جامعة أم القرى

كلية العلوم التطبيقية

الماجستير في الفيزياء الطبية بالمقررات

والرسالة

Learning and Teaching

4/1 Learning Outcomes and Graduate Specifications

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

(a) Medical Physics

4/1/2 Curriculum Study Plan Table

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 1	403677-3	Medical Physics Instrumentations	Required		3
	403678-3	Advanced Radiotherapy Physics	Required		3
	403680-2	Advanced Medical Imaging (1)	Required		2
	403691-2	Radiotherapy Dosimetry	Required		*2*
	403685-2	Advanced Nuclear Medicine	Required		*2*
Total credits hours for level 1					**12 hrs**
Level 2	403683-2	Medical Radiation Protection	Required		2
	403684-3	Brachytherapy Physics	Required		3
	403686-3	Computational Methods in Medical Physics	Required		3
	403681-2	Cell Biophysics	Required		*2*
Level 3		**Total credits hours for level 2**			***10 hrs***
	Selective Topics				2
	403690-5	Thesis	**Continue ..**	**Part (1)**	*5*
Total credits hours for level 3					**7 hrs**
Level 4	**Selective Topics**				2
	403690-5	Thesis	**Continue ..**	**Part (2)**	*5*
Total credits hours for level 4					***7 hrs***
Total credits hours for MSc of Medical Physics					***36 hrs***

Selective topics (level 3 and level 4)				
403687-2	Advanced Medical Imaging (2)	Elective		2 hrs
403679-2	Radiobiology	Elective		2 hrs
403688-2	Radiation Measurements in Diagnostic Radiology	Elective		2 hrs
403692-2	Image Anatomy	Elective		2 hrs
403682-2	Nanotechnology for Bio Medical Applications	Elective		2 hrs

Master of Medical Physics by courses and dissertation

Level one

First semester of the first year

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 1	403677-3	Medical Physics Instrumentations	Required		**3**
	403678-3	Advanced Radiotherapy Physics	Required		**3**
	403680-2	Advanced Medical Imaging (1)	Required		**2**
	403691-2	Radiation Dosimetry	Required		***2***
	403685-2	Advanced Nuclear Medicine	Required		***2***
Total credits hours for level 1					12 hrs

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Medical Physics Instrumentations

Course Code: 403677-3

Date: 5/10/2018.	**Institution**:Umm ALQura University
College of Applied Sciences	**Department**: Physics Department .

A. Course Identification and General Information

1. Course title and code: Medical Physics Instrumentations, 403677-3
2. Credit hours: 3 **(3+0+0) Hr**
3. Program(s) in which the course is offered. Master of Medical Physics

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Prof. Allehyani S.h
5. Level/year at which this course is offered: Level 1 / First year
6. Pre-requisites for this course (if any): Non
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?	80
b. Blended (traditional and online)	√	percentage?	20
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

   1. Study of main concepts of Medical Radiation Physics as follows:

Introducing different types of radiation specially those radiation with ionizing radiation (direct or in-direct ///ionizing radiation) or none-ionizing radiation. Student also study radiation Units, Exposure distribution within the Patient during radiotherapy treatment. X-ray Production with high energy also introduce.

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)

To improve the students' expert in the medical physics instrumentations :

- Encourge students to register to webinars and worshops related to the medical physics instrumentations in medical imaging and radiation therapy

Encourage students to write frequently report about selected research topics related to the field

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
Classification of Ionizing Radiation **1- Directly and Indirectly Ionizing Radiation** **2- Low LET and High LET Radiation** **Use of Ionizing Radiation** **Classification of Directly Ionizing Radiation** **1- Electrons** **2- Positrons** **3- Heavy Charged Particles** **4- Pions** **Classification of Indirectly Ionizing Photon Radiation** **1- Radiation Quantities and Units** **2- Dose Distribution in Water for Various Radiation Beams** **3- Dose Distribution in Water for Photon Beams** **4- Dose Distribution in Water for Neutron Beams** **5- Dose Distribution in Water for Electron Beams** **6- Dose Distribution in Water for Heavy Charged Particle Beams** **7- Choice of Radiation Beam and Prescribed Target Dose**	3	9

Production of X Rays **X-Ray Line Spectra** **1- Characteristic Radiation** **2- Fluorescence Yield and Auger Effect** **3- Emission of Radiation by Accelerated Charged Particle (Bremsstrahlung Production).** **4- Interactions of Charged Particles with Matter** **5- Interactions of Photons with Matter** **6- Energy Transfer and Energy Absorption in Photon Interactions with Matter** **1- Interactions of Neutrons with Matter** **2- Machines for Production of Clinical Fast Neutron Beams** **3- Kinetics of Radioactive Decay** **4- Modes of Radioactive Decay** **5- Production of Radionuclides** **6- Waveguide Theory** **Particle Accelerators in Medicine** **Basic Characteristics of Particle Accelerators.**	4	12
Mid-term Exam		
Practical Use of X Rays **Medical Physics** **Industrial Use of X Rays** **X-Ray Crystallography** **X-Ray Spectroscopy** **X-Ray Astronomy** **Practical Considerations in Production of X Rays** **Traditional Sources of X Rays: X-Ray Tubes** **Crookes Tube and Crookes X-Ray Tube** **Coolidge X-Ray Tube** **Carbon Nanotube Based X-Ray Tube**	4	12

X-ray production from medical equpments:- **Conventional X-ray machine and Computed Tomography** **Circular Accelerators:** **1- Betatron** **1- Cyclotron** **2- Microtron** **3- Synchrotron** **4- Synchrotron Light Source** **Clinical Linear Accelerator** **1- Linac Generations** **2- Components of Modern Linacs** **3- Linac Treatment Head** **4- Configuration of Modern Linacs** **Pulsed Operation of Linacs** **Practical Aspects of Megavoltage X-Ray Targets and Flattening Filters**	4	12
Total	15 weeks	45 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	*3*		-------	-----		45
	Actual	3					45
Credit	Planned	3					3
	Actual	3					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	discuss the radiation classification. Such as Quantities and Units. Dose, Dose Distribution	Lectures Visual presentation - Discussions - Seminars .	Exams Midterms Final examination .
1.2	Knowledge of the interactions of neutrons with matter in medicine such as mechanisms for the production of rapid clinical neutron beams, and the production of radionuclides.	Lectures Visual presentation - Discussions - Seminars .	Home work. Short Quizzes
1.3	Understanding the X-ray , x-ray crystallography, X-ray spectroscopy and X-ray spectroscopy	Lectures Visual presentation - Discussions	Home work. Short Quizzes
2.0	**Cognitive Skills**		
2.1	Enabling students to interpret and general knowledge of x-ray mechanisms	Lectures Visual presentation - Discussions.	Exams Midterms Final examinatio n.
2.2	Enable students to **analyses** the different type of radiation.	Discussions - Seminars	Short Quizzes
2.3	Student's ability to **write** Report for different type of interactions	Lectures Visual presentation - Discussions .	Home work. Short Quizzes
3.0	**Interpersonal Skills & Responsibility**		
3.1	Practice radiography of patients by default	Visual presentation - Discussions - Seminars	Exams
3.2	Collective and individual action in methods of determining radiation quantities	- Discussions - Seminars	Home work. Short Quizzes
4.0	**Communication, Information Technology, Numerical**		
4.1	Radiation dose measurement skill	Visual presentation - Discussions - Seminars	Exams
4.2	Skill analysis of measurements and drawing mode .	Lectures Visual presentation - Discussions	Home work. Short Quizzes
4.3	**illustrate** how to Search in the internet and using software programs to deal with technique	- Discussions - Seminars	Home work.
5.0	**Psychomotor(if any)**		
5.1	Not applicable	Not applicable	Not applicable
5.2	Not applicable	Not applicable	Not applicable

Learining outcome Materix (Medical Radiation Physics Course)

Topic In weeks	Knowledge			Cognitive Skills			Interpersonal Skills & Responsibility		Communication skills, IT skills and numerical skills			Psychomotor
	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	NA
1st, 2nd and 3ed Week lectures		√		√	√	√	√	√	√	√	√	NA
4th, 5th , 6th and 7th Week lectures			√	√		√	√	√		√	√	NA
8th, 9th , 10th and 11th Week lectures			√	√			√	√	√		√	NA
12th, 13th , 14th and 15th Week lectures	√		√	√		√		√		√	√	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	Midterm exam	5th week	20 %
2	Essay , quizzes, homework and presentation	10th week	30%
5	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)

E Learning Resources

1. List Required Textbooks The Physics of Radiology (4TH edn), Thomas, 1983 Fundamental Physics of Radiology (3rd edition) by W.J.Merdith, and J.B.Massey 2013 Rachel A: Powsner, Mattew R. Palmer, Edward R. Powsner " Essential of Nuclear Medicine Physics and Instrumentation, 3rd Edition, Feb 2013, Wiley Blackwell
2. List Essential References Materials (Journals, Reports, etc.) 1) Radiation Physics for Medical Physicists, Second, Enlarged Edition, Biological and Medical Physics, Biomedical Engineering ISSN 1618-7210 ISBN 978-3-642-00874-0 e-ISBN 978-3-642-008745-7, DOI 10.1007/978-3-642-008745-7. 2) PRINCIPLES and PRACTICE of RADIATION ONCOLOGY Matthew B. Podgorsak, PhD Department of Radiation Oncology.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. https://www.uni-oldenburg.de/en/medical-radiation-physics/
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.) There is enough classrooms with a good accomodation
2. Technology resources (AV, data show, Smart Board, software, etc.) Computers with simulation software and a good access to internet are required for web-based projects
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
   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
   Instructors, who teach the course, have regualer meeting to update the course materials and activities

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..
   Evaluation by the accreditation committee in the university.

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.

Name of Course Instructor: _____

Signature: *Prof. Allehyani S H* **Date Completed: 5-10-2018**

Program Coordinator: Taha Alfawwal

Signature: _____ **Date Received: _____**

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Advanced RadiotherapyPhysics

.Course Code: 403678–3

Date 23-10-2108-	**Institution:** ..uqu.
College: Faculty of Applied Science...	**Department:** .... Physics department...

A. Course Identification and General Information

1. Course title and code: advanced radiation therapy and **403678–3**		
2. Credit hours: 3 **(3+0+0) Hr** hrs		
3. Program(s) in which the course is offered. Master of Medical 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. Samir Nitto		
5. Level/year at which this course is offered: Level 1 / First year		
6. Pre-requisites for this course (if any):		
7. Co-requisites for this course (if any):		
8. Location if not on main campus: Abdeia Campus – Alzahr 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. The main objective of this course: This course explains the analysis of radiation doses and explains the physical and medical quantities used to measure doses in hospitals and radiation therapy centers. The explanation of the planning of radiotherapy is one of the most important contents of this course, with the distribution of doses of radiation and the curves of the similarity of doses in water. It is important for the master student to the collection of data for therapeutic package modeling, calculation of corrections, formation and separation of therapeutic packages. The student will also learn about electron therapy for cases that are preferred to be treated and how to determine the absorbed dose in this case and the protocols followed.

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)

To improve the students' expert in the radiation therapy physics :

- Encourge students to register to webinars and worshops related to the radiation therapy

Encourage students to write frequently report about selected research topics related to the field

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
Dose distribution and scatter analysis: **1. Phantoms** **2. Depth dose Distribution (PDD- TAR- SAR)**	3	9
A system of dosimetric calculations: **1- Dose Calculation Parameters** **2- Practical Applications** **Other Practical Methods of Calculating Depth Dose Distribution**	3	9
Mid-term 1		

Treatment Planning I: Isodose distributions: **1- Isodose Chart** **2- Measurement of Isodose Curves** **3- Parameters of Isodose Curves** **4- Wedge Filters** **5- Combination of Radiation Fields** **6- Isocentric Techniques** **7- Wedge Field Techniques** **8- Tumor Dose Specification for External Photon Beams**	3	9
Treatment Planning II: Patient data, Corrections, and set-up: **Acquisition of Patient Data** **1- Treatment Simulation** **2- Treatment Verification** **3- Corrections for contour Irregularities** **4- Corrections for Tissue Inhomogeneities** **5- Tissue Compensation** **Patient Positioning**	2	6
Treatment Planning III: **1- Field shaping** **2- skin dose and field separation** **3- Field Blocks** **4- Field Shaping** **Skin Dose and Separation of Adjacent Fields**	2	6
Electron beam therapy: **1- Electron Interactions** **2- Energy Specification and Measurements** **3- Determination of Absorbed Dose** **4- Characteristics of Clinical Electron Beams** **5- Treatment Planning** **6- Field Shaping** **7- Electron Arc Therapy** **Total Skin Irradiation**	2	6
Total	15 weeks	45 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	3					45
	Actual	3					45
Credit	Planned	3					3
	Actual	3					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 the radiation therapy planning process	1- Lectures 2- Discussions Visual presentation	
1.2	Define the location of cancerous tumors in the body and the dose distribution process	1- Lectures 2- Discussions Visual presentation	
1.3	producing the process of measurement and treatment of various radiotherapy devices	3- Lectures 4- Discussions Visual presentation.	
2.0	**Cognitive Skills**		
2.1	Summarizing different of tumor cancers	**Encourage** the student to look for some books in the different references describing radiation.	
2.2	justify the Use of therapeutic planning for different therapeutic fields	**Ask** the student to attend lectures for radiation effects.	
2.3	Calculation how to reduce exposure to peaceful cells	Homework , assignments.	
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate the work in front of treatment planning specialists.	Ask the students to search the internet and use the library. Encourage them how to attend lectures regularly by assigning marks for attendance.	

3.2	Evaluate the Skill in planning and handling	Teach them how to cover missed lectures. Give students tasks of duties	
4.0	**Communication, Information Technology, Numerical**		
4.1	Outline how to communicating with: Peers, Lecturers and Community.	Creating working groups with peers to collectively prepare: solving problems and search the internet for some topics.	Discussing a group work sheets.
4.2	The student should **interpret** how to Know the basic principles using the internet for radiation measurements.	Give the students tasks to measure their: practical skills, analysis and problem solving.	Discuses with them the results of computations analysis and problem solutions.
4.3	The student should **appraise** how to Use the computer skills and library.	Encourage the student to ask for help if needed.	Give homework's to know how the student understands the numerical skills.
4.4	demonstrate how to Search I the internet and using software programs to deal with technique.	Encourage the student to ask good question to help solve the problem.	Give them comments on some resulting numbers.
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	20 %
2	Research assignment, Quizzes, presentation, homework and reports	10th week	30%
3			
4	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)
1- 8-office hours per week in the lecturer schedule. 2- The contact with students by e-mail and website.

E Learning Resources

1. Required Text(s) **Hendee's Radiation Therapy Physics, Fourth Edition, Todd Pawlicki , Daniel J. Scanderbeg, George Starkschall, , February 2016. (Reviwer 1)** Radiation Therapy Physics, (3rd edition.),William R, Hendee, Geoffrey S. Ibbott and Eric G. Hendee, Willey-Liss, 2004.
2.List Essential References Materials (Journals, Reports, etc.) https://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html
3.List Electronic Materials, Web Sites, Facebook, Twitter, etc. https://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.htm.
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.) There is enough classrooms with a good accomodation
2. Technology resources (AV, data show, Smart Board, software, etc.) Computers with simulation software and a good access to internet are required for web-based projects
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 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 Instructors, who teach the course, have regualer meeting to update the course materials and activities
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.. Evaluation by the accreditation committee in the university.
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 2.According to point 1 the plan of improvement should be given.

Name of Course Instructor: Prof.Dr.Samir Nitto _____

Signature: _____ Date Completed: _____

Program Coordinator: ___Taha Al-fawwal
Signature: _____ Date Received: _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanved Medical Imaging (1)

Course Code..... (403680-2)..

Date: 20....–.....–.....	**Institution**:Umm AL-QUra Uiversity
College: College of Aplied Sciences.	**Department**: .Physics Department.

A. Course Identification and General Information

1. Course title and code: advanced Medical Imaging (1) – 403680-2
2. Credit hours: 2 **(2+0+0) Hr**
3. Program(s) in which the course is offered. Master of Medical Physics

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Prof. Allehyani SH
5. Level/year at which this course is offered: **First semester / First year**
6. Pre-requisites for this course (if any): No Pre-requisites
7. Co-requisites for this course (if any): No Co-requisites
8. Location if not on main campus: on main campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	√	percentage?	80%
b. Blended (traditional and online)	√	percentage?	20%
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

Enable the student to learn how to make a picture of a particular member of the human body using medical imaging devices and understanding the meaning of physics to build the image on the camera

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)

In this section, students learn about medical imaging devices used in hospitals, such as CT scans, magnetic resonance imaging devices, and nuclear medicine devices such as camera cameras and digital cameras. It is also exposed to the method of image formation and factors affecting image formation in addition to its medical structure and common names. In addition to dealing with radioisotopes in medicine and how to obtain diagnostic images for a number of cases. The course also discusses the quality of the images of these medical devices and how to monitor them and ensure their safety and suitability for daily or periodic work. This course explains the computerization of these devices and how to connect them to computer systems

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
Digital Image Processing	2	4
Image construction	1	2
Radiography	1	2
X- ray	1	2
Interaction of radiation with matter	1	2
Radiation Detectors	1	2
Screen Detectors	1	2
Image Capacitor	1	2
Image quality	1	2
Computed tomogaphay (CT)	2	4
Electron tomography	1	2
Magnetic resonance imaging (MRI)	1	2
Gamma Camera	1	2

2. Course components (total contact and credit hours per semester):							
		Lecture	**Tutorial**	**Laboratory/ Studio**	**Practical**	**Other**	**Total**
Contact Hours	Planned	2	--	------	-----	-----	30
	Actual	2	----	-----	-----	-----	30
Credit	Planned	2					2
	Actual	2					2

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	Understanding Radiographic Imaging (X-RAY)	Lectures - Seminars - Discussions - Video presentations	Tests - Reports - Image analysis
1.2	Describing the Role of operation of an x-ray imaging	Lectures - Seminars - Discussions - Video presentations	Tests - Reports - Image analysis
1.3	Definning Concept of Imaging using Magnetic Resonance Imaging (MRI)	Lectures - Seminars - Discussions - Video presentations	Tests - Reports - Image analysis
2.0	**Cognitive Skills**		
2.1	Skill how to iamge clips	Lectures - Seminars - Discussions - Video presentations	Tests - Reports - Image analysis

2.2	The skill of locating tumor size using imaging	Lectures - Seminars - Discussions - Video presentations	Tests - Reports - Image analysis
3.0	**Interpersonal Skills & Responsibility**		
3.1	Participation with specialists in the field of radiography	Lectures - Seminars - Discussions - Video presentations	Tests - Reports - Image analysis
3.2			
4.0	**Communication, Information Technology, Numerical**		
4.1	Acquiring communication skills and taking field experiences	Lectures - Seminars - Discussions - Video presentations	Tests - Reports - Image analysis
4.2	Training in medical imaging		
5.0	**Psychomotor(if any)**		
5.1	Not Applicable	Not Applicable	Not Applicable
5.2			

Learining outcome Materix (Medical Imaging Optional Course)

Topics per weeks	**Knowledge**	**Cognitive Skills**	Interpersonal Skills & Responsibility	**Communication skills, IT skills and numerical skills**	Psychomotor
	1.1 1.2 1.3	2.1 2.2	3.1.	4.1 4.2	**NA**
1st, 2nd and 3ed Weeks lectures	√ √ √	√	√	√ √	**NA**
4th, 5th , 6th and 7th Weeks lectures	√ √	√	√	√	**NA**
8th, 9th , 10th and 11th Weeks lectures	√ √		√	√	**NA**
12th, 13th , 14th Weeks lectures	√ √ √	√	√	√	**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	Midterm exam	5th week	20 %
2	Essay , quizzes, homework and presentation	10th week	30%
5	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) Sunday 8-10 Am Tuesday 9-10 Am Wednesday 11-12 Am

E Learning Resources

1. List Required Textbooks Medical Imaging Second Edition , Suetens , 2009, ESBN-13 978-0-511-59640-7 Rachel A: Powsner, Mattew R. Palmer, Edward R. Powsner " Essential of Nuclear . Medicine Physics and Instrumentation, 3rd Edition, Feb 2013, Wiley Blackwell
3. List Essential References Materials (Journals, Reports, etc.)
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. https://www.amazon.com/Fundamentals-Medical-Imaging-Paul-Suetens/dp/0521519152
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.) There is enough classrooms with a good accomodation
2. Technology resources (AV, data show, Smart Board, software, etc.) Computers with simulation software and a good access to internet are required for web-based projects
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 • 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 • Instructors, who teach the course, have regualer meeting to update the course materials and activities

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..
    - Evaluation by the accreditation committee in the university.

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.

Name of Course Instructor: Prof. Allehyani SH

Signature: _ *Prof. Allehyani S H* **Date Completed:**

Program Coordinator: _____Taha Al-Fawwal

Signature: _____ Date Received:

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Radiotherapy Dosimetry

Code: 403691-2

Date: 2018-10-17.	**Institution**: Umm AQura University.
College: . Applied Sciences College..... .	**Department**: .... Physics Department.

A. Course Identification and General Information

1. Course title and code: Radiotherapy Dosimetry – 403691-2
2. Credit hours: 2 Hours
3. Program(s) in which the course is offered. Master of Medical Physics Degree

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Dr. Amani Alalawi
5. Level/year at which this course is offered: Level 1/first year
6. Pre-requisites for this course (if any): Non
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?	70
b. Blended (traditional and online)	√	percentage?	10
c. E-learning	√	percentage?	20
d. Correspondence		percentage?	
f. Other		percentage?	

Comments: f. Other:- Easements, Presentation

B Objectives

1. The main objective of this course
- To understand the theoretical basis for medical dosimetry
- To have knowledge of the interaction of ionizing radiation with matter.
- To discuss the use of each dosimeter and their underpinning theory.

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)

To improve the students' expert in the dosimetry in radiotherapy

1.Encourge students to register to webinars and worshops related to the dosimetry in radiotherapy

2.Encourage students to research assignment about selected specialized topics related to the field

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

Course Description: This course is designed to teach students how to calculate and measure radiation dose in different ways and techniques. The student has to know the radiation dose and the difference between it and other similar concepts. The student will also learn how to transfer energy from therapeutic or diagnostic radiation to the patient. Therefore, the radiation exposure and the absorbed dose must be included in the contents of the course and the work theory of these different devices and the different between them.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
1. Prime quantities in medical radiation dosimetry **2. Energy Transfer (kerma and absorbed dose)** **3. Electronic equilibrium** **4. Basic concepts in metrology (traceability and uncertainty).**	2	4
5. Theoretical basis for medical dosimetry (cavity theory). **6. Determination of absorbed dose using an absolute ion chamber** **7. Effect of Temperature and Pressure on Ionization Measurements** **8. Exposure – The Roentgen** **9. Standard Air Chamber**	3	6

10. Practical Ion Chamber- The Thimble Chamber 11. Effective Atomic Number 12. Types of Ion Chambers 13. Solid State Detectors-The Diode, TLD, Chemical Dosimetry, Film as a dosimeter, the Calorimeter 14. Basics of the TRS-398 measurement protocol for high-energy photons and electrons	3	6
Mid-term 1		
15. Dosimetry problems related to measurements in standard conditions using the TRS-398 formalism 16. Dosimetry problems related to measurement in non-standard conditions. (measurements in the build-up zone, in small fields or in heterogeneous media). 17. Fluence spectra and dose deposition for simple situations using the EGSnrc Monte Carlo user codes flurznrc and dosnrcrz 18. Signal-generating mechanisms and the basis characteristics for a range of dosimetry systems such as ion chambers and solid-state detectors 19. Dose deposition kernel of a radionuclide decaying in water. 20. Concept of biokinetic distribution models	2	4
21. Organ doses from S-factors and MIRD values 22. Sources of ionizing radiation in medical radiation dosimetry 23. Quantities and metrology 24. Monte Carlo introduction	2	4
25. Charge-particle and radiation equilibria 26. Monte Carlo calculations 27. Cavity theory and ionometry 28. Dosimetry protocols 29. Micro dosimetry 30. Internal dosimetry 31. Chemical dosimetry 32. EPR and Film dosimetry in practice 33. Solid-state dosimetry	3	6
Total	15 weeks	30

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	2					30
	Actual	2					30
Credit	Planned	2					2
	Actual	2					2

3. Individual study/learning hours expected for students per week.	4

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

Course Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning, assessment, and teaching.

The ***National Qualification Framework*** provides five learning domains. Course learning outcomes are required. Normally a course has should not exceed eight learning outcomes which align with one or more of the five learning domains. Some courses have one or more program learning outcomes integrated into the course learning outcomes to demonstrate program learning outcome alignment. The program learning outcome matrix map identifies which program learning outcomes are incorporated into specific courses.

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. **Fourth**, if any program learning outcomes are included in the course learning outcomes, place the @ symbol next to it.

Every course is not required to include learning outcomes from each domain.

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 the **Prime quantities in medical radiation dosimetry**	**5- Lectures** **6- Discussions** **7- Visual presentation**	Exams Midterms Final examination.

1.2	Defining the absorbed dose using an absolute ion chamber	**3- Lectures** **4- Discussions** **5- Visual presentation**	Home work. Quizzes
1.3	Describing Signal-generating mechanisms and the basis characteristics for a range of dosimetry systems such as ion chambers and solid-state detectors	**1- Lectures** **2- Discussions** **3- Visual presentation**.	Continuous discussions with the students during the lectures.
2.0	**Cognitive Skills**		
2.1	Summarizing the **Sources of ionizing radiation in medical radiation dosimetry**	**Encourage** the student to look for some books in the different references describing radiation.	Midterm exam Quizzes.
2.2	Evaluating **Organ doses from S-factors and MIRD values**	**Ask** the student to attend lectures for radiation effects.	Doing homework. Check the problems solution.
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate the Dosimetry protocols.	Ask the students to search the internet and use the library. Encourage them how to attend lectures regularly by assigning marks for attendance.	Quizzes of some previous lectures. Ask the absent students about last lecture.
3.2	Evaluate the Dose deposition kernel of a radionuclide	Teach them how to cover missed lectures. Give students tasks of duties	Discussion during the lecture.
4.0	**Communication, Information Technology, Numerical**		
4.1	Outline how to communicating with: Peers, Lecturers and Community.	Creating working groups with peers to collectively prepare: solving problems and search the internet for some topics.	Discussing a group work sheets.
4.2	The student should **interpret** how to Know the basic principles of **Internal dosimetry** .	Give the students tasks to measure their: practical skills, analysis and problem solving.	Discuses with them the results of computations analysis and problem solutions.

4.3	The student should **appraise** how to Use the computer skills and library.	Encourage the student to ask for help if needed.	Give homework's to know how the student understands the numerical skills.
4.4	demonstrate how to Search I the internet and using software programs to deal with technique.	Encourage the student to ask good question to help solve the problem.	Give them comments on some resulting numbers.
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	10 %
2	Midterm 1	10th week	20%
3	Midterm 1	15th week	20%
4	Homework + reports	During the semester	10%
5	Final exam	End of semester	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)

1- Eight office hours per week in the lecturer schedule.

2- The contact with students by e-mail and website.

E Learning Resources

1. List Required Textbooks

Introduction to Radiological Physics and Radiation Dosimetry, 1991, Frank H. Attix, John Willey and Sons, 1991

Hendee's Radiation Therapy Physics, Fourth Edition, Todd Pawlicki , Daniel J. Scanderbeg, George Starkschall, , February 2016. (Reviewer 1)

Principles of Radiological Physics, Donald Graham and Paul Clock, 2007

Introduction to Radiological Physics and Radiation Dosimetery, Frank H. Attix, John Willey and Sons, 1986.

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

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

https://www.zapmeta.ws/ws?q=radiation%20dosimetry&asid=ws_gc9_09&mt=b&nw=g&de=c&ap=1o2

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

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)

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

There is enough classrooms with a good demonstration rooms in building W in Faculty of Science

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

Data show and computers with simulation laboratory and a good access to internet are required for web-based projects

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

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching 1-Course reports 2-Course questionares and program questionares
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 Instructors, who teach the course, have regualer meeting to update the course materials and activities
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.. 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 • Student evaluation • Course report • Program report • Program Self study According to point 1 the plan of improvement should be given.

Name of Course Instructor: Dr. Amani Alalawi _____

Signature: _____ **Date Completed:** _____

Program Coordinator: ____**Taha Alfawwal**
Signature: _____ **Date Received:** _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advanced Nuclear Medicine

Course Code: 403685-2

Date: 20.-.....-..... 10/10/2018...	**Institution:** UMM ALQUA UNIVERSITY.....
College: ..... Faculty of Applied Science....	**Department:** ..... Physics Department.....

A. Course Identification and General Information

1. Course title and code: Advanced Nuclear Medicine 403685-2
2. Credit hours: 2 Hours
3. Program(s) in which the course is offered. Master of Medical Physics Degree

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Ramadan Ali Hassan
5. Level/year at which this course is offered: Level 1/ First year
6. Pre-requisites for this course (if any): Noon
7. Co-requisites for this course (if any): Noon
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?	10
c. E-learning	√	percentage?	20
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

   In this section, the student will learn about nuclear medicine equipment, materials and medical chemical preparations used in nuclear medicine. As well as the method of production and production places in addition to the composition and medical names common. In addition to dealing with radioisotopes in medicine and how to obtain diagnostic images for a number of cases. It also discusses the quality of these medical devices and how to monitor them and ensure their safety and suitability for daily or periodic work. This course explains the computerization of these devices and how to connect them to computer systems.

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)

To improve the students' expert in the nuclear medicine imaging

1.Encourge students to register to webinars and worshops related to the advances in nuclear medicine imaging .

2-Encourage students to write frequently report about selected research topics related to the field

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
RADIOACTIVE DECAY:- 1. Exponential Decay, Specific Activity, Decay Of A Mixed Radionuclide Sample 2. Parent-Daughter Decay	1	2
RADIATION COUNTING SYSTEMS:- 1. NaI(Tl) well counter 2. 2. Counting with conventional NaI(Tl) detectors Liquid scintillation counters 4. Gas-filled detectors 5. In vivo counting systems	2	4
THE GAMMA CAMERA: PERFORMANCE CHARACTERISTICS:- 1. basic performance characteristics 2. detector limitations: nonuniformity and nonlinearity measurements of gamma camera performance	2	4

IMAGE QUALITY IN NUCLEAR MEDICINE:- 1. basic methods for characterizing and evaluating image quality 2. spatial resolution 3. contrast 4. noise	2	4
SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY:- 1. SPECT systems 2. practical implementation of SPECT 3. performance characteristics of SPECT systems applications of SPECT	3	6
POSITRON EMISSION TOMOGRAPHY:- 1. basic principles of PET imaging 2. PET detector and scanner designs 3. data acquisition for PET 4. data corrections and quantitative aspects of PET 5. performance characteristics of PET systems clinical and research applications of PET	3	6
RADIATION SAFETY IN NUCLEAR MEDICINE:- 1. quantities and units 2. regulations pertaining to the use of radionuclides 3. safe handling of radioactive materials disposal of radioactive waste	2	4
Total	15 weeks	30 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	2	7				37
	Actual	2					
Credit	Planned	2					
	Actual	2					

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

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 THE Exponential Decay, Specific Activity, Decay Of A Mixed Radionuclide Sample	8- Lectures 9- Discussions Visual presentation	Exams Midterms Final examination.
1.2	DEFINING THE RADIATION COUNTING SYSTEMS	6- Lectures 7- Discussions Visual presentation	Home work. Quizzes
1.3	DESCRIBING THE THE GAMMA CAMERA: PERFORMANCE CHARACTERISTICS	10- Lectures 11- Discussions Visual presentation.	Continuous discussions with the students during the lectures.
2.0	**Cognitive Skills**		
2.1	Summarizing the IMAGE QUALITY IN NUCLEAR MEDICINE	Encourage the student to look for some books in the different references describing radiation.	Midterm exams Quizzes.
2.2	Evaluating Models of Dose Rate and Dose Calculation	Ask the student to attend lectures for radiation effects.	Doing homework. Check the problems solution.
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate the SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY.	Ask the students to search the internet and use the library. Encourage them how to attend lectures regularly by assigning marks for attendance.	Quizzes of some previous lectures. Ask the absent students about last lecture.
3.2	Evaluate the clinical and research applications of PET	Teach them how to cover missed lectures. Give students tasks of duties	Discussion during the lecture.
4.0	**Communication, Information Technology, Numerical**		
4.1	Outline how to communicating with: Peers, Lecturers and Community.	Creating working groups with peers to collectively prepare: solving problems and search the internet for some topics.	Discussing a group work sheets.
4.2	The student should interpret how to Know the basic principles of Internal dosimetry .	Give the students tasks to measure their: practical skills, analysis and problem solving.	Discuses with them the results of computations analysis and problem solutions.
4.3	The student should appraise how to Use the computer skills and library.	Encourage the student to ask for help if needed.	Give homework's to know how the student understands the numerical skills.
4.4	demonstrate how to Search I the internet and using software	Encourage the student to ask	Give them

	programs to deal with technique.	good question to help solve the problem.	comments on some resulting numbers.
5.0	**Psychomotor(if any)**		
5.1	Not applicable		
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	Midterm 1	5th week	10 %
2	Midterm 1	10th week	20%
3	Midterm 1	15th week	20%
4	Homework + reports	During the semester	10%
5	Final exam	End of semester	40 %
6			
7			
8			

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- 8-office hours per week in the lecturer schedule. 2- The contact with students by e-mail and website.

E Learning Resources

1. List Required Textbooks Physics in nuclear medicine, 4th Add 2012, Simon R. Cherry, James Sorenson and Michael E. Phelps, Philadelphia, PA 19103-2899, ISBN: 978-1-4160-5198-5 (Reviewers 1 and 2)
2. List Essential References Materials (Journals, Reports, etc.) -Rachel A. Powsner, Edward R. Powsner "Essential Nuclear Medicine Physics" Blackwell Publishing Ltd 2006 -Peter F. Sharp, Howard G. Gemmell and Alison D. Murray "Practical Nuclear Medicine 3rd add." Springer–Verlag London Limited 2005 -Basics of PET Imaging, Second Edition, Gopal B. Saha Springer Science& Business Media, LLC 2010, ISBN; 978-1-4419-0804-9 -Radiation Safety in Nuclear Medicine, Second Edition, Max H. Lombardi, 2007 by Taylor & Francis Group, ISBN: 0-8493-8168-1
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. https://www.justdial.com/Chennai/Advanced-Nuclear-Medicine-Research-Centre-Opposite-Hotel-Saravana-Bhavan-Purasawalkam/044P9019449_BZDET
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.) There is enough classrooms with a good accomodation
2. Technology resources (AV, data show, Smart Board, software, etc.) Computers with simulation software and a good access to internet are required for web-based projects
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 • 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

- Instructors, who teach the course, have regualer meeting to update the course materials and activities

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..
- Evaluation by the accreditation committee in the university.

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.

Name of Course Instructor: _____ Ramadan Ali Hassan Ali ___

Signature: _____ **Date Completed:** __10/10/2018___

Program Coordinator: _____ Ramadan Ali Hassan Ali _____

Signature: _____ **Date Received:** ____10/10/2018_____

4/1/4. Course Specification:

Level Two

Second semester of the first year

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 2	**403683-2**	Medical Radiation Protection	Required		**2**
	403684-3	Brachytherapy Physics	Required		**3**
	403686-2	Computational Methods in Medical Physics	Required		**3**
	403681-2	Cell Biophysics	Required		***2***
Total credits hours for level 2					***10 hrs***

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Medical Radiation Protection

Course Code: 403683-2

Date 6–10–2018....-	**Institution**: .....Umm Al-Quraa University...
College: ..... Faculty of Science	**Department**: .....Physics Department ..

A. Course Identification and General Information

1. Course title and code: Medical Radiation Protection and 403683-2
2. Credit hours:2hrs
3. Program(s) in which the course is offered. Master of Medical Physics

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course. **Dr. Taha Alfawwal**
5. Level/year at which this course is offered: Level 2 / First 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: Abdeia Campus – Alzahr Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	☐	percentage?	80
b. Blended (traditional and online)	☐	percentage?	20
c. E-learning	☐	percentage?	
d. Correspondence	☐	percentage?	
f. Other	☐	percentage?	

Comments:

B Objectives

1. The main objective of this course: Course Description:

This course aims to introduce the radiation protection principles in radiology practices. Identify the types of radiation exposure, medical , professional and the public..It aims to calculate protective shields for rooms of conventional x-ray , mammography ,computer tomography and fluoroscopy. Radiation Protection for radiosensitive orgsans for patients under going mammogram, fluoroscopy, computed tomography and radiography examinations.

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)

-To improve the students' expert in the radiation protection for different x-ray modalities

1.Encourge students to register to webinars and worshops related to the radiation protection

2-Encourage students to write frequently report about selected research topics related to the field

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 radiation protection **Goals of radiation protection** **Concepts of radiation protection** **Justification and responsibility for image procedures. Aa low as reasonably achievable (ALARA principles) -** **Patient protection and patient education**	3	9
Radiation quantities and units **Historical evolution of radiation quantities,and units.** **Radiation Quantities and their SI units and units of measureurements.**	1	3

Radiation Monitoring **Personnel Monitoing, Personnel, dosimeters,Rradiation Survey Instruments for area monitoring. Instruments used to measure X-ray Exposure in Radiology.**	3	9
Dose Limits for exposure to ionizing radiation , **Basis of effective dose limiting system. Radiation Protection Standards organizations. Radiation Safety Program. ALARA concepts.dose lomits. Basis for the effective dose limiting system . occupational and non occupational dose limits.**	2	6
Equipment design for radiation protection . **Radiation safety features of radiographic equipment , Fluroscopic , digital Fluroscopy and mobil C-Arm , devices and accessories.**	2	6
Management of patient radiation dose during some x-ray procedures. Protection shielding , technical exposure factors protecting the pregnant .Pediatric considerations during radiographic imaging.	1	3
Methods for reduction of patient dose in Computed Tomograpjy. Computed Tomography dose parameters . **Goal of computed tomography imaging from a radiation protection point of view. Patient dose in mammography.**	1	3
Management of Imaging Personnel Radiation dose during diagnostic X-ray procedures. **Annual limit for occupational exposed personnel. ALARA Concept. Dose reduction methods and techniques. Protection for pregnant personnel . Basic Principles of Radiation Protection for personnel exposure . Protecting during fluoroscopic procedures. Protection during Mobile Radiographic examinations. Protection during C-Arm Fluroscopy .**	2	6
Total	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					45
	Actual	45					45
Credit	Planned	3					3
	Actual	3					3

3. Individual study/learning hours expected for students per week.	9

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 sug
gestions 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	Outline **Justification and optimization in clinical practice**	**Lectures** **Discussions** **Visual presentation**.	Midterms Final examination.
1.2	Describeing **Types Radiation Quantities and their SI units .**	**Lectures** **Discussions** **Visual presentation**.	Continuous discussions with the students during the lectures.
1.3	list **Radiation Monitoring and personnel dosimeters**	**Lectures** **Discussions** **Visual presentation**.	
1.4	**State methods of dose reduction in radiology**	**Lectures** **Discussions** **Visual presentation**.	
2.0	**Cognitive Skills**		
2.1	Summarize the radiation protection principles	**Encourage** the student to look for	Midterm

		some books in the different references describing radiation protection	exams
2.2	Design **the Shielding thickness for mammogram, radiography, CT and fluoroscopy rooms.**	**Ask** the student to attend lectures for radiation protection	
2.3	create the **Radiation protection shielding garment to protect radiosensitive organs**	**Ask** the student to attend lectures for radiation effects.	Check the problems solution.
3.0	**Interpersonal Skills & Responsibility**		
3.1	Choose the appropriate shielding material for certain x-ray modalities.	Teach them how to cover missed lectures. Give students tasks of duties	Discussion during the lecture
3.2	Modify **personnel Monitoring for the current x-ray modalities**		
4.0	**Communication, Information Technology, Numerical**		
4.1	Outline how to communicating with: Peers, Lecturers and Community.	Creating working groups with peers to collectively prepare: solving problems and search the internet for some topics	Discussing a group work sheets.
4.2	The student should illustrate procedures for design radiation shield	Give the students tasks to measure their: practical skills, analysis and problem solving.	Discuses with them the results of computations analysis and problem solutions.
4.3	The student should **appraise** how to use the computer skills and library.	Encourage the student to ask for help if needed	Give them comments on some resulting numbers
4.4	demonstrate how to Search I the internet and using software programs to deal with technique.	Encourage the student to ask for help if needed.	
5.0	**Psychomotor(if any)**		
5.1	NA		
5.2	NA		

Learining outcome Materix (Radiation Protection in Medicine Course)

Topic In weeks	*Knowledge*				*Cognitive Skills*			*Interpersonal Skills & Responsibility*			*Communication skills, IT skills and numerical skills*				*Psychomotor*
	1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*	*3.1*	*3.2*	*3.3*	*4.1*	*4.2*	*4.3*	*4,4*	*NA*
1st, 2nd and 3ed Week lectures	√	√			√	√					√		√	√	*NA*
4th, 5th , 6th and 7th Week lectures			√	√		√	√	√			√	√	√	√	*NA*
8th, 9th , 10th and 11th Week lectures						√	√	√			√	√	√	√	*NA*
12th, 13th , 14th and 15th Week lectures			√	√	√		√	√	√		√	√	√	√	*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	Midterm exam	5th week	20%
2	**Essay , quizzes, home work and presentation**	10th week	30%
3	Final exam	16 th	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)

E Learning Resources

1. List Required Textbooks Radiation Protection in Medical Radiography , 8th edition , 2018, Mary Alice, Paula J Viscont, E-Russel Ritenour, Keli Welch Haynes., 2018. (Reviewers 1 and 2) Leonie Munro.Basics of radiation protection for every day use. How to achive ALARA: working tips and Guidelines, WHO, 2004. Radiation Protection in Medical Physics Edited by Yves Lemoigne Alessandra Caner, 2009
3.List Essential References Materials (Journals, Reports, etc.) 1)James E. Martin " Physics for Radiation Protection" 3rd edition, 2013 2)Journal of Radiological Protection.Publisher: Society for Radiological Protection, IOP Publishing IAEA, Diagnostic Radiology Physics, 2014
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. https://www.amazon.com/Radiation-Protection-Medical-Radiography- https://www.epa.gov/radiation/protecting-yourself-radiation
3.Other learning material such as computer-based programs/CD, professional standards or regulations and software. Radiation Shielding software

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) There is enough classrooms with a good demonstration rooms in building W in Faculty of Science
2-Technology resources (AV, data show, Smart Board, software, etc.) Computers with simulation laboratory and a good access to internet are required for web-based projects
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) Computers with simulation laboratory and a good access to internet are required for web-based projects

G Course Evaluation and Improvement Procedures

Strategies for Obtaining Student's Feedback on Effectiveness of Teaching 1. Course reports 2. 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. VIisual presentation using power point and learning video Instructors, who teach the course, have regualer meeting to update the course materials and activities
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.. Evaluation by the accreditation committee in the university.
4.Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. The following points may help to get the course effectiveness • Student evaluation • Course report • Program report • Program Self study According to point 1 the plan of improvement should be given.

Name of Course Instructor: Taha A-Fawwal

Signature: _____  **_____ Date Completed: ___6-10-2018_____**

Program Coordinator: ____Taha Al-fawwal_____

Signature: _____ Date Received: _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: **Brachytherapy** Physics

Course Code: 403684-3

Date: **20**....–.....–.....	**Institution**: .....uqu.....
College: .... Faculty of Applied Science.....	**Department**: ..... Physics Department..

A. Course Identification and General Information

1. Course title and code: Brachtherapy Physics and 403684-3

2. Credit hours: 3 hrs

3. Program(s) in which the course is offered. Master in Medical Physics

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

4. Name of faculty member responsible for the course Prof. F.H .Al-ghourabi

5. Level/year at which this course is offered: Level 2/First 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 .

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

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

Comments:

B Objectives

1. What is the main purpose for this course?

Course Description: This course is considered an extension of modern radiotherapy. It explains another type of radiotherapy, a treatment using radioactive isotopes that can be inserted into the patient's body. This type is called internal radiation therapy. Therefore, this course reviews the radioactive isotopes used and how they are produced and calibrated in addition to their physical properties. The dosimetry in this case must be recognized, along with the Monte Carlo methods for dose measurement during treatment. Radiation therapy is closely related to recent changes and developments, which are explained in detail in this course

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)

To improve the students' expert in the Brachytherapy physics.

1.Encourge students to register to webinars and worshops related to the advances in brackytherapy .

2-Encourage students to write frequently report about selected research topics related to the field

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**
BRACHYTHERAPY RADIONUCLIDES AND THEIR PROPERTIES:- **1. Introduction** **2. Notation** **3. Cobalt-60** **4. Caesium-137** **5. Gold-198** **6. Iridium-192** **7. Iodine-125** **8. Palladium-103** **9. Ytterbium-169** **Thullium-170**	3	9

PRODUCTION AND CONSTRUCTION OF SEALED SOURCES:- **1. Introduction** **2. Iridium Sources-192** **3. Iodine LDR Seeds-125** **4. Palladium LDR Seeds-103** **5. Ytterbium LDR Seeds-169** **6. Cobalt-60 HDR Sources** **7. Cesium-137 LDR Sources** **8. Gold-198 HDR Seeds** **9. Thulium-170 High Activity Seeds** **10. Caesium-137 LDR Seeds** **11. Enrichment Methods** **ß-ray Emitting Microparticles and Nanoparticles**	3	9
SOURCE SPECIFICATION AND SOURCE CALIBRATION:- **Source Specification** **Source Calibration**	2	6
Mid-term 1		
SOURCE DOSIMETRY:- **1. Introduction** **2. Coordinate Systems and Geometry Definition** **Models of Dose Rate and Dose Calculation**	2	6
MONTE CARLO-BASED SOURCE DOSIMETRY:- **1. Introduction** **2. Monte Carlo Photon Transport Simulations** **3. Monte Carlo-Based Dosimetry of Monoenergetic Photon Point Sources** **4. Monte Carlo-Based Dosimetry of 103Pd, 125I, 169Yb, and 192Ir Point Sources** **5. Monte Carlo-Based Dosimetry of Commercially Available 192Ir Source Designs** **Monte Carlo-Based Dosimetry of 125I and 103Pd LDR Seeds**	2	6
EXPERIMENTAL DOSIMETRY:- **1. Introduction** **2. Phantom Material** **3. Ionization Dosimetr** **4. TLD Dosimetry** **Polymer Gel Dosimetry in Brachytherapy**	2	6
MODEN BRACHYTHERAPY:- **1. HDR Brachytherapy** **2. High Dose Rate Unit** **3. Licensing Requirements** **4. High Dose Rate Source Calibration** **5. Treatment Planning** **6. Quality Assurance** **7. Prostate implants**	1	3

2. Course components (total contact and credit hours per semester):							
		Lecture	**Tutorial**	**Laboratory/ Studio**	**Practical**	**Other**	**Total**
Contact Hours	Planned	3					45
	Actual	3					45
Credit	Planned	3					3
	Actual	3					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 THE **RADIONUCLIDES AND THEIR PROPERTIES**	**Lectures** **Discussions** **Visual presentation**	Exams Midterms Final examination .
1.2	DEFINING THE **SOURCE SPECIFICATION AND SOURCE CALIBRATION**	**Lectures** **Discussions** **Visual presentation**	Home work. Quizzes
1.3	DESCRIBING THE **PRODUCTION AND CONSTRUCTION OF SEALED SOURCES**	**Lectures.** **Discussions** **Visual presentation.**	Continuous discussions with the students during the lectures.
2.0	**Cognitive Skills**		

2.1	Summarizing the **Coordinate Systems and Geometry Definition**	**Encourage** the student to look for some books in the different references describing radiation.	Midterm exams Quizzes.
2.2	Evaluating **Models of Dose Rate and Dose Calculation**	**Ask** the student to attend lectures for radiation effects.	Doing homework Check the problems solution.
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate the Ionization Dosimetr.	Ask the students to search the internet and use the library. Encourage them how to attend lectures regularly by assigning marks for attendance.	Quizzes of some previous lectures. Ask the absent students about last lecture.
3.2	Evaluate the Dose deposition kernel of a radionuclide	Teach them how to cover missed lectures. Give students tasks of duties	Discussion during the lecture.
4.0	**Communication, Information Technology, Numerical**		
4.1	The student should **interpret** how to Know the basic principles of **Internal dosimetry** .	Creating working groups with peers to collectively prepare: solving problems and search the internet for some topics.	Discussing a group work sheets.
4.2	The student should **appraise** how to Use the computer skills and library.	Give the students tasks to measure their: practical skills, analysis and problem solving.	Discuses with them the results of computations analysis and problem solutions.
4.3	demonstrate how to Search I the internet and using software programs to deal with technique.	Encourage the student to ask for help if needed.	Give homework's to know how the student understands the numerical skills.
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 exam	5th week	20 %
2	Essay , quizzes, homework and presentation	10th week	30%
5	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) 1- 8-office hours per week in the lecturer schedule. 2- The contact with students by e-mail and website.

E Learning Resources

1. List Required Textbooks The physics of Radion Therapy " Forth Edition" Faiz M.Khan, 2010. (Reviewers 1 and 2) The Physics of Radiation Therapy (3rd edn), LWW, 2003 The Physics of Modern Brachytherapy for Oncology Dimos Baltas, Loukas Sakelliou, Nikolaos Zamboglou
2. List Essential References Materials (Journals, Reports, etc.) https://www.radiologyinfo.org/en/info.cfm?pg=brachy
2. 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.) There is enough classrooms with a good accomodation
2. Technology resources (AV, data show, Smart Board, software, etc.) Computers with simulation software and a good access to internet are required for web-based projects
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 • 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

- Instructors, who teach the course, have regualer meeting to update the course materials and activities

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..
- Evaluation by the accreditation committee in the university.

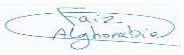
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

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

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

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

Name of Course Instructor: Prof. Al-ghourabi F.H

Signature:  **Date Completed: _____**

Program Coordinator: __Taha Alfawwal

Signature: _____ Date Received: _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Computational Methods in Medical Physics

Course Code: 403686-3

Date: 20....–.....–.....	**Institution**: .....uqu.....
College: Faculty of Applied Science	**Department**: Physics Department.

A. Course Identification and General Information

1. Course title and code: Computational Methods in Medical Physics -403686-3		
2. Credit hours: 2 hrs		
3. Program(s) in which the course is offered. Master of Medical 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.Samir		
5. Level/year at which this course is offered: Level 2/ first year		
6. Pre-requisites for this course (if any):		
7. Co-requisites for this course (if any):		
8. Location if not on main campus:		
9. Mode of Instruction (mark all that apply):		
a. Traditional classroom	√ percentage?	70
b. Blended (traditional and online)	√ percentage?	10
c. E-learning	√ percentage?	20
d. Correspondence	percentage?	
f. Other	percentage?	
Comments:		

B Objectives

1. The main objective of this course: : Course Description: In this course, students will familiarize themselves with the modeling of radiation fields during modern radiotherapy and on the real patients' daily cases. And identify the physical bases behind all the options of these mathematical programs. The student does all the necessary dependencies of the planning that he works. The student will actually visit a hospital in the area to work on the planning equipment for external and internal radiation therapy

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:

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
Digital Image Coomunication (DICOM) and Picture Archeiving Communication Sysrtem (PACS) Iintroduction to DICOctionM **DICOM and Clinical data** **Medical Image in DICOM** **DICOM Communicationa** **DICOM and Teleradiology** **DICOM Applications**	3	9
Medical Simulators Simulation Modalities and Technology Simulation for health care displines	3	9
Monte Carlo Calculations	3	9
Mid-term 1		
Computational Methods for Radiological Sciences	2	6
Mathematical Methods for Radiological Sciences	1	3
Mathematical Methods for Imaging in Medicine	2	6
Digital X-Ray Imaging and Computed Tomography **Biomedical image processing** **Noise reduction** **Biomedical image segmentation**	1	3
Final Exam		

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	3					45
	Actual	3					45
Credit	Planned	3					3
	Actual	3					3

3. Individual study/learning hours expected for students per week. 9

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 the Medical Simulators and understand it operational method	**Lectures Discussions Visual presentation**	Exams Midterms Final examination
1.2	Define the Mathematical Methods for Imaging in Medicine	**Lectures Discussions Visual presentation**	Home work. Quizzes
1.3	Describing Digital X-Ray Imaging and Computed Tomography	**Lectures Discussions Visual presentation**	Continuous discussions with the students during the lectures.
2.0	**Cognitive Skills**		
2.1	Summarizing the Medical Simulators operational method	**Encourage** the student to look for some books in the different references describing radiation.	Midterm exams Quizzes

2.2	evaluate Mathematical Methods for Imaging in Medicine	**Ask** the student to attend lectures for radiation effects	Doing homework Check the problems solution
3.0	**Interpersonal Skills & Responsibility**		
3.1	Demonstrate the medical Simulators Tech.	Ask the students to search the internet and use the library. Encourage them how to attend lectures regularly by assigning marks for attendance.	Quizzes of some previous lectures. Ask the absent students about last lecture
3.2	Evaluate the Medical Simulators in Imaging	Teach them how to cover missed lectures. Give students tasks of duties	Discussion during the lecture.
4.0	**Communication, Information Technology, Numerical**		
4.1	Outline how to communicating with: Peers, Lecturers and Community.	Creating working groups with peers to collectively prepare: solving problems and search the internet for	Discussing a group work sheets.
4.2	The student should **interpret** how to Know the basic principles using the internet for radiation measurements	Give the students tasks to measure their: practical skills, analysis and problem solving	Discuses with them the results of computations analysis and problem solutions.
4.3	The student should **appraise** how to Use the computer skills and library.	Encourage the student to ask for help if needed.	Give homework's to know how the student understands the numerical skills.
4.4	demonstrate how to Search I the internet and using software programs to deal with technique.	Encourage the student to ask good question to help solve the problem.	Give them comments on some resulting numbers
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	20 %
2	Research	10th week	10%
4	Homework + reports	15th week	20%
5	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)

1- 8-office hours per week in the lecturer schedule.

2- The contact with students by e-mail and website.

E Learning Resources

1. List Required Textbooks

Digital Imaging and Communications in Medicine (DICOM), Oleg S. Pianykh
A Practical Introduction and Survival Guide Second Edition, 2012
The Comprehensive Textbook of Healthcare Simulation, Adam I. Levine • Samuel DeMaria Jr. Andrew D. Schwartz • Alan J. Sim Editors, 2014.

Essential References

Digital Image Processing for Medical Applications, GEOFF DOUGHERTY2 2013
Handbook of Physics in Medicine And Biology, Robert Splinter, CRC Press is an imprint of Taylor & Francis Group, an Informa business, 2010.

Digital Image Processing for Medical Applications, GEOFF DOUGHERTY2 2013

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
https://www.slideshare.net/VictorEkpo2/the-role-of-computers-in-medical-physics

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.)
Classroom with capacity of 10-students.
- Library.

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

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. Student evaluation electronically organized by the University.
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department. The colleagues who teach the same course discuss together to evaluate their teaching.
3. Procedures for Teaching Development. Course report, Program report and Program self-study.
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 verify the students achievement from the course by evaluating the student reports and exams .
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

Name of Course Instructor: Prof.Dr. Samir Nitto
Signature: _____ Date Completed: _____

Program Coordinator: _____ Taha Al-fawwal

Signature: _____ Date Received: _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Cell Biophysics

Course Code:403681-2

30-10 – **Date:** 2018	.**Institution:** Umm Al-Qura University
College: Applied Science	**Department:** Physics

A. Course Identification and General Information

403650-3 : 1. Course title and code: Cell Biophysics Code: 403681-2

2. Credit hours: 2 (2+0+0) hrs

3. Program(s) in which the course is offered.

Ms. C Medical Physics Program

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

4. Name of faculty member responsible for the course

Dr. Hosam Salaheldin Ibrahim & hsibrahim@uqu.edu.sa.

All Medical Physics academic staff members are involved in teaching this course.

5. Level/year at which this course is offered: Level 2/ First year

6. Pre-requisites for this course (if any): Non

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

8. Location if not on main campus: **Main campus (Abdeia) and Alzaher campus**

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

A. Traditional classroom	✓	What percentage?	80%
B. Blended (traditional and online)	✓	What percentage?	10%
C. E-learning	✓	What percentage?	10%
D. Correspondence		What percentage?	
F. Other		What percentage?	

Comments. The traditional classroom with about 80%, while blended mode of instruction and E-learning mode with 10%. and 10%, respectively.

B Objectives

1. The main objective of this course

After completing this course student should be able:

1. To understand the basics of cellular biophysics.
2. To acquire the difference between various models and theories describing the cellular conduction e. g: Nernst equation, Donnan equation, Cable theory, and Voltage Clamp.
3. To define the cellular ion channels, activation and inactivation.
4. To describe different types of separation methods of cellular proteins, and DNA.

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 E-Learning system is being conducted.
- To carry out an assay, encourage the students to use different web search engines, writing software packages, statistical softwares ....etc.
- Interpersonal skills, relating to the ability to interact with other people and to engage in team- working through group discussion.
- Problem solving skills, relating to qualitative and quantitative information.

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
• Background Physics and Mathematics	1	**2**
• Membrane structure and basic Evoked Potential (EP) • Ion Transport, Resting Potential, and Cellular Homeostasis • Composition of cell membranes. • Membrane transport. • Diffusion with an external force in a frictional system. • Steady-state equilibrium for a single ion. • Nernst equation. • Modeling of resting potential: the Bernstein and Gibbs-Donnan models. • Steady-state, non-equilibrium. • Modifications of the steady-state membrane model. • Cellular homeostasis.	**2**	**4**

• John Bridge on resting potential and Donan Equillibrium.
  ○ Ionic concentration of cell at resting.
  ○ Measuring Membrane Potential.
  ○ Membrane Equivalent Circuit.
  ○ The Donnan equilibrium system.
  ○ The Osmotic Argument.
  ○ Driving Forces of ions across the cell membrane.
  ○ Ohms Law and Electrophysiolgy.
• John Bridge on Action potentials and Excitation Contraction Coupling.
  ○ At the steady state (resting membrane) when there is not net current:
  ▪ The “sodium theory” of the action potential.
  ▪ Voltage Clamp.
  ▪ Channel (Gating) Simulations
  ▪ Cardiac Ion Currents
  ▪ Cardiac Action Potential
  ▪ Cardiac Cell Currents
  ▪ Calcium Cycle in Cardiac Muscle!
	2	**4**

• Introduction to ion channels
  ○ Ion channels: general properties.
  ○ Four major breakthroughs in ion channel biology.
  ○ Classification of ion channels.
  ○ Physiological functions of ion channels.
  ○ Ion channels can be highly localized.
  ○ Channel Gating: closed-open-inactivated.
  ○ Channel structure.
• Activation gate
  ○ Gates.
  ▪ Activation
  ▪ Inactivation
• Ion Selectivity
  ○ Selectivity filter.
  ○ Selective"ion"permeability.
• Voltage sensing
  ○ VSD: the voltage sensor domain.
  ○ Voltage sensor.
  ○ Voltage!gated"ion"channel"="pore"domain"+"VSD.
	2	**4**

• John White on Neurons ○ Neurons. ○ What makes neurons different from cardiomyocytes? ○ The father of modern neuroscience. ○ Morphological polarity. ○ Cajal's art. ○ Microtubule-based transport. ○ Neuronal action potentials are Na^+ and K^+ dominated. ○ Refractory periods are short. ○ Crucial features of the neuronal action potential. ○ Neurons can fire at high rates. ○ Spike-rate adaptation is very common in neurons. • Types of glia in the CNS ○ Astrocytes in neurovascular coupling. ○ Short-term enhancement is linked to presynaptic Ca^{2+}.	**2**	**4**
Midterm Class test Exam	1	**2**
Methods in Cellular Biophysics Principle, instruments and application of spectroscopic instruments: • UV Visible: absorption of light, radiation sources, sample holders, monochroamtors, radiation detectors, single and double beam instruments, colorimeter. IR spectroscopy: • Rotational and vibration spectra, Instrumental features, applications. Raman effect, strokes and anti-strokes, lines, advantages, applications. CD ORD principles and applications. Fluorescence: • Fluorescence and phosphorescence, bioluminescence and chemiluminiscence phenomenon, quenching, energy transfer, and applications. Atomic absorption spectroscopy: • Principle and instrumentations.	**2**	**4**

Separation techniques Electrokinetics methods: • Electrophoresis, • Electrophoretic mobility (epm), • Factors affecting epm, paper, Page, • SDS-Page, disc gel, gradient gel, • Electrophoresis of nucleic acid and its application, • Pulse field electrophoresis, • Single cell gel electrophoresis, • Isolectrophoresis, preparative electrophoresis, • 2-D gel electrophoresis, Capillary, Iso-Electric focusing, • Applications in biology and medicine. • Chromatography, tlc, • Adsorption, partition, • Ion exchange, • Gel filtration, affinity and FPLC, GLC	**3**	**6**
	15 weeks	**30 hrs**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	2	-	-	-	-	30
	Actual	2	-	-	-	-	30
Credit	Planned	2	-	-	-	-	2
	Actual	2	-	-	-	-	2

3. Individual study/learning hours expected for students 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 co 6

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.)

Learning outcome Materix (Cell Biophysics Course)

Topic In weeks	*Knowledge*		*Cognitive Skills*			*Interpersonal Skills & Responsibility*		*Communication skills, IT skills and numerical skills*		*Psychomotor*
	1.1	**1.2**	**2.1**	**2.2**	**2.3**	**3.1**	**3.2**	**4.1**	**4.2**	**5.1**
1st, 2nd and 3ed Week lectures	√	√		√		√				***NA***
4th, 5th , 6th and 7th Week lectures	√	√	√				√	√		
8th, 9th , 10th and 11th Week lectures	√	√	√		√	√		√	√	
12th, 13th , 14th and 15th Week lectures	√	√	√		√	√	√	√	√	

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	Conduct the basic knowledge of cellular biophysics.	1. Lectures 2. Tutorials 3. Individual Assignment 4. Discussions	a) Short exams b) Long exams (final) c) Discussions during the lectures. d) Homeworks. e) Write a Report
1.2	Recognize advanced methods of cellular macromolecules (e.g. Proteins, lipids, and DNA) separation techniques.		
2.0			**Cognitive Skills**
2.1	The ability to differentiate between different theories of ionic conduction, mechanisms through cellular membrane.	1. Web-based activities 2. Individual and Group Assigments 3. Group Discussions	a) Assignments included some open end tasks b) Web-based project c) Homeworks d) Final exam e) Short exams f) Seminars
2.2	Differentiate between the basic types of protein, and carbohydrates by modern analysis techniques .		
2.3	Analysis and interpret the physical and chemical methods of macromolecules separation techniques.		

3.0	**Interpersonal Skills & Responsibility**		
3.1	Work effectively in groups as well as individuals.	1. Writing an essay 2. Presentations in some selected topics 3. Small Group Discussion. 4. Visits to spectroscopic labs to enhance the students' expert	a) Essay (Group Assessment) b) Presentations (individual and Group Assessment) c) Homework d) Final exam e) Report in field (Individual Assessment
3.2	Justify a short report in a written form and/or orally using appropriate scientific language.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrate information technology and modern computer tools to locate and retrieve scientific information relevant to image processing.	2. Group Discussions 3. Reports 4. Presentations	a) Essay (Group Assessment) b) Presentations (individual and Group Assessment c) Report in the field (Individual Assessment or in group)
4.2	Appraise the cooperation through teamwork to assess and criticize various emergent problems.		
5.0	**Psychomotor(if any)**		
5.1	Not applicable (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, Homework, Participation, In-Class Discussion Essay, Reports and Oral Presentations.	All weeks	30%
2	Mid-Term Class Test Exam	Week 8	20%
3	Final Exam	Week 15	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)
There is an academic counseling teaching staff for every postgraduate student enrolled in the medical physics program.

E Learning Resources

1. List Required Textbooks

1. Biophysical Chemistry, The Behaviour of biological macromolecules, Vol I, II, III, Cantor and Schimmel, (2008), W H Freeman & Co.
2. Applied Biophysics, A Molecualr Approach for Physical Scientist, Tom A Weigh, (2007), Wiley

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

1. Molecular biophysics journal
   https://www.nature.com/subjects/molecular-biophysics

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

- Syllabus in HTML, also available as PDF file
- Current-Voltage Curve Tutorial by James Dilger at Stonybrook University.
- Some notes on effective reading (and writing) of science papers from Dana Brooks (Northeastern University)
- The Science of Scientific Writing, also in pdf format . This is the best article I know for scientific writing. Mandatory reading!
- MATLAB information
- Additional CV physiology and bioelectricity background information.

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

1. The Microsoft Office for editing reports.

2. The Matlab and Image J software package to train the student about how making image processing.

F. Facilities Required. Facilities Required

Indicate requirements for the course, including the size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) There are enough classrooms provided with a good accommodation, including good air condition, good data show slide projector, and suitable white board .
2. Computing resources (AV, data show, Smart Board, software, etc.) In each lecture classroom and laboratory, there is a data show, and a suitable white board.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **N/A**

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

Question to students on the course evaluation.

Question to students on the exam evaluation.

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

Internal revisions by the staff members about the courses and examinations.

Questionnaires to job owners in the graduate employer evaluation.

3 Processes for Improvement of Teaching

Periodical revisions to the course specification, reports and evaluations of the instructor.
Continuous training courses on teaching improvements for staff member
Using scientific flash and movies.

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

Efficiency of course will be reflected in the results of the class, which reviewed by members of the teaching staff in addition to other duties such as discussing ideas and ways of teaching and learning.

- **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**

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

Continuous observations of the following processes:
Statistical data feedback from questionnaires to students on the Instructor evaluation.

- **Internal revisions by the staff members about the courses and examinations.**
- **Statistical data feedback from questionnaires to job owners in the graduate employer evaluation in order to improve the course according to the needs of the outer community.**
- **Statistical data feedback from questionnaires to the student needs in order to improve the course according to the needs of the students.**
- **Observation of the student results from examinations...**

Name of Course Instructor: Dr. Hosam Salaheldin Ibrahim

Signature: Hosam _____ **Date Completed:** 30/10/2018

Program Coordinator: Dr. Taha Alfawal_____

Signature: ___ _____ **Date Received:** _____

Level Three

Third semester of second year

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 3		Selective Topics			2
	403690-5 Part1	Thesis	Continue ..		5
Total credits hours for level 3					7 hrs

Level Four

Fourth semester of second year

Level	Course Code	Course Title	Required or Elective	Prerequisite Courses	Credit Hours
Level 3		Selective Topics			2
	403690-5 Part2	Thesis	Continue ..		5
Total credits hours for level 3					7 hrs

COURSE SPECIFICATIONS

Form

Course Title: Thesis

Course Code: 403690-5 (Part (1)

403690-5 Part2 (Part (2)

Date: 20....–.....–.....	**Institution**: uqu.....
College: College of Applied Science	**Department**: .....Physics Department.....

A. Course Identification and General Information

1. Course title and code: Thesis and 403690-5 (part 1 and part 2)
2. Credit hours: 5 credit hours per semester (i.e. level 3 and level 4) for the thesis
3. Program(s) in which the course is offered. Master of Medical Physics

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

3. Name of faculty member responsible for the course
   Selected supervisors
5. Level/year at which this course is offered: 3rd level and 4th level /second year
6. Pre-requisites for this course (if any): 2 credit hours per semester (Selective Topics)
7. Co-requisites for this course (if any):
8. Location if not on main campus: Main Campus and Zaher
9. Mode of Instruction (mark all that apply):

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

Comments: the thesis will be conducted starting from the third level , continued and finished at the fourth level

B Objectives

1. The main objective of this course :

To identify a driving question for the thesis and thesis endpoint

To improve thesis /time management skills

To lean to identify and manage resources and risks

To communicate thesis results clearly and effectively .

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)

To improve the students' expert in the thesis selective topic :-

1.Encourge students to register to webinars and worshops related to the dosimetry in diagnostic radiology , radiotherapy , nuclear medicine and radiation protection, quality control and quality assurance for diagnostic x-ray , radiotherapy and nuclear mediine.

2.Encourage students to prepare research assignment about selected specialized topics related to the field

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

Course Description: A supervisor of the thesis

1. Topics to be Covered

List of Topics researches	Period	Contact hours
Physics application in Medicine and Biology	1st term and 2nd term of the second year	150
quality control and quality assurance for diagnostic x-ray machiners , Linear accelerators and and hot laboratorty and gamma camera of nuclear medicine imaging.	1st term and 2nd term of the second year	150
dosimetry in diagnostic radiology , radiotherapy and nuclear medicine	1st term and 2nd term of the second year	150

Radiation protection for workers Radiation protection and dosimetry for patients undergoing diagnostic and computed tomography examination.	1st term and 2nd term of the second year	150
Generation of nanoparticle of radiopharmaceticalls and its application in imaging and treatment	1st term and 2nd term of the second year	150
Treatment planning system for linear accelerators .	1st term and 2nd term of the second year	150
Comparison study for the modern radiotherapy technology	1st term and 2nd term of the second year	150
Special Topics: the suprervisor will advise a student to study two selective courses to fullfilement the requirements of a thesis.	1st term and 2nd term of the second year	150
Total	32 weeks	150 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	150					150
	Actual	150					150
Credit	Planned	10					150
	Actual	10					150

3. Individual study/learning hours expected for students per week. 10

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	To Identify a driving question for the project and project endpoint	Seminars	Course auditors Assignments As well as Oral Presentations Essays Research for thesis Write a thesis and introduce seminar to examination Committee (Reviewer 1 and 2)
1.2	Outline the quality control and quality assurance for X-ray modalities, nuclear medicine and radiotheraoy.	Discussions	
1.3	Describeing set up for experiment arrangement for calibration and dose assessment.		
1.4	Stat the methodlgy of blood sampling and separation its components		
2.0	**Cognitive Skills**		
2.1	Explain methods for measurement a dose in mammogram, radiography, CT and fuoroscopy x-ray modalities.	Seminars	As well as Oral Presentations Focus group discussion . Assignments Assaya-seminars , web based a research . Reasech for thesis Write a thesis and discuss it in front of examination Committee (Reviewer 1 and 2)
2.2	create the new method for calibration of advanced new dosimetrs in CT, Mamogram, Fluoroscopy ,Radiography, gamma camera and linear accelerators	Discussions	
2.3	Explain methods for measurement absorption of a hemoglobin and other biological macrmolecue using UV-IR scpectrophotmeter.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	To improve project/time management skills	Presentation	Course auditors Assignments As well as Oral Presentations Essays Reasech for thesis Write a thesis and introduce seminar to examination Committee (Reviewer 1 and 2)
3.2	choose a suitable methods for measurement of a absorbed dose in radiography, mammogram and computed tomography, medical imaging and radiotherapy	Discussions	
3.3	Modify the direct and indirect methods of patient dose assessment for radiograpgy fluoroscopy , computed tomography , nuclear imaging and radiotherapy.	Discussions	
3.4	To improve medical imaging and radiotherapy using nanomedicine, nanoparticle of radiopharmaceticalls .	Discussions	
4.0	Communication, Information Technology, Numerical		
4.1	To communicate project results clearly and effectively through high quality oral and written reports	Seminars	a.Essay Assessment) b. As well as Oral Presentations c.Reasech for thesis c.Write a thesis e.discuss the thesis in front of examination Committee (Reviewer a and 2)
4.2	The student should illustrate seminar for the research project	Discussions	
5.0	Psychomotor(if any)		

5. Assessment Task Schedule for Students During the Semester			
	Assessment task (i.e., research projevt , write a thesis and oral presentations etc.)	**Week Due**	**Examination Committee**
1	Research Project Write a thesis	All weeks	**The number of the examination Committee for a research thesis are three.**
3	Oral Presentations	Week 15	

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

Hendee's Radiation Therapy Physics, Fourth Edition, Todd Pawlicki , Daniel J. Scanderbeg, George Starkschall, , February 2016.

Michael J.r and Albert v. K. Basic Clinical Radiobiology, 4th Eds., Edward Arnold, 2009.

Biophysical Chemistry, The Behaviour of biological macromolecules, Vol I, II, III, Cantor and Schimmel, (2008), W H Freeman & Co.

Applied Biophysics, A Molecualr Approach for Physical Scientist, Tom A Weigh, (2007), Wiley

Dosimety in Diagnostic Radiolgy, IAEA, 2014.

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

International Atomic Energy Agency (IAEA). Radiation Biology for teacher and student,academic press, 2010

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

https://www.amazon.com/Accelerators-Radiation-Therapy-Biomedical-Engineering/dp/0750304766

https://uqu.edu.sa/lib/917

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

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) There is enough classrooms with a good demonstration rooms in building W in Faculty of Science
2. Technology resources (AV, data show, Smart Board, software, etc.) Data show and computers with simulation laboratory and a good access to internet are required for web-based projects
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 1-Course reports 2-Course questionares and program questionares
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department Analysis the research reports of students.
3. Procedures for Teaching Development Instructors, who supervise the research thesis have regualer meeting to update the thesis materials and activities
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) Evaluation by the accreditation examination 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 • Student evaluation • Course report • Program report • Program Self study

Name of Course Instructor: Selective supervisors

Signature: _____ Date Completed: _____

Program Coordinator: _Taha AlFawwal
Signature: _____ Date Received: _____

Selective topics (level 3 and level 4)				
403687-2	Advanced Medical Imaging (2)	Elective		2 hrs
403679-2	Radiobiology	Elective		2 hrs
403688-2	Radiation Measurements in Diagnostic Radiology	Elective		2 hrs
403692-2	Image Anatomy	Elective		2 hrs
403682-2	Nanotechnology for Bio Medical Applications	Elective		2 hrs

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: Advannced Medical Imaging (2)

Course Code: 403687-2

Date: 20....–.....–.....	**Institution**: Umm ALQura University.
College: College of Applied Sciences	**Department**: Physics Department.

A. Course Identification and General Information

1. Course title and code: Advanced Medical Imaging (2) and 403687-2
2. Credit hours: 2 Hr
3. Program(s) in which the course is offered. Mean CAMPUS

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course Prof. Allehyani S
5. Level/year at which this course is offered: Level 3 or Level 4 /Second year
6. Pre-requisites for this course (if any): No Pre-requisites
7. Co-requisites for this course (if any): No Co-Pre-requisites
8. Location if not on main campus:
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	√	percentage?	%80
b. Blended (traditional and online)	√	percentage?	%20
c. E-learning		percentage?	
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

The mean objective , introduce medical imaging devices used in hospitals, such as CT scans, magnetic resonance imaging devices, and nuclear medicine devices such as camera cameras and digital cameras. It is also exposed to the method of image formation and factors affecting image formation in addition to its medical structure and common names. In addition to dealing with radioisotopes in medicine and how to obtain diagnostic images for a number of cases. The course also discusses the quality of the images of these medical devices and how to monitor them and ensure their safety and suitability for daily or periodic work. This course explains the computerization of these devices and how to connect them to computer systems

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)

To improve the students' expert in the medical imaging
1.Encourge students to register to webinars and worshops related to the avances in medical imaging

2-Encourage students to write frequently report about selected research topics related to the field

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
Medical imaging methods 1 - X-ray images 2 - Images of gamma rays 3 - Ultrasound imaging 4 - MRI	2	4
The basics of digital image processing 1 - Gray color chart 2 - Graph shifts and search tables	2	4
Improved image in spatial area 1. Algebraic processes 2. Logical processes 3. Engineering operations 4. Torsion-based processes	2	4

Optimize image in frequency range 1 - Forer field 2 - Freer conversions 3. Characteristics of Fourier Transformations 4. Simplification 5. Reciprocal correlation and self-association	2	4
Imaging Systems 1- Function of a spread point 2. Optical propagation function 3. Frequency band filters 4 - Reconstruction of the CT image	1	2
Restore the image 1 - deterioration of the picture 2. Noise 3. Filters to reduce noise 4 - Misty 5 - deterioration of modeling image 6 - geological deterioration	1	2
Treatment of morphological images 1 - Mathematical Morphology 2. Morphological operators 3 - extension of grayscale images	1	2
Image fragmentation 1. What is fragmentation 2 - threshold 3. Area-based approaches 4. Border-based methods 5 - Other methods	1	2
Highlight and sort the image 1 - Identify the member to be filmed and classified 2 - Connect the related members 3 - Features Statistical Classification 5 - Applications in the analysis of medical images	1	2
3D visualization 1 - format images 2 - flatten images 3 - Image size 4. Its true form	2	4

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	2	-----	-----	-----	----	30
	Actual	2					30
Credit	Planned	2					2
	Actual	2					2

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

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	Knowing the types of imaging devices	Lectures Visual presentation - Discussions - Seminars	– the exams - Short tests - Duties
1.2	Determination of imaging characteristics	Lectures Visual presentation - Discussions - Seminars	– the exams - Short tests - Duties
1.3	Understanding How to process images	Lectures Visual presentation - Discussions - Seminars	– the exams - Short tests - Duties
2.0	**Cognitive Skills**		
2.1	Acquire the skill of how the image is three-dimensional	Lectures Visual presentation - Discussions - Seminars	– the exams - Short tests - Duties
2.2			
3.0	**Interpersonal Skills & Responsibility**		
3.1	Practice applying Fourier transforms	Lectures Visual presentation - Discussions - Seminars	– the exams - Short tests - Duties
3.2	Analyze image data	Lectures Visual presentation	– the exams - Short tests

√

		- Discussions - Seminars	- Duties
4.0	**Communication, Information Technology, Numerical**		
4.1	The skill of building the image on the camera	Lectures Visual presentation - Discussions - Seminars	– the exams - Short tests - Duties
4.2			
5.0	**Psychomotor(if any)**		
5.1	Not applicable	Not applicable	Not applicable
5.2			

Learining outcome Materix (Advanced Medical Imaging Course)

Topics per weeks	**Knowledge**	**Cognitive Skills**	Interpersonal Skills & Responsibility	**Communication skills, IT skills and numerical skills**	Psychomotor
	1.1 1.2 1.3	2.1	3.1 3.2	4.1	**NA**
1st, 2nd and 3ed Weeks lectures	√ √ √	√	√ √	√	**NA**
4th, 5th , 6th and 7th Weeks lectures	√ √	√	√	√	**NA**
8th, 9th , 10th and 11th Weeks lectures	√ √		√	√	**NA**
12th, 13th , 14th and 15th Weeks lectures	√ √ √	√	√	√	**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	Midterm exam	5th week	20 %
2	Essay , quizzes, homework and presentation	10th week	30%
5	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)

Sunday	Monday	Wednesday
9-10 Am	12-1 afternon	8-10 morning

E Learning Resources

1. List Required Textbooks

1-Medical Inaging Proceesing : Concepts and applications , C.R. Pattel, 2014 ,Kindel edition. (Reviewer 1 and 2)

2 -Digital Image Processing for Medical Applications, Geoff Dougherty, Cambridge University Press 2009, ISBN-13 978-0-511-53343-3.

3-Quantitative Analysis in Nuclear Medicine Imaging Habib Zaidi 2006 Springer ScienceBusiness Media, Inc. ISBN-13: 978-0387-23854

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

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
http://www.amibozeman.com/

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

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.)

Smart panels in the department as well as the Internet inside the central library

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
2. Other Strategies for Evaluation of Teaching by the Instructor or the Department New Course
3. Procedures for Teaching Development New Course
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) New Course
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

Name of Course Instructor: Prof. Allehyani S. H

Signature: . *Prof. Allehyani S H* **Date Completed: _____**

Program Coordinator: ___Taha Al-fawwal
Signature: _____ Date Received: _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title. Radiobiology

.Course Code: 403679-2

Date: 20....–.....–.....	**Institution**: **Umm AQura University**
College: .... **Applied Sciences**....	**Department**: .....**Physics Department**.....

A. Course Identification and General Information

1. Course title and code: Radiobiology [403679-2]			
2. Credit hours: 2**(2+0+0) Hr**			
3. Program(s) in which the course is offered. Master of Medical Physics (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course Dr/ Hanan Amer- Dr/Taha alfawwal			
5. Level/year at which this course is offered: Level 3 or Level 4 **/ Second year**			
6. Pre-requisites for this course (if any):			
7. Co-requisites for this course (if any):			
8. Location if not on main campus: Abdeia Campus – Alzahr Campus			
9. Mode of Instruction (mark all that apply): a. Traditional classroom	√	percentage?	70
b. Blended (traditional and online)	√	percentage?	10
c. E-learning	√	percentage?	20
d. Correspondence		percentage?	
f. Other		percentage?	
Comments:			

B Objectives

1. The main objective of this course

- Describe the biological impact on living cells and tissue at the DNA, cellular, organ, and whole animal levels.
- Describe the physical-chemical events which follow an ionizing event, in terms of Dose–Response Characteristics and modification.
- Predict the expected radiobiological outcome, when presented with the ambient conditions of irradiation (e.g. energy, dose, dose rate/fractionation, oxygen level, drugs).
- Apply radiobiological principles and models to fractionated radiation therapy.
- Become aware of heritable effects of radiation and the radiological aspects of brachytherapy.

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)

To improve the students' expert in the nanotechnology field for medical applications:

- Encourge students to register to webinars and worshops related to the radiobiology in medical imaging and radiation therapy
- Encourage students to write frequently report about selected research topics related to the field

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

Course Description: The course is designed to provide a fundamental knowledge of the mechanisms and biological responses of human beings to ionizing and non-ionizing radiations through the study of the effects of radiation on biological molecules, cells, and man including cancer and mutagenesis. The course will develop the ability to make objective decisions regarding the relative risks and benefits of radiation use in a variety of applications.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Basic Physics of Radiobiology: Dose–Response Characteristics - Particle Track Structure (LET definition, RBE definition, Alternative Radiation Beams, Radiation Quantities and Units)	1	2
Radiation Chemistry: Water Radiolysis - Radical Interactions - Oxygen Effect (OER) and Radiosensitizers - RadioProtectors (DMF)	2	4
DNA Damage and Repair: Types of Radiation Damage - Chromosome Aberrations - Lethal and Non-Lethal Lesions - DSB and Lesion Yields - Basics of Carcinogenesis	2	4

Cell Survival Curves : Experimental Technique - Dual Action theory (Linear Quadratic) - Statistics of cellular "hits" - Mathematical Models	1	2
"4 R's" of Radiobiology : Dose Rate Effects - Repair of radiation damage - Redistribution (cell cycle) - Repopulation of cells - Re-Oxygenation (OER)	1	2
Radiation Effects on Humans: Acute Whole Body Exposures - Stochastic *versus* non-stochastic effects - Carcinogenesis	1	2
Radiobiology Aspects in Radiotherapy: Early-Reacting Tissue (TCP Calculations) - Late-Reacting Tissue Normal Tissue Response (NTCP) - Dose Fractionation/Rate (BED calculations)	2	4
Radiologic Terrorism: Scenarios for radiologic terrorism – External contamination – Internal Contamination – Medical Management Issues in the event of radiologic terrorism	1	2
The Dose Rate Effect: Mechanisms underlying the dose-rate effect - Isoeffect relationships between fractionated and continuous low dose-rate irradiation - Radiobiological aspects of brachytherapy – Radiological aspects of diagnostic radiology and nuclear medicine	2	4
Heritable Effects of Radiation Germ cell production and radiation effects on fertility - Radiation-Induced heritable effects in humans - International Commission on Radiological Protection estimates of heritable risks - Mutations in the children of the A-bomb survivors changing concerns for risks	1	2
Chemotherapeutic Agents from the Prespective of the Radiobiology Classes of agents and their mode of action – Dose-response relationship - Sublethal and potentially lethal damage repair – resistance to chemotherapy and hypoxic cytotoxins – drug resistance and cancer stem cells – comparison of chemotherapeutic agents with radiation – adjunct use of chemotherapeutic agents with radiation – assays for sensitivity of individual tumors	1	2
	15 weeks	30 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	30					30
	Actual	30					30
Credit	Planned	2					2
	Actual	2					2

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	List 4R's of Radiobiology	1. Lectures 2. Tutorials 3. Individual Assignment 4. Discussions	a) Short exams b) Long exams (final) c) Discussions during the lectures. d) Home work. e) Write a Report
1.2	Recognize the heritable risk of Radiation exposure		
1.3	Outline the different DNA damage and repair types		
2.0	**Cognitive Skills**		
2.1	The ability to explain the radiological difference between early- and late- reacting tissue in radiotherapy.	1. Web-based activities 2. Individual and Group Assigments 3. Group Discussions	a) Aissgnments included some open end tasks b) Web-based project c) Homework d) Final exam e) Short exams f) seminars
2.2	The ability to analyze cell survival curves		
2.3	The ability to differentiate between different radiation effects on human		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Write an essay about the radiation effects on humans and related carcinogensis	1. Writing an essay 2. Presentations in some selected topics 3. Small Group Discussion.	a) Essay (Group Assessment) b) Presentations (individual and Group Assessment) c) Homework d) Final exam e) Report in field (Individual Assessment
3.2	Choose the appropriate scenario of radiologic terrorism		

4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrate the radiological risk versus benfit in radiotherapy and brachytherapy	1. Group Discussions 2. Reports 3. Presentations	a) Essay (Group Assessment) b) Presentations (individual and Group Assessment c) Report in field (Individual Assessment)
4.2	Illustrate the isoeffect relationships between fractionated and continuous low dose-rate irradiation		
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	Short exams	5th	20%
2	Oral presentations/ seminars, Essay/research report	10th	30%
3			
4	Final written exam	16th	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) 4hrs/week

E Learning Resources

1. List Required Textbooks
   - Eric J. Hall, and Amato J. Giaccia. **Radiobiology for the Radiobiologist**, 7th Eds., Lippincott Williams& Wilkins, 2012.

2. List Essential References Materials (Journals, Reports, etc.)
   - International Atomic Energy Agency (IAEA). Radiation Biology for teacher and student,academic press, 2010
   - Michael J.r and Albert v. K. Basic Clinical Radiobiology, 4th Eds., Edward Arnold, 2009.

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
https://www.astro.org/Affiliate/ARRO/Resident-Resources/Educational-Resources/Radiobiology-Lectures
https://www.unscear.org

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.) There is enough classrooms with a good accomodation
2. Technology resources (AV, data show, Smart Board, software, etc.) Computers with simulation software and a good access to internet are required for web-based projects
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 • 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 • Instructors, who teach the course, have regualer meeting to update the course materials and activities
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.. • Evaluation by the accreditation committee in the university.
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.

Name of Course Instructor: _____Dr/ Hanan Amer_____
Signature: __Hanan Amer_____ Date Completed: _____
Program Coordinator: ___Taha Alfawwal
Signature: _____ Date Received: _

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Radiation Measurements in Diagnostic Radiology

Course Code: 403688-2

Date:.**10–3–2018**	**Institution**: ……. **Umm– Alquraa University**…..
College: **Applied Science** ….. **Department**: …..**Physics Department** ……..	

A. Course Identification and General Information

1. Course title and code: **Radiation measurements in in Diagnostic Radiology**, 403688-2
2. Credit hours**: 2 hrs**
3. Program(s) in which the course is offered.

   Master of Medical Physics

   (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course : **Dr. Taha Alfawwal**
5. Level/year at which this course is offered: Level 3 or Level 4 /Second year
6. Pre-requisites for this course (if any): **none**
7. Co-requisites for this course (if any): **none**
8. Location if not on main campus: main campus and Al-Zaher
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	70	percentage?	80
b. Blended (traditional and online)	10	percentage?	10
c. E-learning	10	percentage?	10
d. Correspondence		percentage?	
f. Other		percentage?	

Comments:

B Objectives

4. What is the main purpose for this course?

Course Description: This course aims to explain some types of patient dosimetric quantities and units used for assessment of doses for patients. Discuss code of practice for measurements of patients doses in diagnostic radiology, radiography, fluoroscopy, mammography, dental and computer tomography.

5. 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).

To improve the students' expert in the dosimetry in diagnostic radiology

1.Encourge students to register to webinars and worshops related to the dosimetry in diagnostic radiology

2.Encourage students to research assignment about selected specialized topics related to the field

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**
Dosimetric Quantities - **3. Basic dosimetric quantities** **2- Application specific quantities** **3- Quantities related to stochastic and deterministic effect** **4- Conversion coefficient for the assessment of organ tissue dose**	3	6
Fundamental of x-ray production: x-ray tubes, energizing and controlling the x-ray tube, x-ray tube abd generating ratings, collimation and filtration, factors influencing x-ray output and filtration.	2	4
Mid-term exam	7th week	

Code of practice for clinical measurements **General radiography : Indirect dose measurement , Free in air and direct dose measurements , Design of phantoms, , X-ray phantoms, Choice of dosimetric quantities, measurements using phantom,patient dosimetry,** **Fluroscopy : Choice of dosimetric quantities, measurements using phantoms, patient dosimetry, fluoroscopy, Interventional procedures,**	4	8
Mammography: choice of dosimetric quantities, choice the breast phantom, measurement practicalities, patient dosimetry,.Dose calculation for measurements with phantoms. Reference dose level	2	4
Computed Tomography: special dosimetric quantities for CT, measurement using phantom and free in air and measurements o1n patients. **dental radiography: Choice of disimetric quantities , measurements using phantoms, patient dosimetry,.**	3	6
Reference dose levels and Risks in Diagnostic Imaging **Reference dose levels for different x-ray modalities.** Effective dose calculations and X-ray risk assessment.	1	2
Total	15 weeks	30 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	2	-	-	-		30
	Actual	2					30
Credit	Planned	2					2
	Actual	2					2

3. Individual study/learning hours expected for students per week. 9 hrs/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 lear

Learining outcome Materix (Radiation Protection in Medicine Course)

Topic In weeks	*Knowledge*				*Cognitive Skills*			*Interpersonal Skills & Responsibility*				*Communication skills, IT skills and numerical skills*				*Psychomoto*
	1.1	*1.2*	*1.3*	*1.4*	*2.1*	*2.2*	*2.3*	*3.1*	*3.2*	*3.3*	*3.4*	*4.1*	*4.2*	*4.3*	*4,4*	*NA*
1st, 2nd and 3ed Week lectures	√	√			√			√			√				√	*NA*
4th, 5th , 6th and 7th Week lectures			√		√	√				√		√	√			*NA*
8th, 9th , 10th and 11th Week lectures			√			√		√		√			√	√	√	*NA*
12th, 13th , 14th and 15th Week lectures			√			√		√		√		√	√	√	√	*NA*

ning 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	Outline the specific application quantities in **X-ray for ploy clinical medical practices**	**Lectures**	Midterms
1.2	Describeing **Quantities related to stochastic and deterministic effect**	**Discussions**	Final examination
1.3	describe **Fundamental of x-ray production:**		
1.4	**State the different methods fol dosimetry in radiology .**		
2.0	**Cognitive Skills**		
2.1	Summarize the types of specific application quantities radiology and phantoms	**Encourage** the student to look for some books in the different references describing radiation doae measureements.	Continuous discussions with the students during the lectures.
2.2	Explain methods **for measurement a dose in mammogram, radiography, CT and fuoroscopy x-ray modalities.**	**Ask** the student to attend lectures for physics of radiology	.
2.3	create the new method for calibration of **CT, Mamogram, Fluoroscopy and Radiography**		
3.0	**Interpersonal Skills & Responsibility**		
3.1	choose a suitable methods for m**easurement of a absorbed dose in radiography, mammogram,**	Teach them how to cover missed lectures.	Midterm exams

		Give students tasks of duties	
3.2	Modify the direct and indirect methods of patient dose assessment for **fluoroscopy , computed tomography.**		Discussion during the lecture
4.0	**Communication, Information Technology, Numerical**		
4.1	Choose the appropriate phantom and procedure for certain x-ray modalities.	Creating working groups with peers to collectively prepare: solving problems and search the internet for some topics	Check the problems solution.
4.2	Assess **entrance skin dose to patients undergoing diagnostic x-ray and CT examination for the current x-ray modalities**	Give the students tasks to measure their: practical skills, analysis and problem solving.	
4.3	Outline how to communicating with: Peers, Lecturers and Community. The student should illustrate procedures for patint dosimetry	Encourage the student to ask for help if needed	Final examination
4.4	The student should **appraise** how to use the computer skills and library.	Encourage the student to ask for help if needed.	Presentation
4.5	demonstrate how to Search the internet and using software programs to deal with technique.		Video demonstration
5.0	**Psychomotor(if any)**		
5.1			
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	Midterm exam	5th week	20%
2	Research assignment report, Presentation, discussion	10th week	20%
3			
5	Final exam	16 th	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)

E Learning Resources

1. List Required Textbooks Dosimetry in Diagnostic Radiology: An International Code of Practice (TECHNICAL REPORTS SERIES) 1st Edition, by Frantisek Pernicka (Author), Iain D McLean (Author), International Atomic Energy Agency (Author), 2005. Patient Dosimetry and Quality Control in Diagnostic Radiology: Radiation dose measurements, quality criteria and quality control in digital and interventional radiology Paperback – June 5, 2011 , by Ibrahim Idris Suliman (Author)
2.List Essential References Materials (Journals, Reports, etc.) JRRAS, ANSI N13.11 , EC, IAEA, NRPB Patient dose measurements in diagnostic radiology procedures in Korea. February 2007, Radiation Protection Dosimetry 123(4):540-5, DOI: 10.1093/rpd/ncl501 Patient dosimetry techniques in diagnostic radiology. Wall, B.F. (National Radiological Protection Board, Chilton (UK)); Harrison, R.M. (Newcastle General Hospital (UK)); Spiers, F.W. Institute of Physical Sciences in Medicine, London (UK), 1988.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. https://www.sciencedirect.com/science/a *https://www-pub.iaea.org/*
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.) There is enough classrooms with a good demonstration rooms in building W in Faculty of Science
2. Technology resources (AV, data show, Smart Board, software, etc.) Data show and computers with simulation laboratory and a good access to internet are required for web-based projects
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) Caldose software

G Course Evaluation and Improvement Procedures

1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching 1-Course reports 2-Course questionares and program questionares
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 Instructors, who teach the course, have regualer meeting to update the course materials and activities
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.. 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 • Student evaluation • Course report • Program report • Program Self study According to point 1 the plan of improvement should be given.

Name of Course Instructor: __Dr. Taha Al-Fawwal
Signature: _____ _____ Date Completed: _____
Program Coordinator: __Taha Alfawwal

Signature: _____ Date Received: _____

4/1/4. Course Specification:

COURSE SPECIFICATIONS
Form

Course Title: Image Anatomy....

Course Code: 403692-2.

Date: 20....–.....–.....	**Institution**: .....uqu.....
College: ..... applied Science.....	**Department**: ..... **Department of Biology**..

A. Course Identification and General Information

1. Course title and code: image anatomy- 403692-2
2. Credit hours: 2 hrs
3. Program(s) in which the course is offered. Master of Medical 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. Osama M. M. Sarhan (email:omsarhan@uqu.edu.sa - Sarhanomm5975@gmail.com)**
5. Level/year at which this course is offered: Level 3 or Level 4 /second year
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any):
8. Location if not on main campus: Campus and Al-Zaher
9. Mode of Instruction (mark all that apply):

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

Comments:

B Objectives

1) Reinforce and expand on anatomic knowledge (learned in previous undergraduate course) as it pertains to the structures commonly evaluated in medical imaging.

To let the student learn more about his body and how its work. To know more about all systems in the human and animal body and how they work. System structures and function and the role of each one and their correlations activity together. The role in maintain the good health for their bodies and how each system work and cooperative work for all human systems between each others

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 most important plan to improve this course is to have suitable reference books updated in Arabic and English for students to study easily and encourage them to visit the web sites regarding this course subjects. Also the practical side of the course must be developed by implemented new experiments for each system in this course.

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**
Head and neck CT scan.	3	5/week
Chest CT scan, cardiac and musculoskeletal structure. Periodical exam	3	5/week
Midterm exam	7th week	
Abdominal CT scan, biliary, pancreatic, gastric and renal structures. Periodical exam	2 9th week	5/week
CT scan of male and female pelvis.	2	
X-ray figures for body regions Participation	2 13th week	5/week
Participation and Revision	14th week	
Practical and Final exam	15-16th week	

2. Course components (total contact and credit hours per semester):							
		Lecture	**Tutorial**	**Laboratory/ Studio**	**Practical**	**Other**	**Total**
Contact Hours	Planned	5	12		12		99
	Actual	5					99
Credit	Planned	2					2
	Actual	2					2

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	The student must learn the basic and advance radiographic informations of human body	By choosing specialized websites which will covers the main ideas about the present course.	• By essays and midterm and final and practical exams. • Periodical exam and reports 10%,(15 min) 3rd and 9th weeks. • Mid- term exam 30%, (30 min), 6th

			week Final exam 60%, (60 min), 14th week
2.0	**Cognitive Skills**		
2.1	The student(s) must assign a report labelled CT radiographs represent body regions.	Lectures, training practically by using CT radiographs, assign reposts.	
2.2	How can the student identify radiographs for different body regions.		By giving the student some topics to make assays about some topics being developed also by mid and final exams
3.0	**Interpersonal Skills & Responsibility**		
3.1	At the end of the course, the student will be able to: • The ability to assume responsibility for self-education • Work effectively in a group • The ability to express their own opinion without fear or hesitation and improves their self-confidence Ability to lead a team to work	By using the updated information using specialised websites.	To guide students to apply their information by using more and more CT and X-ray radiographs.
4.0	**Communication, Information Technology, Numerical**		
4.1	Through personal communication, mobile, friends, office hours and in the practical class.	By developing lectures, and to guide students to seek information from different sources of knowledge such as web sites and YouTube videos	Personally, mobile, friends, essays, exams, techniques, projects.
4.2			
5.0	**Psychomotor(if any)**		
5.1			
5.2			

5. Schedule of Assessment Tasks for Students During the Semester				
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment	Exam duration
1	Periodical exam, Exercises, Home works,	4th and 8th W	5 %,	15 min
2	Participation	13th - 14th W	5 %	15 min
3	Midterm "Written Test (1)"	7th W	15%	30 min
4	Practical Test (1)	7th W	15%	30 min
5	Final Exam "Practical test (2)"	15th W	20%	60 min
6	Final Exam "written test (2)"	16th W	40%	60 min

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)

Throughout the term in lecture and office hours personally

Lecture notes prepared by the subject staff.

E Learning Resources

1. Required websites

Head and neck region

https://www2.med.wayne.edu/diagRadiology/Anatomy_Modules/axialpages/Overview.html

http://www.radiologyassistant.nl/en/p48f4c4ccd9682/brain-anatomy.html

https://www2.med.wayne.edu/diagRadiology/Anatomy_Modules/axialpages/Overview.html

https://www.youtube.com/watch?v=udVjvvL5xjY

http://headneckbrainspine.com/Neck-CT.php\

Chest region

https://www.youtube.com/watch?v=4pjkCFrcysk

https://www.youtube.com/watch?v=AAc6oLviZNc

Abdominal region

https://www.slideshare.net/sakherkh/ct-abdomen-anatomy

http://www.startpuntradiologie.nl/coschappen/interne-geneeskunde/buik/ct-abdomen-algemeen/

https://www.slideshare.net/doctoranish/sectional-anatomy-of-abdomen

Male pelvis

https://www.uaz.edu.mx/histo/Webpatutah/histhtml/Radnorm/ABCT56.HTM

https://www.uaz.edu.mx/histo/Webpatutah/histhtml/Radnorm/ABCT53.HTM

https://emedicine.medscape.com/article/390416-overview

Female pelvis

http://radiology-anatomy.blogspot.com/2014/12/mri-anatomy-of-female-pelvis.html

https://www.alamy.com/stock-photo/ct-of-the-female-pelvis.html

https://www.researchgate.net/figure/A-29-year-old-female-with-pelvic-tuberculosis-Non-enhanced-CT-scan-of-the-abdomen-and_fig2_301308891

https://posterng.netkey.at/esr/viewing/index.php?module=viewing_poster&task=viewsection&pi=1=07924&ti=332734&si=1049&searchkey

X-ray

Head:

https://www.bmj.com/content/356/bmj.i6315

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-39842016000500013

Chest

http://www.thoracicmedicine.org/viewimage.asp?img=AnnThoracMed_2009_4_3_149_53349_u8.jpg

https://www.nature.com/articles/ncpendmet0639/figures/1

https://canadiem.org/boring-question-lung-ultrasound-vs-cxr-dx-pneumothorax/

Abdomen and pelvis

http://www.ijoonline.com/viewimage.asp?img=IndianJOrthop_2018_52_2_140_226713_f2.jpg

http://www.thetrp.net/viewimage.asp?img=ThyroidResPract_2012_9_3_102_99660_u5.jpg

Upper and lower limbs

http://www.startradiology.com/internships/general-surgery/shoulder/x-shoulder/

http://www.ijoonline.com/viewimage.asp?img=IndianJOrthop_2013_47_3_283_111500_u2.jpg

https://theultrasoundsite.co.uk/ultrasound-case-studies/freiberg-disease-of-the-2nd-mtpj/xrayfrei/

http://www.startradiology.com/internships/general-surgery/shoulder/x-shoulder/

http://iranjradiol.com/en/articles/56262.html

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

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
http://www.radiologyassistant.nl/en/p48f4c4ccd9682/brain-anatomy.html

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.)

a- Class rooms are already provided with data show, audiovisual equipments

b- The areas of class rooms are suitable, concerning the number of enrolled students; and air conditioned.

2. Technology resources (AV, data show, Smart Board, software, etc.)
Upgrading book database in the main library

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)
CD prepared by the staff members containing U-tube video.

G Course Evaluation and Improvement Procedures

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

1.Continuous follow up, Questionaries and discussions

2.By asking them about the course; looking at their periodical exams, attending one lecture and lab

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

a- Revision of student answer paper by another staff member.

b- Analysis the grades of students.

3. Procedures for Teaching Development Modify course contents continuously and upgrade lectures presentation.
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) Continuous evaluation of student's activities and homeworks.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.

Name of Course Instructor: _1. Prof Dr. Osama Mohamed Sarhan
Signature: _____ Date Completed: __ November 2018_____

Program Coordinator: __ Dr. Hussein Abulreesh
Signature: _____ Date Received: __Date: November 2018

4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title. **Nanotechnology for Biomedical Applications**

.

Course Code: …403682-2

Date: 20....–.....–.....	**Institution**: Umm AQura University
College: .... Applied Sciences College....	**Department**: .....Physics Department.....

A. Course Identification and General Information

1. Course title and code: Nanotechnology for Biomedical Applications- 403682-2
2. Credit hours: 2 hours
3. Program(s) in which the course is offered. Master of Medical 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: Level 3 or Level 4 / Second year
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any):
8. Location if not on main campus: Abdeia Campus – Alzahr Campus
9. Mode of Instruction (mark all that apply):

a. Traditional classroom	√	percentage?	50
b. Blended (traditional and online)	√	percentage?	20
c. E-learning	√	percentage?	20
d. Correspondence	√	percentage?	10
f. Other		percentage?	

Comments:

B Objectives

1. The main objective of this course

- Describe the physics principles underlying the fundmentals of mcrofabrication.
- List, in words, merits and drawbacks of nanomedicine and nanobiosensors.
- Demonstrate an understanding of and apply nanofabrications of biological systems
- Compare the different methods of biosensors applications in different biological systems.
- Demonstrate an understanding of aspects of clinical applications of bionanomedicine

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)

To improve the students' expert in the nanotechnology field for medical applications:

- Cooperate with external organization to practicize synthesis of nanotechnology materials for different medical applications.
- Encourge students to register to webinars and worshops related to the synthesis and characterization of nanotechnology field for different medical applications
- Encourage students to write frequently report about selected research topics related to the field

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

Course Description: Nanotechnology is a multidescrpancy field. It has an innovative applications in both medical imaging and therapy. This course is designed to introduce the students to the world of nanotechnology and its medical applications. It focuses on the different applications of nanoparticles in medical and research level, since nanoparticles can enhance the most of the medical imaging modalities in addition to greatly increasing the targeting and effectiveness of therapy.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Fundamentals of Micro Fabrication: Photolithography - Deposition, and Selective Etching - Thin Film Growth and Deposition - Diffusion and Dopants - Atomic Layer Epitaxy - Soft Lithography. Self-assembled organized systems: Dendrimers, Liposomes, Vesicles, Supramolecular Complexes, Langmuir Blodgett films. Atomic Force Microscopy (AFM)	4	8
Micro Fluidic Pattering and Biopolymer Pattering: Fundamentals of Laminar Fluids Micro Fluidic Processes - The Role of Micro-Scale Fluid Dynamics in BioMEMS Neuro MEMS - Microelectrodes and Neuronal Interfaces, Microstereolithography	3	6

Nanofabrication: Molecular Engineering and Quantum Dots, Nanoscale Structures as Biological Tags and as Functional Interfaces with Biological Systems	2	4
Nano-Biotechnology: Nanoparticles and Microorganisms, Nano-materials in Bone Substitutes and Dentistry, Nanoparticles in medical imaging modalities, Drug delivery and its applications.	3	6
Nanobiosensors: Biochips and analytical devices, Biosensors Nanomedicine, Nanobiosensor, Nanofluidics, Nanocrystals in Biological Detection, Electro-chemical DNA Sensors, Integrated Nanoliter Systems. Clean rooms practice and environmental issues; Applications.	3	6
	15 weeks	30 hrs

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other	Total
Contact Hours	Planned	2					30
	Actual	2					30
Credit	Planned	2					2
	Actual	2					2

3. Individual study/learning hours expected for students per week. 10

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	List nanofabrication techniques used with biological systems	5. Lectures 6. Tutorials 7. Individual Assignment 8. Discussions	f) Short exams g) Long exams (final) h) Discussions during the lectures. i) Home work. j) Write a Report
1.2	Recognize nanoparticles chracteristics in different medical applications		
1.3	Outline the different types of nanobiosensor and its applications		
2.0	**Cognitive Skills**		
2.1	The ability to explain the different types of nanofabrication	4. Web-based activities 5. Individual and Group Assigments 6. Group Discussions	g) Aissgnments included some open end tasks h) Web-based project i) Homework j) Final exam k) Short exams l) seminars
2.2	The ability to analyze merits and drawbacks of different types of biosensors and their applications		
2.3	The ability to differentiate between micro fluidic pattering and biopolymer pattering and their applications.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Write an essay about the requirements of nanoparticles' fabrication used in drug delivery and therapy.	4. Writing an essay 5. Presentations in some selected topics 6. Small Group Discussion. 7. Visits to nanotechnology research laboratory to Improve Students' Expert in Field	f) Essay (Group Assessment) g) Presentations (individual and Group Assessment) h) Homework i) Final exam j) Report in field (Individual Assessment
3.2	Choose the appropriate nanoparticles for different medical imaging modalities.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Demonstrate the use of nanoparticles in different medical imaging modalities.	4. Group Discussions 5. Reports 6. Presentations	d) Essay (Group Assessment) e) Presentations (individual and Group Assessment f) Report in field (Individual Assessment)
4.2	Illustrate the Protocol of using nanoparticles in drug delivery to enhance the targeting and effectiveness of therapy.		
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	Short exams	5 th week	20%
2	Oral presentations/ seminars	All weeks	30%
3	Essay/research report		
4	Final written 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) 2hrs/week

E Learning Resources

1. List Required Textbooks
   - Gabriel A. Silva, **Nanotechnology for biology and medicine**, 1st Ed., Springer, 2012.

2. List Essential References Materials (Journals, Reports, etc.)
   - Michael Koch, Alan Evans, Arthur Brunnschweiler, **Micro fluidic Technology and Applications (Micro technologies and Microsystems Series)**, 1st Ed., CRC Press; London, 2001.
   - Eugene J. Koprowski, Gene Koprowski, **Nanotechnology in medicine: Emerging applications**, Mcgraw-Hill Education, 2011
   - Sarah Hurst Petrosko and Emily S. Day. **Biomedical Nanotechnology**,.2nd Eds., Springer, 2017 (Reviwers 1 and 2)

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
   - https://www.nano.gov/nanotech-101/what/definition
   - http://iopscience.iop.org/journal/0957-4484

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.)
There is enough classrooms with a good accomodation

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

Computers with simulation software and a good access to internet are required for web-based projects

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 • 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 • Instructors, who teach the course, have regualer meeting to update the course materials and activities
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.. • Evaluation by the accreditation committee in the university.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it. 3- The following points may help to get the course effectiveness • Student evaluation • Course report • Program report • Program Self study 4- According to point 1 the plan of improvement should be given.

Name of Course Instructor: Dr.Hanan Amer **Signature: _____**
Date Completed: _____
Program Coordinator: Taha Alfawwal
Signature: _____ **Date Received: _____**