An Introduction to the Electron Theory of Solids: J. Stringer, Pergamon, 1967.
4) Introduction to the Modern Theory of Metals: A. Cottrell, Institute of Metals, London, 1988.
5) Physics of Solids: C. A. Wert and R. M. Thompson, McGraw-Hill, 1964.
6) Introduction to solid State Physics: C. Kittel, John Wiley and Sons, 1986.
7) Electronic Properties of Crystalline Solids: R. H. Bube, Academic Press, New York, 1974.
8) Solid State Theory in Metallurgy: P. Wilkes, Cambridge University Press, 1973.
9) Solid State Electronic Devices: B.G. Streetman, Prentice-Hall, 1980.
10) Magnetic Materials: R. S. Tebble and D.J. Craik, Wiley Interscience, 1969.
11) Electronic process in Non-crystalline Materials, N.E Mott and E.A.Davis , Oxford classic texts in physical sciences , 2012

Electronic Materials, Web Sites

http://www.physicalpropertiesofmaterials.com/student

Other learning material such as computer-based programs/CD, professional standards / regulations

- Youtube videos (use e-learning gate of Umm Al-Qura university)

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.)

-Class room is already provided with data show
-The area of class room is suitable concerning the number of enrolled students and air conditioned.
-Lab with for 20 students

2. Computing resources

- Providing class rooms with computers and labs with data show.

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 :

- Questionaries (using of e-learning gate of Umm Al-Qura university)

- Online Quizzes (using of e-learning gate of Umm Al-Qura university)
- Open discussion (using of e-learning gate of Umm Al-Qura university)

1. Other Strategies for Evaluation of Teaching by the Instructor or by the Department :

- Revision of student answer paper by another staff member if evaluable
- Analysis the grades of students.

2. Processes for Improvement of Teaching :

- Preparing the course as PPT.
- Using scientific movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

3. 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)

- After the agreement of Department and Faculty administrations
- 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.

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
   - Program Self study
   - E-learning
2- According to point 1 the plan of improvement should be given.
3- Contact the college to evaluate the course and the benefit it add to other courses.

Add some subject and cut off others depending on the new discoveries in physics.

Name of Constructor : Dr. Abdelmajid TIMOUMI

Signature : ……. **Date completed:** 19/ 10/2018

Program Coordinator : Prof Adel-Madani

Signature : …….. **Date received:**…….

Course Title: Renewable energy

Course Code: 403665-3

(M-5)

Date: 2018-10-20	**Institution:** Umm Al-Qura University .
College: Faculty **of** Applied Science	**Department:** Physics

A. Course Identification and General Information

1. Course title and code: New and renewable energy (**403665-3**)
2. Credit hours: 3 hrs
3. Program(s) in which the course is offered : MSc 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: **level 2 / 1st year**
6. Pre-requisites for this course (if any): **403662-3**
7. Co-requisites for this course (if any):
8. Location if not on main campus: Main Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	X	percentage?	75
b. Blended (traditional and online)	X	percentage?	10
c. E-learning	X	percentage?	5
d. Correspondence		percentage?	
f. Other	X	percentage?	10

Comments: External Manufacturing visits are also available

B Objectives

1.The main objective of this course

The aim of the Renewable Energy courses in the MSc (Material Science Track) is to :

1. Understand the various forms of conventional energy resources.
2. Learn the present energy scenario and the need for energy conservation
3. Explain the concept of various forms of renewable energy
4. Outline division aspects and utilization of renewable energy sources for both domestics and industrial application
5. Analyze the environmental aspects of renewable energy resources.
6. Produces graduates with a mix of skills which are tailored to the renewable energy technology methods.
7.Provide a qualification that meets high Level of the Framework for Higher Education Qualifications.

2.Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

New and renewable energy course provides an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternate energy sources and their technology and application. The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro. Energy conservation methods will be emphasized and Fuel cells technologies.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
Introduction to Renewable Energy Technology	1	3
Energy Shortage and Fossil Fuel - Coal . Petroleum. Natural Gas . Hydrocarbon Conversion . Fossil Fuel Summary	1	3
Basics on Solar Energy -Description of the solar Spectrum . Black body . Wien Law Stefan Effect and energy lost. Existing Energy Technologies	1	3

Global Worming and Greenhouse Effect - Albedo and the Greenhouse Effect . Atmospheric Physics . Global Energy Flow . CO2 and the Carbon Cycle. Feedbacks and Climate Modeling	1	3
Solar Radiation Distribution over the world	1	3
Solar Energy **Photovoltaics .** Introduction to solar energy, solar geometry, photovoltaic effect, Solar cell technology, photovoltaic generators technologies, photovoltaic systems autonomous/interconnected. **Solar thermal applications.** Solar thermal power systems (household, centralized), Energy generating systems, thermal energy storage. Photovoltaic Energy. Thermal Energy. Solar Concentrators	2	6
Wind Energy Introduction to wind energy. The Nature of the Wind . Characterization of a Wind Resource . The Potential of Wind Energy. Wind Turbines. Wind characteristics, Wind energy potential, Types of wind turbines, wind farms.	1	3
Biomass Introduction to biomass, biomass potential, exploitation possibility, cogeneration.	1	3
Hydropower Introduction to hydropower, Small hydropower systems, system resources, hydroelectric power plants technologies. Fuel cell technology	2	6
Geothermal Energy Introduction to geothermal energy, geothermal fields, space heating, electricity generation, shallow geothermal energy systems	1	3
Other form of renewable energy Tidal power, wave power.	1	3
Energy storage -Performance Criteria for Energy Storage , Grid-scale Storage -Mobile Energy Storage . Other Energy Storage Systems	1	3
Efficient Energy Use and Thermal Building Optimization -First Law Efficiency , Second Law Efficiency , Example: The Efficiency of Space Heating , Exergy , Efficiency and Conservation Case Studies Energy Systems: Scales and Transformations	1	3
Total	15	45

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

	Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total

Contact Hours	Planned	45 hrs			10 hrs		55 hrs
	Actual	45 hrs			10 hrs		55 hrs
Credit	Planned	45 hrs			10 hrs		55 hrs
	Actual	45 hrs			10 hrs		55 hrs

3. Individual study/learning hours expected for students per week.	8

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

On the table below are the seven 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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	**NQF Learning Domains And Course Learning Outcomes**	**Course Teaching Strategies**	**Course Assessment Methods**
1.0	**Knowledge**		
1.1	On completing the program students should be able to: **Recognize** knowledge and understanding of current worldwide energy usage and its impact on climate.	-Theoretical and experimental teaching is supported . -Give the students the summary of course after the end of each chapter. -Recommended textbooks, paper, data show, internet.	-exams -Homework -quizzes
1.2	**describe** a comprehensive knowledge and understanding of the origins and distribution of different renewable energy sources (solar, wind, hydro, wave, tidal and bioenergy).		
1.3	**relate** a comprehensive knowledge and understanding of the storage/conversion and integration of these renewable energy sources into existing systems.		
1.4	understand the operation and control principles of electrical power distribution networks.		

1.5	understand the roles of different energy sources in the provision of a national electricity supply.		
2.0	**Cognitive Skills** On completing the program students should be able to:		
2.1	**Evaluate** current research and methodologies in renewable energy production , conversion and storage.	Discussion same physical method, check the solution of the problems	Exams
2.2	**Demonstrate** originality in identifying and considering problems of sustainable energy sources .		
2.3	**Produce** and critically appraise renewable energy solutions.		
2.4	**Deal** with complex issues both systematically and creatively.		
2.5	**Make** sound judgments in the absence of complete data.		
2.6	**Review** options and make decisions while considering a range of issues including technical, financial, environmental and policy.		
2.7	Use appropriate software packages and IT skills for modelling and simulation of renewable energy systems.		
2.8	Quantify resource potential and determine the appropriate renewable energy resource at a given site.		
2.9	Analyze the energy capture potential for solar, wind & hydro resources.		
2.10	Demonstrate practical measuring and auditing skills.		
3.0	**Interpersonal Skills & Responsibility** On completing the program students should be able to demonstrate:		
3.1	critical awareness of theoretical design concepts and their practical implementation within renewable energy systems.		
3.2	**The ability** to work independently for continuing professional development.		
3.3	**The ability** to understand basic concepts such as power production, efficiency, energy yield of various renewable energy systems for a specific site.		
3.4	**The ability** to describe the main design concepts, main differences, advantages of various renewable energy systems		
3.5	**The control** of Time and resource planning and management.		
4.0	**Communication, Information Technology, Numerical**		

4.1	Intellectual skills are taught primarily through design classes, case studies and seminars. Development of these skills is particularly linked to industrial applications such as group and individual design exercises, post school assignments and the lab course.	- Seminars - presentation	
5.0	**Psychomotor (if any)**		
5.1	Not applicable.	Not applicable.	

5. Assessment Task Schedule 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	Midterm 1	5th week	15 %
2	Midterm 2	10th week	15 %
3	quizzes	During the semester	10%
4	Home works	During the semester	10%
5	Final exam	15th week	50%
	Total		100%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per 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. (2hrs per week)

E Learning Resources

1. List Required Textbooks

1. Renewable and Efficient Electric Power Systems. Masters, G. (2004). Wiley Interscience.
2. The Physics of Energy . Robert L Jaffe and Washington Taylor Cambridge University Press, 2018 ISBN 978-1-107-01665-1 Hardback
3. Physics of Energy Sources. Manchester physics series. George C. King, 1st edition
   a. Editor Wiley 2014
4. Energy for a sustainable world: from the oil age to a sun-powered future, Armaroli N. and Balzani V Wiley-VCH.
5. Energy and the Environment, Ristinen R.A. , Kraushaar J.J. Wiley.
6. Messenger, R., & Ventre, J. (2010). Photovoltaic Systems Engineering. CRC Press.
7. Patel, M. (2006). Wind and Solar Power Systems. Taylor and Francis.

8. Yildiz, F., & Coogler, K. (2010). Development of a Renewable Energy Course for a Technology Program. ASEE Annual Conference and Exposition.
2. List Essential References Materials (Journals, Reports, etc.) - Renewable and Efficient Electric Power Systems, Master G. M., John Wiley & Sons, Inc. - Energy: Physical, Environmental and Social Impact, Aubrecht G. J., Pearson Prentice Hall. - Emissions Trading: Principles and Practice, Tietenberg T. H. Washington D.C.: Resources for the Future Press.
3.List Electronic Materials, Web Sites, Facebook, Twitter, etc. http://www.microbot-ed.com/ExpRenewNRG1_0.pdf
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.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)
2.Technology resources (AV, data show, Smart Board, software, etc.) Data show, Smart Board, software of many techniques is available in the department
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching -Questionaries' -Open discussion in the class room at the end of the lectures
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department -Revision of student answer paper by another staff member. -Analysis the grades of students.
3.Procedures for Teaching Development Knowledge and understanding of 1.1 – 1.4 is generally taught via formal lectures, distance learning/self-guided material and case studies, supplemented by seminars and tutorials. Students are encouraged to develop their knowledge and understanding by independent reading, for which they are given guidance in the distance learning/self guided material, use of the internet and discussing the subjects with their industry based colleagues and/or other students as well as teaching staff.

4.Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) After the agreement of Department and Faculty administrations
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. Periodical revision by Quality Assurance Units in the Department and institution.

Name of Course Instructor: Prof. Adel MADANI

Signature: _____ **Date Completed:** _____

Program Coordinator: Prof. Adel Madani

Signature: _____ **Date Received:** _____

Optics and Photonics track

Course Title: **Advanced optics**

Course Code: **403656-3**

(O-1)

Date: 27/9/2018	**Institution:** Umm AL – Qura University
College: College of Applied Science	**Department:** Department of Physics

A. Course Identification and General Information

1. Course title and code: **Advanced optics (code: 403656)**
2. Credit hours: **3Hrs**
3. Program(s) in which the course is offered. **Master of Physics;**

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course: **Mohamed Boustimi**
5. Level/year at which this course is offered: **1st Year / Level 1**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any):
8. Location if not on main campus: **Main campus and Alzaher**
9. Mode of Instruction (mark all that apply):

a. traditional classroom	✓	What percentage?	90
b. blended (traditional and online)		What percentage?	
c. e-learning	✓	What percentage?	10
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

The course aims providing basic as well as advanced topics in optical science (with elementary physical and engineering applications) that are not usually covered in previous physics courses.

Objectives of the class are:

1- Laying down the foundations of the understanding the most fundamental laws and principles of optics; along with their application.
2- Studying fundamental properties of light propagation and interaction with matter under the approximations of geometrical optics and scalar wave optics.
3- Using optical techniques such as holography and Fourier transform for information processing.
4- Emphasis on physical intuition and underlying mathematical tools.
5- Application of physical concepts to topical engineering domains.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

1- Collaborate with other educational institutions to reveal how they deal with the subject.

2- Renew and update the course references periodically.

3- Frequently check the latest discovery in science to improve the course objectives.

4- Posting some course material on the websites to help the students.

5- Assigning presentations to students to improve their research skills.

6- Focusing on generic skills.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

This advanced course on optics is proposed to bridge the gap between the usual course at BSc. level and the modern applications of optics in spectroscopy and Optical Information Processing. It covers the fundamental properties of light interaction with matter under the approximations of geometrical and scalar wave optics, intermediate topics of electromagnetic optics, optics of anisotropic media, fundamentals of light beam propagation and elements of Fourier optics, including concepts of digital holography.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**

❖ **Geometrical Optics:** Basic concepts, Geometrical light rays, Fermat's Principle of least time, Ray-tracing, Perfect and real optical systems, aberrations, lens design, apertures and stops, radiometry, photometry.	**2**	**6**
❖ **Wave optics:** Huygens principle, Basic electrodynamics, Connection of EM wave to geometric optics, Eikonal Equations: Path of Light in an Inhomogeneous Medium, polarization, interference, wave-guiding, Fresnel and Fraunhofer diffraction, image formation, resolution, and space-bandwidth product.	**3**	**9**
❖ **Anisotropic media:** Susceptibility of an anisotropic media, Wave propagation, normal modes, index ellipoid, Effective refraction index, Distortion of the index ellipsoid, Optical activity and Faraday Effect, Pockels effect, Optics of liquid Crystals, Polarization devices, Electro-optics of anisotropic media, Electro-optic effects in liquid crystals, Photorefractive materials, Electroabsorption.	**3**	**9**
❖ **Beam Optics:** Angular spectrum of plane waves, Field propagators, Helmholtz equation, Gaussian Beams, Description and properties, Transmission through a thin lens, Other solution of Helmholtz equation, Short duration beams, Alternate method for describing a beam: covariance matrix.	**3**	**9**
❖ **Fourier Optics:** Fourier Transform (FT) of some functions, Decomposition and Wave Packets, Convolution and correlation between two functions, Hamonic analysis of a signal, Amplitude and phase modulations, Linear systems, Impulse response, Transfer function, Coherent optical processing, Optical transfer function, Diffraction & Interference, Image shaping, Holography.	**4**	**12**
	15 weeks	**45 hrs**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	**30**	**15**	**0**	**0**	**0**	**45**
	Actual	**30**	**15**	**0**	**0**	**0**	**45**
Credit	Planned	**2**	**1**	**0**	**0**	**0**	**3**
	Actual	**2**	**1**	**0**	**0**	**0**	**3**

3. Individual study/learning hours expected for students per week.	6

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Recall basic principles and concepts of geometric Optics and their related optical phenomena.	**1.** Lectures. **2.** Discussions **3.** Slides and computer simulation software may be used by the teachers to clarify concepts. **4.** Problems solving **5.** Students may be asked to solve some problems on computer using MATLAB language.	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams
1.2	Describe fundamental properties of light propagation and interaction with matter under the approximations of geometrical optics and scalar wave optics.		
1.3	Outline facts, principles and concepts of light propagation in anisotropic media and state the related optical phenomena.		
1.4	Describe optical beam propagation in free-space and through various optical components.		
1.5	Recognize optical techniques such as holography and Fourier transform for information processing.		
2.0	**Cognitive Skills**		
2.1	Reorganize how to apply the knowledge acquired to solve problems in new or	**1.** Lectures.	

	unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.	**2.** Discussions. **3.** Problems solving. **4.** Encourage the student to look for the information in different references. **5.** Ask the student to attend lectures for practice solving problem.	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams
2.2	Develop and justify knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.		
2.3	Explain the fundamentals of image formation, of the propagation of light waves and beams through different media and of Fourier Optics.		
2.4	Capacity for predict, calculate, analyse and interpret quantitative results in all related areas.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics	**1.** Ask the students to search the internet and use the library. **2.** Encourage them how to attend lectures regularly by assigning marks for attendance. **3.** Small group discussion. **4.** Give students tasks of duties **5.** Discussion in class	**1.** Evaluate the scientific values of solutions. **2.** Evaluate the work in team **3.** Evaluation of the role of each student in group Project assignment **4.** Evaluation of student's presentations. **5.** Direct contact during office hours.
3.2	Show the ability to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.		
3.3	Communicate effectively with peers.		
3.4	Being aware how companies are organised and the principles that govern their activity, and being able to understand employment regulations and the relationships between planning, industrial and commercial strategies, quality and profit.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrating capability in performing research as well as an effective oral and written communication.	**1.** Communicate effectively in writing, orally and through scientific diagrams. **2.** Preparing a report on some topics related to the course depending on web sites.	1. Evaluation of presentations 2. Evaluation of reports & Project assignment.
4.2	Achieving a level of spoken and written proficiency in English, that meets the needs of the profession and the labour market.		

4.3	Acquire a working knowledge of basic research methodologies, data analysis and interpretation.	**1.** Independent study. **2.** Problem solving.	**1.** Homework **2.** Assignments.
4.4	Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.	**1.** Oral Presentations. **2.** Problem solving. **3.** Independent study.	**2.** Performance in problem solving. **3.** Homework. **4.** Assignments.
4.5	Use of the internet to research solution for relevant scientific problems.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments
4.6	Demonstrate enough knowledge in evaluating published works.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments.
5.0	**Psychomotor(if any)**		
5.1	N/A	N/A	N/A

5. Assessment Task Schedule 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	Exercises & Home works	At the end of each chapter	10%
2	Participation in activities during lectures	All weeks	10%
3	Practical group projects	At the end of each chapter	10%
4	1st Periodic Exam	8th week	10%
5	2nd Periodic Exam	11th week	10%
6	Final Exam	16th week	50%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

Students are supervised by academic advisers in physics Department and the time tables for academic advices were given to the student each semester. (8hrs per week).

E Learning Resources

1. List Required Textbooks **1-** Optics 5th Edition, by Eugene Hecht, Pearson, 2016. **2-** Holographic Materials and Optical Systems, by Izabela Naydenova, InTech, 2017. **3-** Fundamentals of Photonics, Saleh & Teich, 2nd Ed., 2007, Wiley. **4-** Geometric Optics, by J. B. Tatum, 2006. **5-** Classical and Modern Optics**,** by Daniel A. Steck, University of Oregon, 2010.
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.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Lecture room with 25 seats, equipped with a Smart Board, projector, computers and internet connection.
2. Technology resources (AV, data show, Smart Board, software, etc.) **1.** Data Show. **2.** AV Presentations. **3.** Matlab software
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) NA

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching **1.** Discussions on coverage, preferred activity, approach. **2.** Student course evaluation at the end of the course.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Revision of student answer paper by another staff member. • Analysis of the grades of students. • Periodic self- assessment of the program. • Departmental council meetings.

3. Procedures for Teaching Development **1.** Sharing teaching experience during the department meetings. **2.** Constant update with the best teaching practices in case methodology. **3.** Attending workshop on effective teaching methods presented by experts on the teaching methodologies.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members 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 developing it. The following points may help to get the course effectiveness ▪ Reviewing student's formal and informal feedback. ▪ Evaluating relevancy of the teaching methods on a regular basis. ▪ Discussing the results with the industry experts. ▪ Program Self study. According to the above points the plan of improvement should be given.

Name of Course Instructor: **Mohamed Boustimi**

Signature: _____ **Date Completed:** _____

Program Coordinator: **Walid Belkacem Belhadj**

Signature: _____ **Date Received:** _____

Course Title: **Optical Wave Propagation**

Course Code: **403658**

(O-2)

Date: 27/9/2018	**Institution:** Umm AL – Qura University
College: College of Applied Science	**Department:** Department of Physics

A. Course Identification and General Information

1. Course title and code: **Optical Wave Propagation (code: 403658)**
2. Credit hours: **3Hrs**
3. Program(s) in which the course is offered. **Master of Physics;**

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course

   Walid Belkacem Belhadj
5. Level/year at which this course is offered: **1st Year / Level 1**
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any):
8. Location if not on main campus: **Main campus and Alzaher**
9. Mode of Instruction (mark all that apply):

a. traditional classroom	✓	What percentage?	90
b. blended (traditional and online)		What percentage?	
c. e-learning	✓	What percentage?	10
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

The purpose of this course is to provide students with fundamental concepts for the treatment of electromagnetic wave propagation in complex linear and nonlinear media and to give them an overview of guided wave optical devices and the principles underlying their operation.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

1- Collaborate with other educational institutions to reveal how they deal with the subject.

2- Renew and update the course references periodically.

3- Frequently check the latest discovery in science to improve the course objectives.

4- Posting some course material on the websites to help the students.

5- Assigning presentations to students to improve their research skills.

6- Focusing on generic skills.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

This course gives a tool for the treatment of electromagnetic wave propagation in linear and nonlinear media as well as an overview of guided wave optical devices and the principles underlying their operation. It covers the foundation of electromagnetic optics, the propagation of electromagnetic plane waves within homogeneous, isotropic linear and nonlinear dielectric media, across planar boundaries between them, through periodic arrangements of dielectric layers, in planar waveguides and in optical fibers.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
❖ **Fundamentals of Electromagnetic wave theory:** Electromagnetic fields, electromagnetic properties of materials, Integral and differential time varying Maxwell's equations, Poynting's theorem, time harmonic Maxwell's equations, Boundary conditions, Plane wave propagation, Power flow density, Electromagnetic waves in a homogeneous medium; Refractive Index, Group velocity and group index.	**2**	**6**

❖ **Wave and interferences:** Phase Matching at planar interfaces, Propagating, surface, and evanescent waves, Transverse Electric (TE) and Transverse Magnetic (TM) modes, Snell's law, Fresnel Reflection, Reflection and transmission coefficients Brewster's Angle, Total Internal Reflection, Goos-Haenchen-Shift, Mirrors, Interferometers and Thin-Film Structures, photonic crystal; Dielectric layered media, Scattering and Transfer Matrix Formulation, Beamsplitter.	**3**	**9**
❖ **Electromagnetic Propagation in nonlinear Media:** Nonlinear optical media; nonlinear Harmonic Oscillator model, Nonlinear Susceptibility Tensors. Nonlinear Wave Propagation; Second Harmonic Generation, third Harmonic Generation, wave mixing, Phase Matching. Nonlinear optical processes; Kerr effect, Nonlinear Refractive index, Optical bistability, self focusing and phase modulation, Saturation of Absorption, Two-Photon Absorption, Stimulated Raman Scattering.	**3**	**9**
❖ **Optical Waveguides and Resonators:** Planar Dielectric Waveguides; Modes, Propagation Constants, Dispersion relations for TE and TM modes, Cut-off conditions and single mode operation, Field distribution and power flow, Mode orthogonality, Slab Waveguide, Numerical Aperture. Waveguide Coupling; Coupling of Modes and Coupled Mode Theory. Metallic Waveguides; Parallel plate metallic waveguides, Dispersion relations, single mode operation, Field distribution and power flow. Optical Resonators; Fabry-Perot Resonator; Finesse, spectral width and Quality Factor, loss, photon lifetime, photonic crystal cavity, Thin-Film Filters.	**4**	**9**
❖ **Optical fibers:** Evolution of Fiber Telecommunications, Ray analysis of optical fiber; Propagation mechanism of rays in an optical fiber, numerical aperture, dispersion. Step-index multimode fibers; Wave equation and boundary conditions, Characteristics equation, TE, TM and Hybrid modes, Weakly guiding approximation, linearly polarized (LP) modes, Single mode fiber, V – parameter, Power confinement and mode cutoff, Mode field diameter. Graded-index fiber; Modal analysis	**3**	**9**
	15 weeks	**45 hrs**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	**30**	**15**	**0**	**0**	**0**	**45**
	Actual	**30**	**15**	**0**	**0**	**0**	**45**
Credit	Planned	**2**	**1**	**0**	**0**	**0**	**3**
	Actual	**2**	**1**	**0**	**0**	**0**	**3**

3. Individual study/learning hours expected for students per week.	6

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Describe electromagnetic wave propagation within homogeneous, isotropic linear dielectric media as well as across planar boundaries between them.	**1.** Lectures. **2.** Discussions **3.** Slides and computer simulation software may be used by the teachers to clarify concepts. **4.** Problems solving **5.** Students may be asked to solve some problems on computer using MATLAB language.	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams
1.2	Describe optics of nonlinear media in terms of susceptibility tensors and outline the associated nonlinear optical processes.		
1.3	Recognition of several guided wave optical devices and the principles underlying their operation.		
1.4	Reproduce how the wave equation is solved in waveguide geometries and how arbitrary solutions can be composed in terms of modes.		
1.5	Describe how transmission, reflection, absorption and dispersion in optical media can be characterized.		
1.6	Recognize some kinds of optical resonators and how they can be employed the confine light.		
2.0	**Cognitive Skills**		

2.1	Predict optical effects with e.g. light-matter interaction, interference, waveguides, optical fibers and geometrical optics using suitable mathematical principles.	**1.** Lectures. **2.** Discussions. **3.** Problems solving. **4.** Encourage the student to look for the information in different references. **5.** Ask the student to attend lectures for practice solving problem. 6. Following some proofs 7. Define duties for each chapter	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams.
2.2	Calculate parameters such as the cut-off frequency, number of modes, propagation constant, and group velocity, fraction of energy in core for metallic and dielectric waveguides and physically interpret them.		
2.3	Differentiate between linear and nonlinear optical media.		
2.4	Explain the principles of, compare and contrast single- and multi-mode planar and fiber optical waveguide characteristics.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics.	**1.** Ask the students to search the internet and use the library. **2.** Encourage them how to attend lectures regularly by assigning marks for attendance. **3.** Small group discussion. **4.** Give students tasks of duties. **5.** Discussion in class	**1.** Evaluate the scientific values of solutions. **2.** Evaluate the work in team **3.** Evaluation of the role of each student in group Project assignment **4.** Evaluation of student's presentations. **5.** Direct contact during office hours. **6.** Direct contact during office hours.
3.2	Show the ability to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.		
	Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.		
	Illustrate the interrelationships among numerical design, technology, and global society, and of the societal implications of new developments in science.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrating capability in performing research as well as an effective oral and written communication.	**1.** Communicate effectively in writing, orally and through scientific diagrams. **2.** Preparing a report on some topics related to the	1. Evaluation of presentations 2. Evaluation of reports & Project assignment.

		course depending on web sites.	
4.2	Acquire a working knowledge of basic research methodologies, data analysis and interpretation.	**1.** Independent study. **2.** Problem solving.	**1.** Homework **2.** Assignments.
4.3	Demonstrate effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.	**1.** Oral Presentations. **2.** Problem solving.	**1.** Homework. **2.** Assignments.
4.4	Use of the internet to research solution for relevant scientific problems.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments
4.5	Demonstrate enough knowledge in evaluating published works.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments.
5.0	**Psychomotor(if any)**		
5.1	N/A	N/A	N/A
5.2			

5. Assessment Task Schedule 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	Exercises & Home works	At the end of each chapter	10%
2	Participation in activities during lectures	All weeks	10%
3	Practical group projects	At the end of each chapter	10%
4	1st Periodic Exam	8th week	10%
5	2nd Periodic Exam	11th week	10%
6	Final Exam	16th week	50%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week) Students are supervised by academic advisers in physics Department and the time tables for academic advices were given to the student each semester. (8hrs per week).

E Learning Resources

1. List Required Textbooks • Physics of Photonic Devices 2nd Edition by Shun Lien Chuang, Wiley, 2009. • Fundamentals of Photonics, Saleh&Teich, 2nd Ed., 2007, Wiley. • Nonlinear Optics, 3rd Edition, Robert Boyd, Academic Press, 2008 • Principles of Optics for Engineers: Diffraction and Modal Analysis 1st Edition, by William S. C. Chang, Cambridge University Press, 2015 • Fundamentals of Nonlinear Optics, by Peter E. Powers, CRC Press (2011).
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.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Lecture room with 25 seats, equipped with a Smart Board, projector, computers and internet connection.
2. Technology resources (AV, data show, Smart Board, software, etc.) **1.** Data Show. **2.** AV Presentations. **3.** Matlab software
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) NA

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching **1.** Discussions on coverage, preferred activity, approach. **2.** Student course evaluation at the end of the course.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department

- Revision of student answer paper by another staff member.
- Analysis of the grades of students.
- Periodic self- assessment of the program.
- Departmental council meetings.

3. Procedures for Teaching Development

1. Sharing teaching experience during the department meetings.
2. Constant update with the best teaching practices in case methodology.
3. Attending workshop on effective teaching methods presented by experts on the teaching methodologies.

4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members 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 developing it.

The following points may help to get the course effectiveness

- Reviewing student's formal and informal feedback.
- Evaluating relevancy of the teaching methods on a regular basis.
- Discussing the results with the industry experts.
- Program Self study.

According to the above points the plan of improvement should be given.

Name of Course Instructor: _____ Walid Belkacem Belhadj __

Signature: _____ Date Completed: _____

Program Coordinator: ____ Walid Belkacem Belhadj _____

Signature: _____ Date Received: _____

Course Title: **Quantum Optics**

Course Code: **403660-3**

(O-3)

Date: 5- 10- 2018.	**Institution:** Umm Al-Qura University
College: College of Applied Sciences	**Department:**Physics

A. Course Identification and General Information

1. Course title and code: Quantum Optics (403660)
2. Credit hours:3
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Masters
4. Name of faculty member responsible for the course: Dr. Tasnim Azim
5. Level/year at which this course is offered: First year / level 1
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any):
8. Location if not on main campus: **Main and** Al-Zaher campus
9. Mode of Instruction (mark all that apply): a. Traditional classroom ✓ percentage? **90%** b. Blended (traditional and online) percent c. E-learning percentage? d. Correspondence percentage? f. Other ✓ percentage? 10% Comments:

B Objectives

1. The main objective of this course is to give the photon concept of quantum electromagnetic field and to develop tools to handle different physical situations of atom-field interaction in semi-classical and quantum mechanical theory. These tools will then be applied to different situations of atom-field interaction. The course will also touch the recent topics of research in this field.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field) The current topics of research should be included in the course using on-line journals and sites like Web of Knowledge, that give updates about the topics of increasing interest.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Quantum Optics describes light and its interaction with matter quantum mechanically. It teaches the mathematical tools for handling atom-photon interaction. The course will showhow classical formulation of interaction can be derived in the quantum optical context. The non-classical properties of light will also be discussed, which have no counter-part in classical physics. As an application of the tools described, some very novel applications of quantum optics which can be experimentally tested and those which have already been experimentally verified will be discussed in the course.

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
Introduction to Quantum Optics and lasers: Comparison of classical and quantum field, properties and representation of vacuum, coherent states, squeezed states of quantum light. Review of quantum mechanical tools for describing interaction of atom with field.	2	6
Semi-classical theory of atom-field interaction: Interaction of a single mode field with two-level atom, Probability amplitude method, Interaction picture	2	6
Density matrix for two-level atom: Equation of motion for the density matrix, Two-level atom.	1	3

Maxwell-Schrodinger equations: Population matrix and its equation of motion, Maxwell's equation for slowly varying field functions	1	3
Atom-field interaction- quantum theory: Atom-field interaction Hamiltonian, Interaction of a single two-level atom with a single-mode field, Probability amplitude method, Heisenberg operator method, Unitary time-evolution operator method, Weisskopf-Wigner theory of spontaneous emission between two atomic levels	5	15
Applications: Coherent dark trapping, Electromagnetically induced transparency, Lasing without inversion, Refractive index enhancement via quantum coherence	4	12
	45 hours	15 weeks

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	45				10	55
	Actual						
Credit	Planned	3					3
	Actual						

3. Individual study/learning hours expected for students per week. 6

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Description of characteristics, properties and states of quantum field,	Begin with the significance and the general idea of the topic.	Questioning during the lecture
1.2	Analysis of the physics and calculation of the interaction dynamics of atom interacting with classical field.	Explain the topic with figures and diagrams on the board	Homework, quizzes and mid-term exam.
1.3	Describe the approaches of atom-field interaction with probability amplitude method, interaction picture and density matrix approach and their respective significance in quantum theory.	Ask question during the lecture to keep the students involved.	
1.4	Describe the phenomenon of spontaneous emission.		
1.5	Application of the described tools on some quantum optical phenomena.		
2.0	**Cognitive Skills**		
2.1	Be familiar with the current research topics in the field of Quantum Optics and Quantum Information	Ask students to do some related small researches	Discussion during lecture
2.2	Use mathematical tools to describe the physical models.	Ask questions during lecture	Homework, quizzes, exams.
3.0	**Interpersonal Skills & Responsibility**		
3.1	Able to apply fundamental principles to different research fields of Quantum Optics	Group project work	Evaluation the efforts of each individual member of the group in the project report
3.2	Working and discussion in groups with shared constructive responsibilities.	Present the project group-wise	Evaluation of group project as a whole
4.0	**Communication, Information Technology, Numerical**		

4.1	Carry out academic work independently using the bibliography and internet search engines.	Homework involving plotting	Assessment of homework and project
4.2	Develop critical thinking and reasoning.	Small research project	
5.0	**Psychomotor(if any)**		

5. Assessment Task Schedule 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	Homework exercises	Every week	15%
2	Short quizzes	5th, 9th week	10%
3	Lecture participation	Every week	5%
4	Mid-term exam	7th, 11th week	30%
5	Final exam	16th week	40%

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week) 4 hours

E Learning Resources

1. List Required Textbooks i-Quantum Optics, M. O. Scully and M. S. Zubairy, *Cambridge University Press*, (1997). ii- Introduction to Quantum Optics, G. Grynberg, A. Aspect and C. Fabre, *Cambridge University Press*, (2010). iii. The Quantum Theory of Light (Oxford Science Publications) 3rd Edition, Rodney Loudon (2000) ISBN-13: 978-0198501763 iV. Quantum Optics for Beginners, Zbigniew Ficek , Mohamed Ridza Wahiddin (2016) ISBN-13: 978-9814411752
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. Software: 'Mathematica'

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.) Classrooms with white board
2. Technology resources (AV, data show, Smart Board, software, etc.)

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching Encouraging students to participate in the thinking process during the lecture.

Course reports. Course evaluation.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department Students grades Students feedback
3. Procedures for Teaching Development Providing lecture notes, Putting up homework solutions for the students.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution) Course project reports Homework Quizzes
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. Keeping in touch with the current research and including the related topics of interest in the syllabus.

Name of Course Instructor: _____ Tasnim Azim _____

Signature: _____ Date Completed: _____

Program Coordinator: ___ Walid Belkacem Belhadj _____

Signature: _____ Date Received: _____

Course Title: **Numerical methods in photonics**

Course Code: **403657**

(O-4)

Date: 27/9/2018	**Institution:** Umm AL – Qura University
College: College of Applied Science	**Department:** Department of Physics

A. Course Identification and General Information

1. Course title and code: **Numerical methods in photonics (code: 403657)**
2. Credit hours: **3Hrs**
3. Program(s) in which the course is offered. **Master of Physics;**

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course

   Walid Belkacem Belhadj
5. Level/year at which this course is offered: **1st Year / Level 2**
6. Pre-requisites for this course (if any): **403656**
7. Co-requisites for this course (if any):
8. Location if not on main campus: **Main campus and Alzaher**
9. Mode of Instruction (mark all that apply):

a. traditional classroom	✓	What percentage?	90
b. blended (traditional and online)		What percentage?	
c. e-learning	✓	What percentage?	10
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. The main objective of this course

This course introduces most widely used computational photonic methods employed to describe propagation of light through homogeneous and inhomogeneous media, and its interaction (linear and nonlinear) with matter. The main goal is to provide the students with some numerical techniques that will allow them to model optical and photonic systems. Upon completion of this course, students will be familiar with modeling of modern photonics components using numerical techniques including: Modal Methods (Transfer Matrix Method (TMM) and Rigorous coupled-wave analysis (RCWA)), finite difference frequency-domain (FDFD), finite difference time-domain (FDTD) methods and finite element method (FEM). Students will also learn to model the propagation of pulses and beams in nonlinear optical materials by using 1+1D nonlinear propagation Formalism. Also, students will be able to identify the appropriate computational method for a photonics modeling problem.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field):

1- Collaborate with other educational institutions to reveal how they deal with the subject.

2- Renew and update the course references periodically.

3- Frequently check the latest discovery in science to improve the course objectives.

4- Posting some course material on the websites to help the students.

5- Assigning presentations to students to improve their research skills.

6- Focusing on generic skills.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

This course addresses graduate students who are interested in numerical methods for studying both fundamental optics and applications such as design, development, and optimization of photonic devices. The numerical techniques considered here are finite-difference method in both, time and frequency domain (FDTD & FDFD), 1+1D nonlinear propagation, Transfer Matrix Method (TMM), Rigorous coupled-wave analysis (RCWA) and finite element method (FEM). After an introductory chapter outlining the essentials of Maxwell's equations, each method is accompanied by a review of the mathematical principles in which it is based, along with sample scripts, illustrative examples of characteristic problem solving, and exercises. Note that the implementation language is MATLAB.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
❖ **Review of Basic Principles of Electromagnetic Theory:** Integral form of Maxwell's equations, Constitutive Relations, Electromagnetic Properties of a Medium, Time–domain differential Maxwell's Equations, the Wave equation, and Time harmonic Maxwell's equation, Helmholtz Equations, Waveguides and Eigenmodes.	1	3
❖ **Finite-Difference modeling (FDM):** Finite-Difference Method (FDM): Review of Linear Algebra, Finite-Differences, Finite-Difference Method (FDM), Matrix Operators, finite-Difference Analysis of optical Waveguides; Formulation of rigorous full-vectorial Modesolver; Formulation of semi-vectorial analysis, Slab waveguide analysis, Implementation. Finite-Difference Frequency-Domain (FDFD): Formulation of 2D-FDFD boundary conditions, Plane wave source, Calculating transmittance and reflectance. Beam Propagation Method: Formulation of 2D finite-difference beam propagation, method (FD-BPM), Transparent boundary condition, stability condition, Implementation.	3	9
❖ **Finite-Difference Time-Domain Method (FDTD):** Discretization of the electromagnetic fields: Yee grid Scheme, Finite-Difference Approximation of Maxwell's Equations. 1D-FDTD Analysis: Basic Update Equations, Spatial Step and Numerical Dispersion, Time Step and Stability of the Solution, FDTD Sources, Absorbing Boundary Conditions, Simulation of Lossy, Dispersive Materials, Implementation of 1D-FDTD Algorithm. FDTD Method in 2D and 3D: Yee Cell, Update Equations in 2D and 3D, Dispersion Analysis, Perfectly Matched Layer Absorbing boundary condition (PML-ABC), Stability conditions, resolution, numerical artifacts.	3	9
❖ **Modeling of Nonlinear Propagation in Waveguides:** Nonlinear Formalism: General Propagation Equation, Pulse Power and Pulse Energy, Nonlinear Polarization, Nonlinear Processes, Single-Mode Propagation Model.Nonlinear Schrödinger (NLS) Equation: Derivation of the NLS Equation, Dispersion and Self-Phase Modulation, Optical Solitons, Solitons and Raman Effects, Self-Steepening, Conservation Laws. Numerical Implementation: Fourier Method, Stepping Techniques, Discrete Fourier Grids.	2	6

❖ **Modal Methods :** 1D Geometry: Eigenmode formulation. Transfer Matrix Method (TMM); Maxwell's equations for 1D structures, Solution to Maxwell's equations in a homogeneous layer, 1D Interface, Multilayer structures, Stability of TMM, TMM Using Scattering Matrices; Calculating Transmitted and Reflected Power, 1D-Periodic Structures, 1D Cavity. 2D Geometry: Plane Wave Expansion Method (PWEM); basic 3D eigen-value problem, Formulation of efficient 1D, 2D and 3D-PWEM, Calculation of band diagrams. Rigorous Coupled-Wave Analysis (RCWA): Background of the RCWA method, Matrix wave equation, Solution to the matrix wave equation, S-matrix approach in layered periodic structures, Calculate transmission and reflection, Formulation of 2D-RCWA with fast Fourier factorization.	**3**	**9**
❖ **Finite Element Method (FEM):** Basic concepts of Finite Element Analysis: Meshing of the Geometry, Derivation of the Element Matrix, Assembly of Element Matrices, Solution of System Matrix, Postprocessing. Helmholtz Equation in 1D, Variational Formulation, Galerkin Method, Discrete Problem, Linear Finite Elements, Domain Mapping, Assembly Process, Algorithm: Plane-Wave Propagation. General Scattering Problem in 1D: Variational Formulation in 1D with Dirichlet-to-Neumann (DtN) Operator, Variational Formulation in 1D with Perfectly Matched Layers (PMLs), Discretization, Error Estimation, Mesh Refinement. Maxwell and Helmholtz Scattering Problems: Variational Forms, Transformation Rules, PML in 2D and 3D, Variational Formulation with PML. FEM for Helmholtz Scattering in 2D and 3D: Rectangular Meshes, General Assembly Process, Finite Elements for Rectangular Meshes, Finite Elements for Triangular Meshes. FEM for Maxwell's Scattering in 2D and 3D: Finite Elements for Rectangular Meshes, Finite Elements for Triangular Meshes.	**3**	**9**
	15 weeks	**45 hrs**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	**30**	**15**	**0**	**0**	**0**	**45**
	Actual	**30**	**15**	**0**	**0**	**0**	**45**
Credit	Planned	**2**	**1**	**0**	**0**	**0**	**3**
	Actual	**2**	**1**	**0**	**0**	**0**	**3**

3. Individual study/learning hours expected for students per week. **6**

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Recognize basic concepts of the most popular methods used in modern computational electromagnetism including: finite-difference method in both the time and frequency domain (FDTD & FDFD), Modal Methods (TMM and RCWA) and Finite Element Method (FEM).	**1.** Lectures. **2.** Discussions **3.** Slides and computer simulation software may be used by the teachers to clarify concepts. **4.** Problems solving **5.** Students may be asked to solve problems and to write simple programs in MATLAB language.	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams
1.2	Reproduce and implement numerical methods such as FDM, FDFD, FDTD, TMM, RCWA and FEM to simulate some modern photonic components.		
1.3	Describe the conditions and approximations under which full- and semi vectorial wave equations in the frequency domain for guided modes in planar waveguides may be derived		
1.4	Outline how nonlinear propagation in the guided modes of optical waveguides can be described efficiently in a so-called 1+1D propagation formalism based on nonlinear Schrödinger equation.		
1.5	Describe the advantages and disadvantages as well as the limitations of each studied numerical method.		
2.0	**Cognitive Skills**		

2.1	Getting a basic insight into numerical techniques for photonics.	**1.** Lectures. **2.** Discussions. **3.** Problems solving. **4.** Encourage the student to look for the information in different references. **5.** Ask the student to attend lectures for practice solving problem.	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams
2.2	Criticize the possibility of use of a certain numerical method to simulate a given photonic problem.		
2.3	Differentiate between time domain and frequency domain computational techniques.		
2.4	Implement and develop a numerical tool in MATLAB to Design, analyse and predict the behaviours of some photonic devices.		
2.5	Analyze the propagation of short and long pulses in some photonic devices and calculate reflection and transmission spectra, group velocity, field amplitudes in these devices.		
2.6	Getting a basic insight in the effects of symmetry on photonic systems.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics	**1.** Ask the students to search the internet and use the library. **2.** Encourage them how to attend lectures regularly by assigning marks for attendance. **3.** Small group discussion. **4.** Give students tasks of duties	**1.** Evaluate the scientific values of solutions. **2.** Evaluate the work in team **3.** Evaluation of the role of each student in group Project assignment **4.** Evaluation of student's presentations. **5.** Direct contact during office hours.
3.2	Ability to choose the best numerical method to simulate a given photonic device and so can analyse a photonic problem by using suitable numerical method.		
3.3	Work effectively both individually and in teams.		
3.4	Communicate effectively with peers.		
3.4	Illustrate the interrelationships among numerical design, technology, and global society, and	**1.** Discussion in class	**1.** Direct contact during office hours.

	of the societal implications of new developments in science.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrating capability in performing research as well as an effective oral and written communication.	**1.** Communicate effectively in writing, orally and through scientific diagrams. **2.** Preparing a report on some topics related to the course depending on web sites.	1. Evaluation of presentations 2. Evaluation of reports & Project assignment.
4.2	Acquire a working knowledge of basic research methodologies, data analysis and interpretation.	**1.** Independent study. **2.** Problem solving.	**1.** Homework **2.** Assignments.
4.3	Demonstrate effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.	**1.** Oral Presentations. **2.** Problem solving.	**1.** Homework. **2.** Assignments.
4.4	Use of the internet to research solution for relevant scientific problems.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments
4.5	Demonstrate enough knowledge in evaluating published works.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments.
5.0	**Psychomotor(if any)**		
5.1	N/A	N/A	N/A
5.2			

5. Assessment Task Schedule 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	Exercises & Home works	At the end of each chapter	10%
2	Participation in activities during lectures	All weeks	10%

3	Practical group projects	At the end of each chapter	10%
4	1st Periodic Exam	8th week	10%
5	2nd Periodic Exam	11th week	10%
6	Final Exam	16th week	50%
7			

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week) Students are supervised by academic advisers in physics Department and the time tables for academic advices were given to the student each semester. (8hrs per week).

E Learning Resources

1. List Required Textbooks • Numerical Methods in Photonics, by A. V. Lavrinenko, et al, CRC Press, 2017. • Analytical and Computational Methods in Electromagnetics, by Ramesh Garg, ARTECH HOUSE 2008. • Computational Electromagnetics (Second Edition), by A. Bondeson et al, Sringer, 2010. • Computational methods for electromagnetic and optical systems, (Second Edition), by J. M. Jarem & P. P. Banerjee, CRC Press, 2011.
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.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Lecture room with 25 seats, equipped with a Smart Board, projector, computers and internet connection.
2. Technology resources (AV, data show, Smart Board, software, etc.) **1.** Data Show. **2.** AV Presentations. **3.** Matlab software

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) NA

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching **1.** Discussions on coverage, preferred activity, approach. **2.** Student course evaluation at the end of the course.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department • Revision of student answer paper by another staff member. • Analysis of the grades of students. • Periodic self- assessment of the program. • Departmental council meetings.
3. Procedures for Teaching Development **1.** Sharing teaching experience during the department meetings. **2.** Constant update with the best teaching practices in case methodology. **3.** Attending workshop on effective teaching methods presented by experts on the teaching methodologies.
4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members 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 developing it. The following points may help to get the course effectiveness ▪ Reviewing student's formal and informal feedback. ▪ Evaluating relevancy of the teaching methods on a regular basis. ▪ Discussing the results with the industry experts. ▪ Program Self study. According to the above points the plan of improvement should be given.

Name of Course Instructor: _ Walid Belkacem Belhadj _____

Signature: _____ Date Completed: _____

Program Coordinator: _____ Walid Belkacem Belhadj _____

Signature: _____ Date Received: _____

Course Title: **Laser physics and Optoelectronics**

Course Code: **403659**

(O-5)

Date: 27/9/2018	**Institution:** Umm AL – Qura University
College: College of Applied Science	**Department:** Department of Physics

A. Course Identification and General Information

1. Course title and code: **Laser physics and Optoelectronics (code: 403659)**		
2. Credit hours: **3Hrs**		
3. Program(s) in which the course is offered. **Master of Physics;** (If general elective available in many programs indicate this rather than list programs)		
4. Name of faculty member responsible for the course **Mohamed M. Sabry**		
5. Level/year at which this course is offered: **1st Year / Level 2**		
6. Pre-requisites for this course (if any): **403660**		
7. Co-requisites for this course (if any):		
8. Location if not on main campus: **Main campus and Alzaher**		
9. Mode of Instruction (mark all that apply):		
a. traditional classroom	✓ What percentage?	90
b. blended (traditional and online)	What percentage?	
c. e-learning	✓ What percentage?	10
d. correspondence	What percentage?	
f. other	What percentage?	
Comments:		

B Objectives

1. The main objective of this course

The overall aim of this course is to provide the students a broad overview of the various laser systems currently being used in both scientific and industrial fields. This court also gives fundamental knowledge of wide variety of different semiconductor and organic optoelectronic devices in order to be able to understand present and future technologies for applications in lightwave systems, as well as energy conversion that has found renewed interest recently due to world-wide demands of energy saving and renewable energy production.

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

1- Collaborate with other educational institutions to reveal how they deal with the subject.

2- Renew and update the course references periodically.

3- Frequently check the latest discovery in science to improve the course objectives.

4- Posting some course material on the websites to help the students.

5- Assigning presentations to students to improve their research skills.

6- Focusing on generic skills.

C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

Course Description:

This course is designed to introduce the students to the fields of Laser and Semiconductor Optoelectronics, which deals with the physics and technology of semiconductor optoelectronic devices such as light emitting diodes, laser diodes and photodiodes, which are becoming important components in consumer optoelectronics and communication devices, and in industrial instrumentation. The course begins with a review of essential of semiconductor physics, followed by the study of interaction of photons with electrons and holes in a semiconductor, leading to the realization of semiconductor photon amplifiers, sources, modulators, and detectors.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
❖ **Quantum-mechanical description of Light-Matter Interaction:** Photon streams, Quantum states of light, Atoms, Molecules, and solids, Energy levels, Interaction of Photons with atoms, Thermal light, Luminescence and scattering.	2	6

❖ **Semiconductor Science and Light Emitting Diodes:** Semiconductor concepts and energy bands, Direct and indirect bandgap semiconductors, p-n junction principles, the p-n junction band diagram, Light-emission processes in semiconductors, Light-emitting diodes (LEDs).	3	9
❖ **Optical Amplifiers and Lasers:** Stimulated Emission Devices Lasers; Stimulated emission and light amplification, Einstein coefficients, Optical fiber amplifiers, Gas laser and He-Ne Laser, The output spectrum of a gas laser. Laser oscillation conditions, Semiconductor lasers (laser diodes), Rate equation, and Light emitters for optical fiber communications.	3	9
❖ **Semiconductor Photodetectors:** Types of photodetectors, Photoconductors, Single junction under illumination: photon and carrier-loss mechanisms, Noise in photodetection; Photodiodes, Photo-transistors, solar cells.	3	9
❖ **Introduction Organic Optoelectronics:** Organic/polymer photonic materials, electronic properties, sigma and pi bonds, Band theory, conduction in organic semiconductors and polymers, HOMO-LUMO energy levels, Charge generation by photo-excitation and recombination, Diffusion and drift of charge carriers. Advanced materials for photonic applications: Fullerenes, Carbon nanotubes, graphenes and other 2D van der Waals materials. Applications of organic photonic materials: Photovoltaic cells, Light emitting diodes, Photorefractive polymers.	4	12
	15 weeks	**45 hrs**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30	15	0	0	0	45
	Actual	30	15	0	0	0	45
Credit	Planned	2	1	0	0	0	3
	Actual	2	1	0	0	0	3

3. Individual study/learning hours expected for students per week. 6

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies

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 targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Curriculum Map

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Recall Classical and Quantum mechanical descriptions of light matter interaction.	**1.** Lectures. **2.** Discussions **3.** Slides and computer simulation software may be used by the teachers to clarify concepts. **4.** Problems solving **5.** Students may be asked to solve some problems on computer using MATLAB language.	**1-** Home work assignments. **2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams
1.2	Define the principles of functioning of most important optoelectronic devices.		
1.3	Describe most common laser operating principles and structures as well as basic physical principles related to laser pumping and semiconductors.		
1.4	Recognize various physical processes of optoelectronic transitions, and outline basic relations between material optical properties and devices in optoelectronics.		
1.5	Recognize optical and electronic properties in organic molecules and polymers that are highly critical for photonic and optoelectronic applications.		
1.6	Recognize semiconductor photon amplifiers, sources, modulators, and detectors.		
2.0	**Cognitive Skills**		
2.1	Explain and implement the equations, which determine main characteristics of optoelectronic devices.	**1.** Lectures. **2.** Discussions.	**1-** Home work assignments.

2.2	Differentiate between laser and thermal radiation	**3.** Problems solving. **4.** Encourage the student to look for the information in different references. **5.** Ask the student to attend lectures for practice solving problem. 6. Following some proofs 7. Define duties for each chapter	**2-** Group Project assignment. **3-** Question – answer session in class. **4-** Exams: quizzes, Mid-term and final exams.
2.3	Apply the knowledge of different optoelectronic components to solve problems mainly in the physics and technical areas.		
2.4	Analyze operational modes of photonic devices, in order to select suitable type for given applications.		
2.5	Explain the interconnections between device design, mode of operation and characteristics, and the overall efficiency of optoelectronic devices and signal transmission.		
2.6	Explain the principles of operation of quantum lasers, calculate characteristics of optical resonators.		
2.7	Calculate parameters and design simple systems for optical communication or energy conversion.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics.	**1.** Ask the students to search the internet and use the library. **2.** Encourage them how to attend lectures regularly by assigning marks for attendance. **3.** Small group discussion. **4.** Give students tasks of duties. **5.** Discussion in class	**1.** Evaluate the scientific values of solutions. **2.** Evaluate the work in team **3.** Evaluation of the role of each student in group Project assignment **4.** Evaluation of student's presentations. **5.** Direct contact during office hours. **6.** Direct contact during office hours.
3.2	Show the ability to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.		
	Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.		
	Illustrate the interrelationships among numerical design, technology, and global society, and of the societal implications of new developments in science.		
4.0	**Communication, Information Technology, Numerical**		

4.1	Demonstrating capability in performing research as well as an effective oral and written communication.	**1.** Communicate effectively in writing, orally and through scientific diagrams. **2.** Preparing a report on some topics related to the course depending on web sites.	1. Evaluation of presentations 2. Evaluation of reports & Project assignment.
4.2	Acquire a working knowledge of basic research methodologies, data analysis and interpretation.	**1.** Independent study. **2.** Problem solving.	**1.** Homework **2.** Assignments.
4.3	Demonstrate effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.	**1.** Oral Presentations. **2.** Problem solving.	**1.** Homework. **2.** Assignments.
4.4	Use of the internet to research solution for relevant scientific problems.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments
4.5	Demonstrate enough knowledge in evaluating published works.	**1.** Independent study.	**1.** Performance in problem solving. **2.** Assignments.
5.0	**Psychomotor(if any)**		
5.1	N/A	N/A	N/A
5.2			

5. Assessment Task Schedule 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	Exercises & Home works	At the end of each chapter	10%
2	Participation in activities during lectures	All weeks	10%
3	Practical group projects	At the end of each chapter	10%

4	1st Periodic Exam	8th week	10%
5	2nd Periodic Exam	11th week	10%
6	Final Exam	16th week	50%

D. Student Academic Counseling and Support

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E Learning Resources

1. List Required Textbooks **6-** Fundamentals of Photonics, Saleh&Teich, 2nd Ed., 2007, Wiley. **7-** Photonics: Optical Electronics in Modern Communications 6th Edition, by A. Yariv and P. Yeh, Oxford University Press, New York, 2007. **8-** Fundamentals of Guided-Wave Optoelectronic Devices 1st Edition, Kindle Edition, by William S. C. Chang, Cambridge University Press, 2009. **9-** Integrated Optics: Theory and Technology, by Hunsperger Robert, Springer-Verlag Berlin Heidelberg, 2002.
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Name of Course Instructor: _ Mohamed M. Sabry _____

Signature: _____ Date Completed: _____

Program Coordinator: _____ Walid Belkacem Belhadj _____

Signature: _____ Date Received: _____