

Al-Ayen Iraqi University



Bachelor of Science (B.Sc.) - *Department: Healthy Physics and Radiation Therapy*

بكالوريوس علوم - هندسة تقنيات الفيزياء الصحية والعلاج الإشعاعي

Table of Contents

جدول المحتويات

1. Mission & Vision Statement	بيان المهمة والرؤية
2. Program Specification	مواصفات البرنامج
3. Program (Objectives) Goals	أهداف البرنامج
4. Program Student learning outcomes	مخرجات تعلم الطالب
5. Academic Staff	الهيئة التدريسية
6. Credits, Grading and GPA	الاعتمادات والدرجات والمعدل التراكمي
7. Modules	المواد الدراسية
8. Contact	اتصال

1. Mission & Vision Statement

Vision Statement

The Department of Health Physics and Radiation Therapy Engineering at Al-Ayen Iraqi University - Engineering Technical College seeks to be a major tributary in preparing highly qualified specialized cadres that will cover wide sectors of work in the medical, radiotherapy, engineering and industrial fields in the public and private sectors, through a combination of theoretical academic work, laboratory experiments, research and field work in hospitals and industrial facilities. The combination of teaching methods leads students to a balanced understanding of medical diagnostic methods and radiotherapy techniques to provide integrated medical care to patients during treatment and follow-up of patients.

The graduates of the department work as members of a medical team, where they cooperate with doctors in the field of radiotherapy, technical support and maintenance of radiotherapy devices, monitoring the radiation dose used during treatment, and developing and implementing quality and health safety programs in this field. The graduates of the department can work in the public and private sectors in hospitals and cancer treatment centers, medical research centers, companies manufacturing and developing radiotherapy and diagnostic devices, and academic institutions.

Mission Statement

Preparing distinguished engineers in the field of Healthy Physics and Radiation Therapy to help build and develop the community and contribute to providing the community with research and applied scientific studies that address its developmental and developmental issues, as well as striving to strengthen the college's role in building institutions and developing engineering work in order to achieve the concept of comprehensive development within the framework of human values and concepts Finally, building and consolidating cooperation relations with all parties working in the engineering and medical fields, locally and internationally.

2 Program Specification

Programme code:	BSc-BIO	ECTS	240
Duration:	4 levels, 8 Semesters	Method of Attendance:	Full Time

The programme covers a wide range of specialized subjects during the years of study, providing students with a strong foundation in both theoretical knowledge and practical skills. The curriculum is designed to meet the demands of hospitals, educational and research institutions in the fields of medical physics, radiotherapy and medical engineering, ensuring that graduates are well equipped to work in medical, scientific and research institutions and excel in their professional lives. The study program focuses on qualifying engineers who are able to use and maintain modern medical devices used in radiotherapy and contribute to the development of these devices and pursue postgraduate studies in this specialty.

Theoretical and practical lectures are held in the first and second stages with the same teachers, which increases students' ability to understand the lecture, provides psychological comfort, and creates good interaction between teachers and students, which leads to good results.

The research ethos is developed and enhanced among students from the beginning by linking theoretical lectures with practical applications through university laboratories, practical visits to hospitals, medical and educational institutions, and holding scientific and research seminars, in addition to lectures given by students. There are scientific and practical field courses for all students at each stage of study, which take place in medical and educational institutions.

At each stage of study, students are assigned to present scientific seminars on various topics related to the specialization of medical physics, radiation therapy, and medical device engineering. Practical and scientific workshops and recreational seminars are held, emphasizing the use of the library and staying away from smart phones. In addition, cultural competitions and seminars are held that focus on teamwork, discussing students' problems, and focusing on the importance of humanitarian work.

As students' progress through the programmed, they will delve deeper into advanced topics, thus

enabling them to design and innovate medical devices.

In their final year, students will undertake a comprehensive research project, allowing them to apply their knowledge and skills to most medical devices, how they work and what causes them to malfunction. This final project is an opportunity for students to prove their competence and demonstrate their ability to contribute to the advancement of the field.

The Department of Health Physics and Radiation Therapy Technical Engineering program combines theoretical education, practical training, and research-oriented projects to provide students with a comprehensive education. Graduates will be prepared to pursue a variety of career paths in hospitals, research centers, laboratories, and more.

3. Program Objectives

The Department of Health Physics and Radiation Therapy Technical Engineering is working as a result of the rapid scientific and technological progress in the medical and engineering field in order to achieve clear strategic goals that help it achieve a leading position within the health and medical communities. The main goals of the department fall within the following items:

1. Graduating qualified engineers in the field of medical physics and radiotherapy engineering, who have the ability to analyze and find appropriate solutions to practical problems related to the use of medical devices in the field of radiotherapy.
2. Participating in preparing scientific and practical research in the field of medical physics and radiotherapy engineering, which contributes to serving the community through effective participation in raising the level of education and continuous training in the field of technical engineering by organizing scientific conferences, social seminars and field visits to medical facilities.
3. Developing partnerships with governmental and private medical facilities and developing the spirit of joint teamwork to achieve goals that serve the development of society.
4. Establishing direct contacts with international companies in the field of manufacturing medical devices all over the world and direct contact with colleges and institutes specialized in the field of manufacturing medical devices.
5. Establishing state-of-the-art scientific laboratories equipped with the latest technical devices and equipment in the field of specialization, run by a team of skilled technicians.
6. Activating and strengthening connections with public government entities and the private sector through:
 - Organizing conferences, seminars, and educational courses.
 - Encouraging consultancy work and providing professional services in Health Physics and Radiation therapy to public and private hospitals and cancer treatment centers

4. Student Learning Outcomes

The Department: Healthy Physics and Radiation Therapy Technical Engineering focuses on studying the functioning of the medical radiation devices, how to operate and maintain them, and knowing the causes of their failure, and graduating qualified engineers in the specializations of medical physics engineering and radiation therapy technology, who have the ability and deal with medical radiation devices with high skill. The Department of Health Physics Engineering and Radiotherapy is committed to producing qualified and responsible cadres who can meet the requirements of the development of the medical device industry Upon graduation, students from the Department Health Physics Engineering and Radiotherapy are prepared to enter the workforce as highly skilled engineering technicians. They are equipped to contribute to the development and maintain the medical radiation devices, ensuring the safety and efficiency of medical devices operations. The department offers a Bachelor of Science degree in Health Physics Engineering and Radiotherapy, which equips students with the skills and knowledge required to excel in this field. Students have the opportunity to specialize in areas such as the design of medical devices as well as their maintenance, and continue their postgraduate studies.

Outcome 1

Identification of Complex Relationships

Graduates will be able to deal with medical radiological devices with high skill, know their components, malfunctions and maintenance methods, provide technical support to doctors in medical centers, training human cadres and work on developing these devices.

Outcome 2

Oral and Written Communication

Graduates will be able to communicate and practice the results of their theoretical and practical studies to specialized medical centers using oral and written communication skills, social media, conferences and scientific seminars.

Outcome 3

Laboratory and Field Studies

Graduates will be able to conduct laboratory experiments, scientific studies, practical and field research, using medical radiological devices, scientific equipment, computer technology and artificial intelligence while observing appropriate safety protocols.

Outcome 4

Scientific Knowledge

Students of the Department of Health Physics and Radiotherapy Engineering are ready to enter the labor market and possess high scientific and practical skills, through the combination of theoretical learning and practical training. In addition, the department supports cooperation between various

medical specialties, and holds scientific seminars and courses that benefit students of other medical departments. During the years of study, students acquire the technical skills necessary to operate and maintain medical radiation devices, and gain a strong understanding of safety rules, a sense of ethical responsibility, and a dedication to achieving excellence in their work.

Outcome 5

Data Analyses

Graduates will be able to handle large data and information related to the use of medical radiation devices, their components, their maintenance and compliance with safety rules, and data and results related to the disease. This demonstrates the scientific and practical quantitative skills, and the high ability of graduate engineers to perform simple and complex analyses of data related to devices and disease.

Outcome 6

Critical Thinking

Graduates will be able to participate in the preparation of scientific and practical research in the field of engineering, medical physics and radiation therapy technologies, develop solutions to practical problems, and contribute to community service. And prepare for postgraduate studies and continuing education programs.

5. Academic Staff

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6. Credits, Grading and GPA

Credits

Al-ayen Iraqi University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs. Student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME				
مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب - قيد المعالجة	(45 - 49)	More work required but credit awarded
	F – Fail	راسب	(0 - 44)	Considerable amount of work required
Note:				
Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

CGPA of a 4-year B.Sc. degree:

$$\text{CGPA} = [(1^{\text{st}} \text{ module score} \times \text{ECTS}) + (2^{\text{nd}} \text{ module score} \times \text{ECTS}) + \dots] / 240$$

7. Curriculum/Modules

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU17011	English for Academic	18	32	2	S	NO
ATU17012	Computer Principals	48	52	4	B	NO
ATU17013	General biology	108	42	6	C	NO
ATU17014	Workshop	63	62	5	B	NO
ATU17015	Organic chemistry	108	92	8	C	NO
ATU17016	Engineering Drawing	59	66	5	S	NO

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU17021	Human Right and Democracy	18	32	2	B	NO
ATU17022	Multi-variables calculus	63	37	4	B	NO
ATU17023	Biophysics	63	137	6	C	NO
ATU17024	Physical Optics	78	47	5	C	NO
ATU17025	Engineering Mechanics-Static	108	17	8	S	NO
ATU17026	Fundamentals of Electricity	108	42	5	B	NO

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU17031	Biochemistry	78	47	5	S	NO
ATU17032	Fundamentals of Electronics	78	47	5	S	NO
ATU17033	Nuclear and Radiation Physics	78	122	8	C	NO
ATU17034	Thermodynamic-ides	48	52	4	S	NO
ATU17035	Medical physics	78	22	4	C	NO
ATU17036	advance Mathematics	48	52	4	S	NO

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU17041	Professional ethics	33	42	3	S	NO
ATU17042	Human Anatomy	93	32	5	C	NO
ATU17043	Laser Principles	48	52	4	S	NO
ATU17044	Atomic physics	78	122	8	C	NO
ATU17045	Healthy Physics	63	87	6	C	NO
ATU17046	Geometrical optics	78	22	4	S	

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU17051	Aerodynamic -Fundamentals	63	12	3	S	NO
ATU17052	logic circuit	93	7	4	S	NO
ATU17053	Nuclear medicine	48	152	8	C	NO
ATU17054	Physiology	63	87	6	C	NO
ATU17055	Biostatistics	48	77	5	C	NO
ATU17056	Control Systems	93	7	4	S	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU17061	Aerodynamic -Applied	48	27	3	S	NO
ATU17062	Medical instrumentation	78	122	8	C	NO
ATU17063	Medical imaging	78	22	4	S	NO
ATU17064	Modern Physics	78	47	5	C	NO
ATU17065	Biomedical Electronics	78	72	6	C	NO
ATU17066	advance medical physics	48	52	4	S	

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU17071	Lasers in Medicine	48	2	2	C	NO
ATU17072	Biomedical sensors	78	122	8	C	NO
ATU17073	Physics of Radiotherapy	63	62	5	C	NO
ATU17074	Spectroscopy	63	12	3	C	NO
ATU17075	Optoelectronics	48	152	8	C	NO
ATU17076	Medical Image Analysis	93	7	4	S	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs.

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ATU17081	advance Medical instrumentation	93	107	8	C	NO
ATU17082	Cell biology	48	127	7	C	NO
ATU17083	Quantum mechanics	48	2	2	C	NO
ATU17084	Engineering of Radiation Instrument	78	72	6	C	NO
ATU17085	Radiophysics	63	37	4	C	NO

ATU17086	Final Project	63	12	3	C	NO
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8. Contact

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