

## Kingdom of Saudi Arabia

### T6. Course Specifications (CS)

## Course Specifications

Institution: <b>Najran University</b>	Date: <b>31-03-2017</b>
College/Department : <b>Applied medical sciences / Radiological sciences</b>	

### A. Course Identification and General Information

1. Course title and code: <b>Radiation Physics - 211 RAD-3</b>			
2. Credit hours : <b>3 (2+1)</b>			
3. Program(s) in which the course is offered. : <b>Bachelor of Radiological sciences</b> (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course <b>Dr. Soheir Soliman (female section)</b> <b>Dr. Hamid Abdullah Ismaeal (male section)</b>			
5. Level/year at which this course is offered : <b>level 4/ second year</b>			
6. Pre-requisites for this course (if any): <b>Introduction to Physics - 204 PHST -2</b>			
7. Co-requisites for this course (if any): <b>None</b>			
8. Location if not on main campus : <b>Main campus</b>			
9. Mode of Instruction (mark all that apply)			
a. traditional classroom	<input checked="" type="checkbox"/>	What percentage?	<b>100</b>
b. blended (traditional and online)	<input type="checkbox"/>	What percentage?	<input type="text"/>
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="text"/>
d. correspondence	<input type="checkbox"/>	What percentage?	<input type="text"/>
f. other	<input type="checkbox"/>	What percentage?	<input type="text"/>
Comments: <b>The lecture involves :</b> <b>Practice good presentation techniques</b> <b>Effective questioning</b> <b>Students discussion</b>			

## B Objectives

<p>1. What is the main purpose for this course?</p> <ul style="list-style-type: none"> <li>• Understanding the basics of electromagnetic wave and theory of electromagnetic radiation</li> <li>• Understand the basic principles of radioactivity, radiation sources and radiation detectors.</li> <li>• Distinguish between the types of x-rays and factors affect the emission of X-ray.</li> <li>• Knowledge of the basic interaction of radiation with matter.</li> </ul>
<p>2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)</p> <ul style="list-style-type: none"> <li>• Updating the textbooks.</li> <li>• Explain strategy of the course in the beginning of the semester.</li> <li>• Encourage the students to see more details in web sites and reference books in the library.</li> <li>• Discussing some selected problems in each chapter.</li> </ul>

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

<p><b>Course Description:</b></p> <p>This course will provide a broad foundation in Radiological Physics. It will examine the structure of matter together with physical phenomena such as types of ionizing radiation, interaction of radiation with matter. In addition students will be introduced to basic of construction of simple x- ray tubes, physics X-ray machine and fluoroscopy, basic of electromagnetic theory, and components of fluoroscopy, image intensifier, image quality and radiation dose.</p>
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1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours
<p><b>Electromagnetic radiation</b></p> <p>Origin of electromagnetic radiation, and Wave theory of electromagnetic radiation</p>	2	8
<p><b>X-rays</b></p> <p>Production of x-rays, and Quality and intensity of x-ray tube output.</p> <p><b>X-ray tubes</b></p> <p>Constriction of simple x- ray tubes modern materials, X-ray tube design, Line focus principle-ray tube shield, Cooling of x-ray tubes, and Fluoroscopy unit components.</p>	3	12

Interaction of x-rays and gamma rays with matter Transmission of x-ray through a medium, and Processes of attenuation. Transmission of gamma rays through a medium, Rayleigh scattering, Compton scattering, Photoelectric absorption, and Pair production.  X-ray and gamma ray interaction with tissues Transmission of x-ray and gamma ray beams through body tissues, effect of scattered radiation on patient dose, staff dose, and image quality.	2	8
X-ray and gamma ray measurements	3	12
Radioactivity Causes of radioactivity, Radioactive transformation processes, and Radioactive decay rates	4	16
Radiation safety Historical background, Biological effects of ionizing radiation, and Principles of radiation safety	1	4

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	30			30		60
Credit	2			1		3

3. Additional private study/learning hours expected for students per week.	2 hrs/week
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy
On the table below are the five NQF Learning Domains, numbered in the left column.  <b>First</b> , insert the suitable and measurable course learning outcomes required in the appropriate learning

domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Describe the essential concept of physics including X-rays production, interaction of x-rays and gamma rays with matter and with tissues.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Practical in labs</li> <li>Discussing with illustrating</li> </ul>	<ul style="list-style-type: none"> <li>Written examinations</li> <li>Practical exams.</li> <li>Assignments and quizzes</li> <li>Oral questions.</li> </ul>
1.2	Describe the x-rays production, interaction of x-rays and gamma rays with matter and with tissues.		
<b>2.0</b>	<b>Cognitive Skills</b>		
2.1	differentiate between different types of radiation.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Practical in labs</li> <li>Group-learning activity such as a seminars and tutorials.</li> <li>Problem solving</li> <li>Brain storming</li> <li>Discussion</li> </ul>	<ul style="list-style-type: none"> <li>Written examinations</li> <li>Practical exams.</li> <li>Assignments and quizzes</li> <li>Oral questions.</li> </ul>
2.2	Explain the essential science concept necessary for imaging application related to radiation physics		
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b>		
3.1	Show a team work spirits	<ul style="list-style-type: none"> <li>Practical in labs</li> <li>Group-learning activity such as a seminars and tutorials.</li> <li>Group discussion.</li> <li>Cooperative learning</li> </ul>	<ul style="list-style-type: none"> <li>Practical exam.</li> <li>Observation</li> <li>Student presentation / seminar and discussion.</li> </ul>
3.2			
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
4.1	Operate effectively the different informational resources including the library resources and websites	<ul style="list-style-type: none"> <li>Practical in lab.</li> <li>Cooperative learning</li> <li>Self-learning to the global of information networks</li> </ul>	<ul style="list-style-type: none"> <li>Practical exam.</li> <li>Observation</li> <li>Student presentation / seminar and discussion.</li> </ul>
<b>5.0</b>	<b>Psychomotor</b>		
5.1	Perform the physics experiments.	<ul style="list-style-type: none"> <li>Practical in lab.</li> <li>Cooperative learning</li> <li>Writing lab report</li> </ul>	<ul style="list-style-type: none"> <li>Practical exam.</li> <li>Observation</li> </ul>
5.2	Drawing graphs of experiments correctly.		

6. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
2	Mid-term written exam	7 <sup>th</sup>	20
3	Practical mid-term exam	8 <sup>th</sup>	10
4	Presentation	During the course	10
6	Practical final exam	16 <sup>th</sup>	20
7	Final written exam	17 <sup>th</sup>	40
8	Total		100

#### D. Student Academic Counseling and Support

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

- Six office hours per week are offered to support students individually.
- Reachable via email.
- Personal web pages of academic members staff in university website.

#### E Learning Resources

1. List Required Textbooks
1. Radiation Physics for Medical Physicists, Podgorsak, Ervin B, (2016).
2. List Essential References Materials (Journals, Reports, etc.)
1. Physics for Radiation Protection: A Handbook, Second Edition. James E. Martin, (2006)
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

<ol style="list-style-type: none"> <li>1. <a href="https://www.iaea.org/nuclearenergy/library-inln/">https://www.iaea.org/nuclearenergy/library-inln/</a></li> <li>2. <a href="https://www.iaea.org/sites/default/files/radiation0204.pdf">https://www.iaea.org/sites/default/files/radiation0204.pdf</a></li> </ol>
<p>4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.</p> <ol style="list-style-type: none"> <li>1. <a href="http://sciencebooksonline.info/physics.html">http://sciencebooksonline.info/physics.html</a></li> <li>2. <a href="http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html">http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html</a></li> <li>3. <a href="http://de.physnet.net/PhysNet/optics.html">http://de.physnet.net/PhysNet/optics.html</a></li> <li>4. <a href="https://www.facebook.com/ScienceChannel/">https://www.facebook.com/ScienceChannel/</a></li> <li>5. <a href="https://www.iaea.org/">https://www.iaea.org/</a></li> </ol>
<p>5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.</p> <p><b>Lab. Notes:</b> Will be distributed to the students by the lecturer</p>

#### 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.)
<p>1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p> <ul style="list-style-type: none"> <li>• Lecture room ( 8 x 15m ) equipped with about 20 student seats,</li> <li>• Lab. ( 8 x 15 m) equipped with about 20 student seats.</li> </ul>
<p>2. Computing resources (AV, data show, Smart Board, software, etc.)</p> <ul style="list-style-type: none"> <li>• White Board, computer, Data Show , Overhead projector and laptop.</li> </ul>
<p>3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)</p> <ul style="list-style-type: none"> <li>• Library, and Seminar Room and Wi-Fi internet connections</li> </ul>

#### G Course Evaluation and Improvement Processes

<p>1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching</p> <ul style="list-style-type: none"> <li>• University online questionnaire for evaluation the course by students.</li> <li>• Observing the students opinions recorded in the college student site.</li> <li>• Appeal &amp; suggestions box.</li> </ul>
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<p>2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department</p> <p>Teaching is evaluated through:</p> <ul style="list-style-type: none"> <li>• Student assessments</li> <li>• Peer review</li> <li>• Evaluation of head department</li> <li>• Self-evaluation &amp; the instructor responses</li> <li>• Course report is provided every semester and improvement plans due to these sources.</li> </ul>
<p>3 Processes for Improvement of Teaching</p> <ul style="list-style-type: none"> <li>• Program learning outcomes are reviewed</li> <li>• Courses specifications</li> <li>• Student questionnaires</li> <li>• Courses and program reports</li> <li>• Independent evaluation of the program</li> <li>• Workshops held by skills development unit</li> <li>• Annual reports of External Examiner</li> </ul>
<p>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)</p> <ul style="list-style-type: none"> <li>• Check marking of final exam papers by peer review</li> </ul>
<p>5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.</p> <ul style="list-style-type: none"> <li>• Study the results of the course learning outcome assessment</li> <li>• The department provides continuous internal review.</li> <li>• Continuous support and monitoring by learning &amp; teaching committee of quality and development deanship.</li> </ul>





**Name of Instructor: Dr. Soheir Soliman**

**Signature:**

**Date Report Completed: 31-3-2017**

**Program Coordinator : Dr. Mawahib Sayed Ahmed Aldosh**

**Signature:**

**Date Received**

**04/ 04/1438**

**Name of Instructor Dr. Hamid Abdullah Ismael**

**Signature:**

**Date Report Completed: 06-04-2017**

**Program coordinator: Alfatih Hasan Mohamed Albadri**

**Signature:**

**Date: 03/05/1438 H**