Academic Program Description

University Name: University of Anbar

Faculty/Institute: Applied Sciences

Scientific Department: Medical Physics

Academic or Professional Program Name: Medical Physics

Final Certificate Name: Bachelor of Science

Academic System: Courses

Description Preparation Date: 2023–2024

File Completion Date: 4–2024

Signature:

Head of Department Name:

Marwan Mahmood Saleh

Date: / /

Signature:

Scientific Associate Name:

Rassim F. Muslim

Date:

وزارة التعليم العالي والبحث العلمي
جامعة الأنبار
قسم الفيزياء الطبية
كلية العلوم التطبيقية

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean

أ.د. تحسين علي زيدان
العميد

1. Program Vision

The vision of medical physics is to improve healthcare outcomes by applying physics principles and techniques to medical diagnosis, treatment, and research. Medical physics is a multidisciplinary field that combines physics, mathematics, engineering, and biology to address challenges in medicine and healthcare.

The overarching goal of medical physics is to ensure the safe and effective use of ionizing and non-ionizing radiation in healthcare. Medical physicists work with other healthcare professionals to develop and optimize medical imaging techniques, radiation therapy treatment plans, and radiation safety protocols. They also conduct research to develop new technologies and treatment approaches that can improve patient outcomes.

The vision of medical physics includes:

- Enhancing patient care by providing accurate and precise diagnostic and treatment methods.
- Improving healthcare quality by ensuring the safe and effective use of medical radiation.
- Developing new technologies and approaches to healthcare that can improve healthcare outcomes.
- Advancing scientific knowledge and understanding of the human body and disease processes through research.
- Promoting the education and training of medical physicists and other healthcare professionals to ensure the highest standards of practice.
- Ultimately, the vision of medical physics is to contribute to the advancement of healthcare and improve the lives of patients around the world

2. Program Mission

The mission of medical physics is to apply the principles of physics to improve and advance the practice of medicine and healthcare. The field of medical physics involves the application of physics principles, techniques, and

technologies to medical imaging, radiation therapy, nuclear medicine, and other areas of healthcare.

The mission of medical physics includes:

- Ensuring the safe and effective use of ionizing and non-ionizing radiation in medical diagnosis and treatment.
- Developing and implementing new technologies and techniques to improve patient outcomes and quality of care.
- Providing accurate and precise measurements and calculations in medical imaging and radiation therapy.
- Conducting research to advance scientific knowledge and understanding of the human body and disease processes.
- Training and educating medical physicists and other healthcare professionals to ensure the highest standards of practice and patient care.
- Medical physicists work closely with other healthcare professionals, such as radiologists, radiation oncologists, and nuclear medicine specialists, to provide safe, accurate, and effective healthcare. They apply their expertise in physics, mathematics, engineering, and biology to facilitate the development of new and innovative solutions to medical problems.
- The mission of medical physics is ultimately to improve the lives of patients by contributing to the advancement of healthcare and the development of new and more effective medical technologies and treatments

3. Program Objectives

1. Provide students with a solid foundation in physics, mathematics, and relevant biomedical sciences.
2. Develop an understanding of the principles and applications of medical physics in diagnostic imaging, radiation therapy, nuclear medicine, and radiation safety.
3. Equip students with the necessary knowledge and skills to perform quality assurance, calibration, and optimization of medical imaging and

radiation therapy equipment.

4. Foster critical thinking, problem-solving, and analytical skills required for research and development in medical physics.

5. Promote ethical and professional behavior, emphasizing patient safety and radiation protection.

4. Program Accreditation

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5. Other external influences

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6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	8	240	30	
College Requirements				
Department Requirements				
Summer Training				
Other				

• This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
1	MPH-111	Electricity and magnetism	2	2
1	MPH-112	Analytical chemistry	2	
1	MPH-113	Mathematics 1	2	2
1	MPH-114	General Biology 1	2	2
1	SCI-101	Computers 1	2	2

1	UNI-101	English Language 1	2	
1	MPH-121	Mechanics	2	2
1	MPH-122	Mathematics 2	2	
1	MPH-123	General Biology 2	2	2
1	UNI-101	Human Rights and democracy	2	
1	UNI-102	English Language 2	2	
1	SCI-102	Computer 2	2	2
2	MPH-211	Heat and Thermodynamic	2	2
2	MPH-212	Optics	2	
2	MPH-213	Atomic physics	2	2
2	MPH-214	Physiology	2	2
2	MPH-215	Electromagnetic waves	2	
2	MPH-126	Organic Chemistry	2	2
2	MPH-221	Medical imaging	2	2
2	MPH-222	Molecular biology	2	2
2	MPH-223	Bioelectronics	2	2
2	MPH-224	Healthy culture	2	
2	MPH-225	Biophysics	2	2
2	MPH-226	Phonetics Science	2	
3	MPH-311	Medical Physics 1	2	2
3	MPH-312	Anatomy 1	2	2
3	MPH-313	Medical Terminology	2	
3	MPH-314	Physics of Diagnostic radiology	2	2
3	MPH-315	Laser Basics	2	2
3	MPH-316	Optional 1	2	
3	MPH-321	Biostatics	2	2
3	MPH-322	Biochemistry	2	2
3	MPH-323	Physics of nuclear medicine	2	2
3	MPH-324	Medical laser applications	2	2
3	MPH-325	Analoge electronics	2	2
3	MPH-326	Optional 2	2	
4	MPH-411	Medical image processing and analysis	2	2
4	MPH-412	Medical instrumentation physics	2	
4	MPH-413	Radiotherapy Physics	2	
4	MPH-414	Digital electronics	2	2
4	MPH-415	Optional 3	2	

4	MPH-416	Research project	2	2
4	MPH-421	Medical Physics 2	2	2
4	MPH-422	Neurophysics	2	
4	MPH-423	Material science and nanotechnology	2	2
4	MPH-424	Biomaterials	2	
4	MPH-425	Optional 4	2	
4	MPH-426	Research project	2	2

8. Expected learning outcomes of the program

Knowledge	
• Understand the fundamental principles of physics and their application in medical imaging, radiation therapy, and nuclear medicine. • Demonstrate knowledge of human anatomy, physiology, and relevant biomedical sciences related to medical physics. • Comprehend the principles of radiation physics, radiation biology, and radiation safety, including the effects of radiation on biological systems.	Understand the principles and techniques of various medical imaging modalities, such as X-ray imaging, computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound. • Demonstrate knowledge of radiation therapy techniques, treatment planning, and quality assurance processes. • Understand the principles and applications of nuclear medicine, including radiopharmaceuticals and imaging techniques
Skills	
Apply mathematical and statistical techniques to analyze and interpret data in medical physics.	Apply mathematical and statistical techniques to analyze and interpret data in medical physics.
Perform quality assurance procedures, calibration, and optimization of medical imaging and radiation therapy equipment.	Perform quality assurance procedures, calibration, and optimization of medical imaging and radiation therapy equipment.
Ethics	
Demonstrate a commitment to continuous learning and staying updated with advances in medical physics.	Demonstrate a commitment to continuous learning and staying updated with advances in medical physics.
Engage in professional development activities, such as attending conferences, workshops, and seminars.	Engage in professional development activities, such as attending conferences, workshops, and seminars.

9. Teaching and Learning Strategies

– Blended learning through, Electronic lectures, and Physical attendance

lessons and daily homework and discussions.

2- Electronic lectures (pdf), Online Meeting, Videos Uploading. Practical Experiments, Applications, Homework and Scientific Discussions

10. Evaluation methods

Exams, Daily Homework, Assignments, Discussions, Lab. Reports and Graduation Research

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Physics	Solid state			1	
Assist Proff	Biology	Molecular Biology			2	1
Assist Proff	physics	Nano			1	
Lec.	Physics	Nano			1	
Lec	Physics	Physics			1	1
Lec	Medicine					1
Assist lec	Physics				5	
Assist lec	Biology				2	

Professional Development

Mentoring new faculty members

- **One-on-one mentorship with an advanced faculty mentor.** The department chair will usually assign new faculty a mentor based on research interests and will require that the mentor and mentee meet a certain number of times. This model is simple

enough to implement, but the mentee may need to seek out additional opportunities for informal mentorship or may be "stuck" with a less-than-ideal mentor.

- **One-on-one mentorship with a near-peer mentor.** The department chair will assign new faculty a mentor who is in more of a peer position. Sometimes a new faculty member can get a better sense of the current state of the department and service expectations from someone who is a peer. Tenure guidelines and expectations may have recently changed, and it is possible that a peer mentor will be more aware of these types of shifts. Still, the new faculty may miss out on some of the wisdom and deeper institutional knowledge of a long-tenured faculty member.
- **Group Mentorship Models.** In these types of models, new faculty may be assigned multiple mentors or be included in a less hierarchical group that includes mentees, peer figures, and more advanced mentors. Group models, or mentoring networks, can remove some of the pressure from the mentor-mentee relationship, and it can give mentees more freedom of choice regarding who to interact with and the depth and type of these interactions. Organizing larger-scale groups and making sure that everyone in the groups has the opportunity to get to know one another involves a great deal of planning and coordination, including sometimes across departments.
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Professional development of faculty members

- Meeting tenure and promotion expectations; balancing research, teaching, and service
- Writing and public speaking: grant proposals, papers and books, responding to reviews; technical and public talks
- Managing time and stress: prioritizing writing, saying "no," time management tactics
- Managing people: supervising students, managing a research group, dealing with conflict; gender, incivility, and bias

12. Acceptance Criterion

(Preparatory school graduate. Scientific branch)

13. The most important sources of information about the program

Medical Physics department of high ranked universities.

14. Program Development Plan

1. Encourage research and development to advance the discipline.
2. Disseminate scientific and technical information in the discipline.
3. Foster the education and professional development of medical physicists.

Program Skills Outline

Year/Level	Course Code	Course Name	Basic or optional	Required program Learning outcomes											
				Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4

- Please tick the boxes corresponding to the individual program learning outcomes under evaluation.