Tafila Technical University

College of Science

Department of Applied Physics

Study Plan Approval Date	Biomedical Physics Study Plan	Study Plan Code
06/11/2024		SCI._PHYS._**0212**

This study plan is applied to the students admitted into the Bachelor's program in Biomedical Physics for the academic year 2024/2025

Study Plan for B.SC. in Biomedical Physics

Offered Degree: B.SC. in Biomedical Physics

Tafila Technical University

College of Science

Department of Applied Physics

Department	Program	Official Stamp
Department of Applied Physics	B.SC. in Biomedical Physics	
The biomedical physics study plan was approved by the **dean's council** on **06/11/2024** Decision Number (**281/2024**)		

TTU Biomedical Physics Program

Welcome to the department of applied physics at Tafila Technical University TTU. It is one of the most important academic departments in the college of science at TTU. It was established at the beginning of the academic year 2006/2007 and offers **B.Sc. in Applied Physics**. This stemmed from TTU's keen interest in the basic sciences as essential to the development of other fields of science. The department has 16 faculty members who hold Ph.D. degrees in various experimental and theoretical fields that cover the essential aspects of physics. The supporting staff consists of 8 members working as laboratory instructors and technicians. TTU has been keen to prepare advanced educational laboratories that are equipped with up-to-date experiments for all stages of the bachelor's degree, covering subjects such as mechanics, electricity and magnetism, geometrical optics, waves and light, vibrations, thermodynamics, electronics, solid-state physics, atomic and nuclear physics, and computer applications in physics. The bachelor's degree study plan is designed to link physics with technology, industry, and other sciences, so that the program graduates are well equipped for any line of work they choose to pursue.

Physics has often emerged and intersected with many interdisciplinary fields of science such as biomedical physics, quantum chemistry, physics at the nanoscale and other areas such as engineering, modern technology, etc. The department of applied Physics also offers **B.Sc. in Biomedical Physics**, which aims to fulfil the needs of the labour market and keep pace with scientific and technological developments. The biomedical physics program was established at the beginning of the academic year 2024/2025. It provides students with integrated knowledge about the functions of the human body, radiation, radioactivity, dosimetry, medical devices, radiation protection, and full knowledge of the physics of therapeutic and diagnostic radiation, medical imaging, and related devices. The department has been designing the study plan of the educational and research laboratories that suits the biomedical physics program. The state-of-the-art biomedical physics program is committed to applying the fundamental concepts of physics to the foremost scientific problems; educating the next generation of biomedical physicists; promoting the public understanding of the importance of biomedical physics; and achieving local and international quality standards and labor market requirements.

Vision and Mission	
Vision	**Preparing** distinguished scientific and professional competencies in the field of biomedical physics to meet the needs of the labor market.
Mission	**Qualifying** specialized scientific, professional and research capabilities in biomedical physics by offering a distinguished scientific program in biomedical physics that achieves local and international quality standards and labor market requirements.

Program Objectives (POs)	
PO_1	**Provide** students with basic knowledge and skills in biomedical physics by a distinguished level of learning and teaching at the bachelor's level.
PO_2	**Qualify** biomedical physics students to meet the requirements of the labor market with specializations needed by governmental institutions and private sector companies.
PO_3	**Train** biomedical physics students on scientific research methods, critical thinking, and problem solving to provide the community with consulting and training services in various biomedical physics applications.
PO_4	**Prepare** distinguished graduates in biomedical physics to complete their postgraduate studies to serve and develop the society.
PO_5	**Attract** distinguished scientific and administrative competencies in biomedical physics.

Program Educational Outcomes (PEOs)	
PEO_1	**Apply** specialized theoretical and practical knowledge in all areas of biomedical physics.
PEO_2	**Apply** advanced theoretical and technical skills in gathering information, analyzing outputs, and evaluating quality assurance procedures in biomedical physics.
PEO_3	**Justify**, **interpret**, and **communicate** specialized knowledge on biomedical physics issues through written, visual, and oral communication methods to specialist and non-specialist audiences.
PEO_4	**Demonstrate** a spirit of initiative and a high degree of independence to work effectively and responsibly in an individual context and within a collaborative teamwork environment.

Student Learning Outcomes (SLOs)	
SLO_1	**Identify**, **formulate**, and **solve** broadly defined technical or scientific problems by applying knowledge of mathematics, science, and technical subjects in areas related to the biomedical physics.
SLO_2	**Formulate** or **design** a system, process, procedure, or program to meet desired needs.
SLO_3	**Develop** and **conduct** experiments or test hypotheses, analyze and interpret data, and use scientific judgment to draw conclusions.
SLO_4	**Communicate** effectively with a wide range of audiences.
SLO_5	**Understand** ethical and professional responsibilities and the impact of technical and scientific solutions in global, economic, environmental and societal contexts.
SLO_6	**Work** effectively in teams that set goals, plan tasks, meet deadlines, and analyze risks.

Cognitive Domains for Biomedical Physics Program	
Domain	Fundamental Cognitive Domains
1	Introduction in Classical and Modern Physics
2	Traditional Applications of Biomedical Physics
3	Diagnostic Methods of Biomedical Physics
4	Medical Application of Biomedical Physics
5	Advanced Applications with Field Experience in Biomedical Physics
	Supporting Domains
	Courses support the biomedical physics program that are offered by other programs in the college of science

Numbering System for Biomedical Physics Program				
College NO.	Program NO.	Course Level	Domain Number	Course order within the cognitive Domain
02	12	From 1 to 4	From 1 to 5	From 1 to 9

Credit Hours Distribution for B.SC. in Biomedical Physics			
Classification	**Credit Hours**		
	Obligatory	**Elective**	**Total**
University Requirements	21	6	27
College Requirements	21	0	21
Specialization Requirements	68	18	86
	110	**24**	**134**

Classification of the Requirements for the B.SC. Degree in Biomedical Physics According to Teaching Mode (Online – Blended – Face to Face)

Requirements Classification	Specialization Requirements		College Requirements			Elective University Requirements			Obligatory University Requirements		
	Obligatory	Elective									
Credit Hours	68	18	21			6			21		
% Credit Hours	50.8 %	13.4 %	15.7 %			4.4 %			15.7 %		
% 100	**64.2 %**		**15.7 %**			**20.1 %**					
Teaching Mode	F-to-F Courses	Blended Courses	F-to-F Courses	Blended Courses	Online	F-to-F	Blended	Online	F-to-F	Blended	Online
%	65 Hrs.	24 Hrs.	3 Hrs.	18 Hrs.	0	0	0	6 Hrs.	0	0	21 Hrs.
	48.5 %	17.9 %	2.3 %	13.4 %	0 %	0 %	0 %	4.4 %	0 %	0 %	15.7 %

Tafila Technical University

College of Science

Department of Applied Physics

First: Obligatory University Requirements (21 Credit Hours)

Course NO.	Course Name	Number Of Credit Hours			Pre-requisite	Teaching Mode
		Theoretical	Experimental	Total		
0501100	Communication Skills in Arabic Language	3	0	3	(1)	Online
0502100	Communication Skills in English Language	3	0	3	(2)	Online
0603099	Computer complementary course (3)	3	0	0	------	Online
0302100	Life skills	3	0	3	None	Online
0301199	Leadership and Social Responsibility	3	0	3	None	Online
0404199	Entrepreneurship and innovation	3	0	3	None	Online
0503101	National Education (4)	3	0	3	None	Online
0503112	Military Science (4)	3	0	3	None	Online

(1) "Arabic Placement Test" or Prerequisite Arabic Language 0501099.
(2) "English Placement Test" or Prerequisite English Language 0502099.
(3) If the student passes computer skill placement test "0602098', the grade of this course is record "**Pass**".
(4) Obligatory course for Jordanian students and optional for non-Jordanians. Non-Jordanian students, who do not choose this course, must study another course from the elective university requirements and the grade for this course will not be included in the student's GPA, but will be counted as **pass** or **fail**.

Second: Elective University Requirements (6 Credit Hours)

The student can choose one course from each of the following **groups**:

Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Mode
		Theoretical	Experimental	Total		
Humanities Group Offered by College of Arts, College of Education and College of Business						
0302099	Islamic Culture	3	0	3	None	Online
0503108	Human Rights	3	0	3	None	Online
0503110	Introduction to Domestic Violence	3	0	3	None	Online
0301102	Principles of Thinking	3	0	3	None	Online
0301105	Family Counseling	3	0	3	None	Online
0404100	Work Ethics	3	0	3	None	Online
0403099	Development and Environment	3	0	3	None	Online
Applied Sciences Group Offered by College of Engineering, College of Science and College of Information Technology and Telecommunications						
0105103	Mineral Resources in Jordan	3	0	3	None	Online
0601104	E-Learning	3	0	3	None	Online
0602100	Digital Culture	3	0	3	None	Online
0106140	Traffic Safety	3	0	3	None	Online
0105102	Sustainable Development	3	0	3	None	Online
0202103	Physics and Society (5)	3	0	3	None	Online
0212111	Radiation Sources and its Applications (5)	3	0	3	None	Online

(5) Can be chosen by all university students except students of Applied Physics Department.

Third: Obligatory College Requirements (21 Credit Hours)

Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Mode
		Theoretical	Experimental	Total		
0213105	Calculus 1	3	0	3	(6)	Blended
0213106	Calculus 2	3	0	3	0213105	Blended
0213101	General Physics 1	3	0	3	(7)	Blended
0213107	General Chemistry 1	3	0	3	(8)	Blended
0213109	General Biology 1	3	0	3	None	Blended
0213115	Principles of Statistics 1	3	0	3	None	Blended
0213103	General Physics Lab. 1	0	3	1	0213101 (9)	F-to- F
0213108	General Chemistry Lab. 1	0	3	1	0213107 (9)	F-to- F
0213116	Principles of Statistics Lab. 1	0	3	1	0213115 (9)	F-to- F

(6) (High School Mathematics) or Prerequisite Calculus 0213098.
(7) (High School Physics) or Prerequisite Physics 0213097.
(8) (High School Chemistry) or Prerequisite Chemistry 0213099.

Fourth: Obligatory Specialization Requirements (68 credit hours)

Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Mode
		Theoretical	Experimental	Total		
0213102	General Physics 2	3	0	3	0213101	Blended
0213104	General Physics Lab. 2	0	3	1	0213102 (9)	F-to-F
0207110	General Biology Lab. 1	0	3	1	0213109 (9)	F-to-F
0202233	Modern Physics	3	0	3	0213102	F-to-F
0202242	General Physics 3	3	0	3	0213102	F-to-F
0202251	Mathematical Physics 1	3	0	3	0213102	F-to-F
0212211	General Physics Lab. 3	0	3	1	0202242	F-to-F
0212212	Introduction to Geometrical Optics	2	3	3	0213102	F-to-F
0212313	Radiation Physics	3	0	3	0202233	F-to-F
0212121	Human Biology	3	0	3	0213109	F-to-F
0212222	Human Physiology	3	0	3	0212121	F-to-F
0212223	Analogue Electronics	2	3	3	0213102 & 0213104	F-to-F
0212324	Introduction to Biomedical Physics	3	0	3	0202242	F-to-F
0212325	Biomedical Physics Lab. 1	0	3	1	0212324	F-to-F
0212328	Health Physics	3	0	3	0212313	F-to-F
0202335	Quantum Mechanics 1	3	0	3	0202233 & 0202251	F-to-F

(9) or concurrent.

0202325	Theory of Electromagnetism 1	3	0	3	0202251	F-to-F
0202352	Mathematical Physics 2	3	0	3	0202251	F-to-F
0212354	Computer Applications in Biomedical Physics 1	1	4	3	0202251	F-to-F
0212431	Medical Imaging	3	0	3	0212328	F-to-F
0212432	Biomedical Physics Lab. 2	0	6	2	0212328	F-to-F
0212442	Biomedical Physics Lab. 3	0	6	2	0212431	F-to-F
0212445	Physics of Nuclear Medicine	3	0	3	0212222 & 0212328	F-to-F
0212456	Artificial Intelligence in Biomedical Physics	2	3	3	0212328	Blended
0212458	Training for Biomedical Physics Students (10)	0	12	3	0212328	F-to-F
0212459	Graduation Project for Biomedical Physics Students	3	0	3	0212458	F-to-F

(10) 12 field training hours per week to fulfill the training course (0212458) requirements (148 training hours).

Fifth: Elective Specialization Requirements (18 Credit Hours)

A- First Group: The student can choose any **THREE** courses (**9 Credit Hrs.**) from the following list:

Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Mode
		Theoretical	Experimental	Total		
0212335	Introduction to Digital Electronics	2	3	3	0212223	F-to-F
0212352	Introduction to Medical Ethics	3	0	3	0212324 (11)	Blended
0202314	Classical Mechanics	3	0	3	0202251	F-to-F
0202344	Thermal and Statistical Physics	3	0	3	0202242	F-to-F
0202425	Theory of Electromagnetism 2	3	0	3	0202325	F-to-F
0202436	Atomic and Molecular Physics	3	0	3	0202335	F-to-F
0202437	Nuclear Physics	3	0	3	0202335	F-to-F
0202453	Mathematical Physics 3	3	0	3	0202352	F-to-F
0212457	Special Topics in Biomedical Physics	3	0	3	Dept. Approval	Blended

(11) or concurrent.

B- Second Group: The student can choose any **THREE** courses (**9 Credit Hrs.**) from the following list:						
Course NO.	Course Name	Number of Credit Hours			Pre-requisite	Teaching Mode
		Theoretical	Experimental	Total		
0212333	Bio-Computational Modeling	3	0	3	0212328	Blended
0212343	Fundamentals of Biophysics	3	0	3	0212324	F-to-F
0212344	Medical Optical Applications	3	0	3	0202212 & 0212231	F-to-F
0212351	Scientific Research and Medical Information Resources	2	2	3	0212313 (11)	Blended
0212353	Introduction to Nanotechnology	3	0	3	0202335	Blended
0212434	Analysis and Processing of Medical Images	2	3	3	0212431(11)	F-to-F
0212336	Artificial Intelligence in healthcare	2	3	3	0212328	Blended
0212441	Physics of Radiation Therapy	3	0	3	0212222 & 0212328	F-to-F
0212446	Nuclear Accelerators Physics	3	0	3	0202325 & 0202335	F-to-F
0212455	Computer Applications in Biomedical Physics 2	1	4	3	0212354	F-to-F

(11) or concurrent.

Tafila Technical University

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Department of Applied Physics

Advisory Plan for B.SC. Degree in Biomedical Physics

First Academic Year_ Biomedical Physics Program							
The First Semester				**The Second Semester**			
Course Number	Course Name	NO. of Credit Hours	Pre-requisite	Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0213105	Calculus 1	3	(1)	0213106	Calculus 2	3	0213105
0213101	General Physics 1	3	(2)	0213102	General Physics 2	3	0213101
0213109	General Biology 1	3	None	0212121	Human Biology	3	0213109
0213115	Principles of Statistics 1	3	None	0213107	General Chemistry 1	3	(3)
0213116	Principles of Statistics Lab. 1	1	0213115 (4)	0213103	General Physics Lab. 1	1	0213101 (4)
	Elective University Requirement	3		0207110	General Biology Lab. 1	1	0213109 (4)
					Obligatory University Requirement	3	
Total		**16**		**Total**		**17**	

(1) (High School Mathematics) or Prerequisite Calculus 0213098.

(2) (High School Physics) or Prerequisite Physics 0213097.

(3) (High School Chemistry) or Prerequisite Chemistry 0213099.

(4) or concurrent.

Second Academic Year_ Biomedical Physics Program							
The First Semester					**The Second Semester**			
Course Number	Course Name	NO. of Credit Hours	Pre-requisite		Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0213104	General Physics Lab. 2	1	0213102 (5)		0212212	Introduction to Geometrical Optics	3	0213102
0213108	General Chemistry Lab. 1	1	0213107 (5)		0202233	Modern Physics	3	0213102
0212222	Human Physiology	3	0212121		0212223	Analogue Electronics	3	0213102 & 0213104
0202242	General Physics 3	3	0213102		0212211	General Physics Lab. 3	1	0202242
0202251	Mathematical Physics 1	3	0213106			Elective University Requirement	3	
	Obligatory University Requirement	3				Obligatory University Requirement	3	
	Obligatory University Requirement	3						
Total		**17**			**Total**		**16**	

(5) or concurrent.

Third Academic Year_ Biomedical Physics Program							
The First Semester				**The Second Semester**			
Course Number	Course Name	NO. of Credit Hours	Pre-requisite	Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0212324	Introduction to Biomedical Physics	3	0202242	0212325	Biomedical Physics Lab. 1	1	0212324
0212313	Radiation Physics	3	0202233	0212328	Health Physics	3	0212313
0202335	Quantum Mechanics 1	3	0202233 & 0202251	0212354	Computer Applications in Biomedical Physics 1	3	0202251
0202352	Mathematical Physics 2	3	0202251	0202325	Theory of Electromagnetism 1	3	0202251
	Elective Specialization Requirement	3			Elective Specialization Requirement	3	
.	Obligatory University Requirement	3			Elective Specialization Requirement	3	
Total		**18**		**Total**		**16**	

Forth Academic Year_ Biomedical Physics Program							
The First Semester				**The Second Semester**			
Course Number	Course Name	NO. of Credit Hours	Pre-requisite	Course Number	Course Name	NO. of Credit Hours	Pre-requisite
0212458	Training for Biomedical Physics Students (6)	3	0212328	0212459	Graduation Project for Biomedical Physics Students	3	0212458
0212431	Medical Imaging	3	0212328	0212445	Physics of Nuclear Medicine	3	021222 & 0212328
0212432	Biomedical Physics Lab. 2	2	0212328	0212442	Biomedical Physics Lab. 3	2	0212431
0212456	Artificial intellegance in Biomedical Physics	3	0212328		Elective Specialization Requirement	3	
	Elective Specialization Requirement	3			Elective Specialization Requirement	3	
	Obligatory University Requirement	3			Obligatory University Requirement	3	
Total		**17**		**Total**		**17**	

(6) 12 field training hours per week to fulfill the training course (0212458) requirements (148 training hours).

Courses that Cover Fundamental Cognitive Domains for the Biomedical Physics Program

Cognitive Domain	Course number	Course Name	Number of credit hours			Pre-requisite
			Theoretical	Experimental	Total	
(1) Introduction to Classical and Modern Physics	0202233	Modern Physics	3	0	3	0213102
	0202242	General Physics 3	3	0	3	0213102
	0212211	General Physics lab. 3	0	3	1	0202242
	0212212	Introduction to Geometrical Optics	2	3	3	0213102
	0212313	Radiation Physics	3	0	3	0202233
	0202314	Classical Mechanics	3	0	3	0202251
	0202325	Theory of Electromagnetism 1	3	0	3	0202251
	0202335	Quantum Mechanics 1	3	0	3	0202233 & 0202251
	0202344	Thermal and Statistical Physics	3	0	3	0202242
	0202425	Theory of Electromagnetism 2	3	0	3	0202325
	0202436	Atomic and Molecular Physics	3	0	0	0202335
(2) Traditional Applications of Biomedical Physics	0212121	Human Biology	3	0	3	0213109
	0212222	Human Physiology	3	0	3	0212121
	0212223	Analogue Electronics	2	3	3	0213102 & 0213104
	0212324	Introduction to Biomedical Physics	3	0	3	0202242
	0212325	Biomedical Physics Lab. 1	0	3	1	0212324
	0212328	Health Physics	3	0	3	0212313
	0202437	Nuclear Physics	3	0	3	0202335
(3) Diagnostic Methods of Biomedical Physics	0212431	Medical Imaging	3	0	3	0212328
	0212432	Biomedical Physics Lab. 2	0	6	2	0212328
	0212333	Bio-Computational Modeling	3	0	3	0212328
	0212434	Analysis and Processing of Medical Images	2	3	3	0212431 (1)
	0212335	Introduction to Digital Electronics	2	3	3	0212223
	0212336	Artificial Intelligence in Healthcare	2	3	3	0212328

(4) Medical Applications of Biomedical Physics	0212441	Physics of Radiation therapy	3	0	3	0212222 & 0212328
	0212442	Biomedical Physics Lab. 3	0	6	2	0212431
	0212343	Fundamentals of Biophysics	3	0	3	0212324
	0212344	Medical Optical Applications	3	0	3	0212212 & 0202233
	0212445	Nuclear Medicine Physics	3	0	3	0212222 & 0212328
	0212446	Nuclear Accelerators Physics	3	0	3	0202335 & 0202325
(5) Advanced Applications with Field Experience	0212351	Scientific Research and Medical Information Resources	2	2	3	0212313 (1)
	0212352	Introduction to Medical Ethics	3	0	3	0212324 (1)
	0212353	Introduction to Nanotechnology	3	0	3	0202335
	0212354	Computer Applications in Biomedical Physics 1	3	0	3	0212251
	0212455	Computer Applications in Biomedical Physics 2	1	4	3	0202354
	0212456	Artificial Intelligence in Biomedical Physics	2	3	3	0212328
	0212457	Special Topics in Biomedical Physics	3	0	3	Dept. Approval
Training	0212458	Training for Biomedical Physics Students (2)	0	12	3	0212328
Graduation Project	0212459	Graduation Project for Biomedical Physics Students	3	0	3	0212458

(1) or concurrent.

(2) 12 field training hours per week to fulfill the training course (0212458) requirements (148 training hours).

Supporting Courses for the Biomedical Physics Program that are Offered by other Programs in the College of Science

Cognitive Domain	Course Number	Course Name	Number of credit hours			Pre-requisite
			Theoretical	Experimental	Total	
Supporting Domains	0213101	General Physics1	3	0	3	(3)
	0213103	General Physics Lab. 1	0	3	1	0213101 (6)
	0213102	General Physics 2	3	0	3	0213101
	0213104	General Physics Lab. 2	0	3	1	0213102 (6)
	0202251	Mathematical Physics 1	3	0	3	0213106
	0202352	Mathematical Physics 2	3	0	3	0202251
	0202453	Mathematical Physics 3	3	0	3	0202352
	0213107	General Chemistry 1	3	0	3	(4)
	0213108	General Chemistry Lab. 1	0	3	1	0213107 (6)
	0213105	Calculus 1	3	0	3	(5)
	0213106	Calculus 2	3	0	3	0213105
	0213115	Principles of Statistics 1	3	0	3	None
	0213116	Principles of Statistics Lab. 1	0	3	1	0213115 (6)
	0213109	General Biology 1	3	0	3	None
	0207110	General Biology Lab. 1	0	3	1	0213109 (6)
	0213097	Prerequisite Physics (7)	3	0	0	None
	0213098	Prerequisite Calculus (7)	3	0	0	None
	0213099	Prerequisite Chemistry (7)	3	0	0	None

(3) (High School Physics) or Prerequisite Physics 0213097.

(4) (High School Chemistry) or Prerequisite Chemistry 0213099.

(5) (High School Mathematics) or Prerequisite Calculus 0213098.

(6) or concurrent.

(7) This course is marked **PASS** or **FAIL**.

Description of the Courses that Cover Fundamental Cognitive Domains of the Biomedical Physics Program

Course Name: **Human Biology**	Course Number: **0212121**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213109**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers chemistry of life, cell structure and function, organization and regulation of body systems, cardiovascular system: heart, blood vessels, and blood, the lymphatic and immune systems, biology of infectious diseases, digestive system and nutrition, respiratory system, urinary system, skeletal system, muscular system, nervous system, senses, endocrine system, reproductive system, development and aging, patterns of chromosome inheritance, cancer, genetic inheritance, DNA biology and technology, human evolution, ecology and the nature of ecosystems, human interactions with the biosphere.	
Course Name: **Human Physiology**	Course Number: **0212222**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0212121**	Teaching language: **English**	Offered by: Appiled Biology Department
Course Description	The course covers mechanisms and basic functions of the human body systems: The cell and general physiology, membrane physiology, nerve, and muscle, the heart, the blood circulation, the body fluids and kidneys, blood cells, immunity, and blood clotting, respiration, aviation, space, and deep-sea diving physiology, the nervous system physiology, gastrointestinal physiology, endocrinology and reproduction, metabolism and temperature regulation, and sports physiology.	
Course Name: **Analogue Electronics**	Course Number: **0212223**	NO. of credit hours: **3** (**2** Theoretical Hrs. and **3** Experimental Hrs.)
Pre-requisite: **0213102 & 0213104**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The **theoretical** part covers AC and DC circuits, semiconductors, semiconductor diodes and applications, bipolar transistor, transistor fundamentals and transistor biasing, field effect transistors, voltage amplifiers, power amplifiers, operational amplifiers. The **experimental** part covers experiments on: Electronics lab equipment familiarization; Oscilloscope and measurement of voltage amplitude and frequency; Diode characteristics; Zener diode characteristics and applications; Diode clipping and clamping; Bridge rectifier: Half-wave and Full-wave rectifier; The photo diode; Transistor characteristic curve; Transistor as a switch; Transistor biasing; The solar cell.	
Course Name: **General Physics 3**	Course Number: **0202242**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213102**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers applications of Faraday's law and Lenz's law, self-induction & mutual induction, resistance, capacitance, inductance, alternating current, electric transformers, gravity: Newton's law of universal gravitation, gravitational field and potential energy, satellites, fluids: pressure in fluids, Archimedes' principle, Bernoulli's equation, Poiseuille' Law, thermodynamics: temperature, thermal expansion of solids, thermal energy and internal energy, heat capacity, first law of thermodynamics, ideal gas, thermal energy and second law of thermodynamics, heat pumps and refrigerators, and third law of thermodynamics.	

Course Name: **General Physics Lab. 3**	Course Number: **0212211**	NO. of credit hours: **1** (3 Experimental Hrs.)
Pre-requisite: **0202242**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	This experimental course covers a set of experiments on: Electromagnetic induction, Phase difference and power in AC circuits, Inductance of solenoids, Series RLC circuit, Parallel RLC circuit, Simple harmonic motion of spring, Speed of longitudinal and Transverse mechanical waves, Standing waves, Stefan-Boltzmann law, Mechanical equivalent of heat, Heat capacity of gases and solids, Thermal expansion of liquids and solids.	
Course name: **Modern Physics**	Course Number: **0202233**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213102**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers development stages of modern physics, special theory of relativity: time dilation and length contraction, mass–energy equivalence, and Lorentz transformations, atomic structure and atomic models, Planck's law of radiation, Compton scattering, wave nature of matter, X-ray diffraction, particle diffraction, de Broglie's hypothesis. Introduction to quantum mechanics: Schrödinger's equation and applications.	
Course Name: **Introduction to Geometrical Optics**	Course Number: **0212212**	NO. of credit hours: **3** (**2** Theoretical Hrs. & **3** Experimental Hrs.)
Pre-requisite: **0213102**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The **theoretical** part covers nature of light, speed of light, index of refraction, concept of a ray, reflection and refraction on surfaces, total reflection, Huygens' principle, Fermat's principle, prism, the dispersion of light. Plane and spherical mirrors and image formation, lenses: convex and concave lenses, thin lenses, thick lenses, and lens defects, optical devices: camera, eye, simple microscope, compound microscope, telescope, fibre optics and communications. The **experimental** part covers a set of experiments on: Reflection and refraction on surfaces, Total internal reflection and scattering of light, Plane and spherical mirrors and image formation, convex and concave lenses and image formation, Newton's rings, prism, Refractive index of air using Michelson interferometer, Single-slit experiment, Young's double-slit experiment, Polarization of light, and Optical fibers.	
Course Name: **Introduction to Biomedical Physics**	Course Number: **0212324**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0202242**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers biomechanics, biofluid mechanics, sound and hearing, light and vision, heat and temperature, electricity and magnetism in the human body, biomagnetism, the use of ionizing and non-ionizing radiation in medical diagnosis and treatment, and introduction to radiation protection and nuclear medicine.	
Course Name: **Radiation Physics**	Course Number: **0212313**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0202233**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers fundamentals of radiation physics: radioactivity and decay kinetics; sources of ionizing radiation, natural decay series; production and properties of ionizing radiation; interactions of photons, charged particles, and neutrons with matter; radiation detectors; concepts of radiation dosimetry (theoretical and experimental, cavity theory and ionization chambers).	

Course Name: **Biomedical Physics Lab. 1**	Course Number: **0212325**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0212324**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers a set of experiments on: Measurement of density: Bone, Blood, and an unkown liquid; Determination the viscosity of an unknown liquid; Measurement of surface tension of an unknown liquid; Measurement of air humidity- determination of dew point; Spirometry - measuring the vital capacity of the lungs; Investigating human physical fitness; Measurement of blood pressure; Measurement of the skin resistance; Electrocardiography (ECG); Electromyography: Measurement of the response of the median nerve; Eye and vision: Determination of accommodation width and visual acuity; Power loss in optical fiber.	
Course Name: **Health Physics**	Course Number: **0212328**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0212313**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers Radiation Dosimetry; Biological Basis for Radiation Safety; Radiation Safety Guides; Health Physics Instrumentation: Radiation Detercors, Dose Measurement, Calibration, and Counting Statristics; External Radiation Safety; Internal Radiation Safety; Evaluation of Radiation Safety Measures; Nonionizing Radiation Safety.	
Course Name: **Theory of Electromagnetsim 1**	Course Number**: 0202325**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite**: 0202251**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers coordinate systems; Vectors analysis; Stoke's theorem and divergence theorem; Electric forces; Electric fields; electric potential; applications of Gauss law, Special methods for calculating potential: Laplace equation, image method, and multipole expansion; Electrostatic fields in matter: dipole moment and electrical displacement; Magnetism: Lorentz's law, Biot-Savart's law, and Ampere's law; magnetic fields in matter: linear and nonlinear media.	
Course Name: **Quantum Mechanics 1**	Course Number: **0202335**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0202233 & 0202251**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers wave function and statistical interpretation, Time-Independent Schrödinger equation, One-dimensional problems: Infinite square well, Harmonic oscillator (operator method), Free particle, Dirac delta-function and finite well, Hilbert space, Hermitian operators, Dirac notation, Schrödinger equation in spherical coordinates, Hydrogen atom, Quantum theory of angular momentum, Spin-1/2 particle.	
Course Name: **Computer Applications in Biomedical Physics 1**	Course Number: **0212354**	NO. of credit hours: **3** (**1** Theoretical Hr. & **4** Experimental Hrs.)
Pre-requisite: **0202251**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	Matlab software and C++ and Python will be used as computational and programming tools in **basic** biomedical physics applications. Students will be trained to solve problems in real and complex algebra, trigonometry, linear algebra, and ordinary differential equations. The four experimental hours are divided into two sessions: each of two experimental hours.	

Course Name: **Physics of Radiation Therapy**	Course Number: **0212441**	NO. of credit hours: **3** (Theoretical Hrs.)
Pre-requisite: **0212222 & 0212328**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers production, interaction, and dosimetry of high-energy x-rays and electrons, LINAC theory, radiation dose distribution and treatment planning, use of radionuclides sources for radiation therapy, materials used, source construction, dosimetry theory and practical applications, therapeutic applications of non-ionizing radiation, proton therapy and heavy ion therapy.	
Course name: **Medical Imaging**	Course number: **0212431**	Number of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0212328**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	This course covers mathematical and statistical aspects of imaging science, physical description of image quality: resolution, contrast, and signal to noise ratio, X-ray imaging radiography, fluoroscopy, computed tomography (CT), ultrasonography, nuclear imaging: radiopharmaceuticals, gamma camera, scintigraphy, positron emission tomography (PET), single photon emission computed tomography (SPECT), and magnetic resonance imaging (MRI), evaluation and optimization of imagining systems, Linear system theory in the Fourier domain, image processing and analysis, statistical properties of signals.	
Course Name: **Biomedical Physics Lab. 2**	Course number: **0212432**	NO. of credit hours: **2** (**6** Experimental Hrs.)
Pre-requisite: **0212328**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	This experimental course covers a set of experiments on: Ionization chamber and the range of alpha particles in the air, dead-time and efficiency of the Geiger counter, properties of Scintillation detector, counting statistics of nuclear radiation, inverse square law and absorption coefficient of gamma rays and beta particles, half-life of a radioactive isotope, internal conversion in a radioactive isotope, Photonuclear cross-section / Compton scattering cross-section, spectroscopy of gamma rays using a high-purity germanium (HPGe) detector, deflection of beta particles in a magnetic field, analyzing proteins/DNA using ultraviolet (UV) spectroscopy, spectroscopy of X-ray, X-ray fluorescence and Moseley's law.	
Course Name: **Biomedical Physics Lab. 3**	Course Number: **0212442**	NO. of credit hours: **2** (**6** Experimental Hrs.)
Pre-requisite: **0212431**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	This experimental course covers a set of experiments on: Ultrasonic echography (A-scan), ultrasonic echography (B-scan), velocity of ultrasound in solid state material, fluid flow velocity/ ultrasonic Doppler effect, Breast cancer/ ultrasonic investigation with breast dummy, effect of artery stenosis/ medical Doppler sonography with arm dummy, relaxation times and spatial encoding in magnetic resonance imaging MRI, generating 2D and 3D magnetic resonance images, optimization of CT-scan quality, ultrasonic computed tomography, contrast medium with blood vessel model, X-ray dosimetry: absorbed dose, equivalent dose, and absorbed dose rate, and imaging of micro and nanostructures with atomic force microscope AFM.	

Course name: **Artificial Intelligence In Biomedical Physics**	Course number: **0212456**	NO. of credit hours: **3** (2 Theoretical Hr. & 3 Experimental Hrs.)
Pre-requisite: **0212328**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers artificial intelligence (AI) in biomedical physics, artificial intelligence algorithms: Supervised learning, Unsupervised learning, Semi-supervised learning, and Reinforcement learning. The influence of AI on the role of medical physicists in Radiotherapy Practice (RT): Simulation, Treatment planning, Treatment delivery, Quality management systems (Quality assurance, and Radiation protection and risk management), Education and training, Limitation medical physicists face with the use of AI in RT practice. The course includes state-of-the-art studies on the use of AI in medical imaging and radiation oncology.	

Course name: **Training for Biomedical Physics Students ***	Course Number: **0212458**	NO. of credit hours: **3** (**148** Field training Hrs. in Biomedical Physics)
Pre-requisite: **0212328**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The field training course is designed to deepen student understanding of the principles, concepts, and applications of biomedical physics acquired during their study. The student must have finished **90** credit hours and the prerequisite (**0212328**) to be enrolled in the training course.	

Course Name: **Graduation Project for Biomedical Physics Students**	Course Number: **0212459**	Number of credit hours: **3** Theoretical Hrs. (Fortnightly 2-Hrs. discussion session)
Pre-requisite: **0212458**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course aims to develop the student's self-learning, interpersonal skills, critical thinking and problem solving through conducting a scientific review, applied experiment, or computer modelling within the biomedical physics discipline in coordination with a supervisor assigned by the department council. This course includes a fortnightly two-hours discussion session to follow up on the student's progress in the project and to enable the student demonstrating, discussing and evaluating his/her achievement with peers and the department faculty members.	

Course Name: **Bio-Computational Modeling**	Course Number: **0212333**	Number of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0212328**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers biological background and developmental strategy of mathematical models of tissue response in cancer treatments and cancer research; Computational methods for dose distribution calculations; Linear quadratic model (LQ); Modeling of radiotherapy response: tumor control probability (TCP) model, Normal tissue complication probability (NTCP) models, and examples of their use.	

* 12 field training hours per week to fulfill the training course (0212458) requirements (148 training hours).

Course Name: **Introduction to Digital Electronics**	Course number: **0212335**	NO. of credit hours: **3** (**2** Theoretical Hrs. & **3** Experimental Hrs.)
Pre-requisite: **0212223**	Teaching language: English	Offered by: Biomedical Physics Program
Course Description	The **theoretical** part covers fundamentals of digital electronics: Number systems, binary codes, digital arithmetic, logic gates and related devices, logic families, boolean algebra and simplification techniques, arithmetic circuits, multiplexers and demultiplexers, flip-flops and related devices, counters and registers, data conversion circuits – D/A and A/D converters. The **experimental** part covers experiments on: Trainer-kit and logic gates package familiarization; Verifications of truth tables of logic gates; Design basic gates using NAND and NOR gates; Design half and full adder; Design half and full subtractor; Design parallel adder and parallel subtractor; Design binary-to-gray and gray-to-binary converter; Multiplexer and de-multiplexer; 1 bit and 4 bit comparator circuits; Encoder and decoder, Design of Flip-flops and truth tables verification; Asynchronous and synchronous counters; Shift registers.	
Course Name: **Artificial Intelligence in Healthcare**	Course number: **0212336**	NO. of credit hours: **3** (**2** Theoretical Hr. & 3 Experimental Hrs.)
Pre-requisite: **0212328**	Teaching language: English	Offered by: Biomedical Physics Program
Course Description	The course covers current healthcare, big data, and machine learning, The rise of artificial intelligence AI in healthcare applications, Drug discovery and molecular modeling using artificial intelligence, Applications of AI in drug delivery and pharmaceutical development, Cancer diagnostics and treatment decisions using AI, AI for medical imaging, Medical devices and AI, AI assisted surgery, Remote patient monitoring using AI, Security, privacy, and information-sharing aspects of healthcare AI.	
Course name: **Thermal and Statistical Physics**	Course Number: **0202344**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0202242**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers fundamental concepts of thermodynamics: state equations, the first law of thermodynamics, entropy and the second law of thermodynamics, applications of thermodynamics in simple systems, Maxwell-Boltzmann statistics, Bose-Einstein statistics, Fermi-Dirac statistics, statistical concepts of temperature and entropy, and applications of Thermal and Statistical Physics.	
Course Name: **Classical Mechanics**	Course Number: **0202314**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite**: 0202251**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers kinematics in different coordinate systems, Newtonian mechanics, oscillations, gravitation, central force motion, rotating frames, Lagrangian mechanics, Hamiltonian mechanics, dynamics of systems of particles, mechanics of rigid bodies, and small oscillations.	

Course Name: **Fundamentals of Biophysics**	Course number: **0212343**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0212324**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers molecular structure of biomolecules. properties and function of proteins, nucleic acids, lipids and membranes. Energetics and dynamics of biological systems. Physical aspects of selected systems including: circulatory system, hearing, nerve transmission, vision, photosynthesis, enzyme mechanism, and cellular diffusion. Introduction to spectroscopic methods for monitoring reactions and determining structure including light absorption or scattering, fluorescence, NMR, and x-ray diffraction.	
Course Name: **Medical Optical Applications**	Course number: **0212344**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite**: 0212212 & 0202233**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers theoretical and experimental principles underlying the application of optics in biomedical physics, optical imaging techniques: endoscopy, optical coherence tomography (OCT), photoacoustic imaging, diffuse optical tomography (DOT), super-resolution microscopy, and Raman spectroscopy. Use of lasers and fiber optics in medicine for diagnosis and therapy, and future trends in medical optics.	
Course Name: **Introduction to Nanotechnology**	Course number: **0212353**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0202335**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers introduction to physics of solid state; History and definition of nanotechnology, Method of measuring nanostructure properties, Properties of individual nanoparticles; Carbon nanostructure; Bulk nanostructure materials; Nanostructured ferromagnetism, Quantum wells, quantum wires, and quantum dots; Self-assembly and catalysis; Biological nanostructure; Applications of nanotechnology in medicine.	
Course Name: **Computer Applications in Biomedical Physics 2**	Course number: **0212455**	NO. of credit hours: **3** (**1** Theoretical Hr. & **4** Experimental Hrs.)
Pre-requisite: **0212354**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	MATLAB software, C++ and Python programming languages will be used as computational and programming tools in **advanced** biomedical physics applications. Students will be trained to solve problems related to special functions, digital signal processing, image processing, data analysis, and computational biology. The four experimental hours are divided into two sessions: each of two experimental hours.	
Course Name: **Scientific Research and Medical Information Resources**	Course number: **0212351**	NO. of credit hours: **3** (**2** Theoretical Hrs. & **2** Experimental Hrs.)
Pre-requisite: **0212313 ***	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers methodologies of scientific research in the health professions, identifying research problems, selecting proper previous studies, formulating research questions, objectives, and hypotheses, exploring research design, determining sample sizes, collecting medical data, methods of analysis, ethics of scientific research, writing and publishing scientific articles. The student is required to participate in a weekly **two-hour visit** to the university library to learn searching in electronic resources, extracting information from books and periodicals. The student should write a simple scientific research paper on a topic within the field of biomedical physics.	

* or concurrent

Course Name: **Introduction to Medical Ethics**	Course number: **0212352**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0212324 ***	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers professional ethics, organizational structures, regulatory commissions, government laws, and fundamental concepts relevant to work in the medical field, workplace safety, information systems, hospitals and laboratories organization, and accredited training certificates. The course includes **field visits** for students to hospitals and medical centers.	
Course Name: **Analysis and Processing of Medical Images**	Course number: **0212434**	NO. of credit hours: **3** (**2** Theoretical Hrs. & **3** Experimental Hrs.)
Pre-requisite: **0212431 ***	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The **theoretical** part covers introduction to digital imaging representation, fundamentals of digital imaging, using transforms in image processing and analysis, such as discrete and fast Fourier transforms, Hotelling and Hog transforms, image enhancement methods, image reconstruction, image encryption, image segmentation, and introduction to 3D imaging. The **experimental** part covers training on display, segmentation, and processing of medical images using advanced computational software.	
Course Name: **Physics of Nuclear Medicine**	Course number: **0212445**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0212222 & 0212328**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The course covers fundamental physics of radioactivity, the use of unsealed sources in medical diagnosis and treatment, Unsealed source dosimetry, nuclear measurement instrumentation, spectrometry, design and function of gamma cameras, single photon emission tomography (SPECT), and positron emission tomography (PET), instruments quality assurance, counting statistics.	
Course Name: **Theory of Electromagnetism 2**	Course number: **0202425**	NO. of credit hours: **3** Theoretical Hrs.
Perquisite: **0202325**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers the basic principles of electrodynamics: Maxwell's equations; electromagnetic waves: wave equation, wave propagation, reflection and refraction of plane waves, wave vectors; electromagnetic radiation: impedance, dipole radiation, antennas.	
Course Name: **Nuclear Physics**	Course number: **0202437**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0202335**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	This course covers basic nuclear concepts and properties; nuclear force: deuteron, extended forces, scattering of nucleons, nuclear models: liquid drop model, shell model; unified model; radioactive decays: alpha, beta, and gamma; nuclear reactions: compound nucleus reactions, nuclear fission and fusion.	

* Or concurrent.

Course Name: **Nuclear Accelerators Physics**	Course number: **0212446**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0202325 & 0202335**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	This course covers nuclear accelerator technology; Physical principles and mathematical modelling of the motion of particle beams within accelerators; Basic principles of accelerator operation and particle beams; Types of accelerators: Linear accelerators, cyclotrons, synchrotrons, and others; Uses of accelerators in materials science, production of radioactive sources, and medical applications such as particle therapy.	

Course Name: **Atomic and Molecular Physics**	Course number: **0202436**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0202335**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers one-electron atoms, electron spin, addition of angular momenta, fine structure, Hyperfine structure, interaction of one-electron atoms with electromagnetic radiation, electric dipole approximation and selection rules, interaction of one-electron atoms with external electric and magnetic fields: Stark effect and Zeeman effect, two-electron atoms, molecular structure and spectra of diatomic molecules.	

Course Name: **Special Topic in Biomedical Physics**	Course number: **0212457**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **Dept. Approval**	Teaching language: **English**	Offered by: Biomedical Physics Program
Course Description	The content of this subject is determined by the department council so that it includes selected topics in biomedical physics and within the compulsory fundamental cognitive domains for the medical physics program. The student must have finished **100** credit hours to be enrolled in this course.	

Description of the Courses Offered by other Programs in the College of Science and Cover the Supporting Domains of the Biomedical Physics Program

Course Name: **General Physics 1**		Course number: **0213101**	NO. of credit hours: 3 Theoretical Hrs.
Pre-requisite: *		Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers units and measurement, scalar and vector quantities, vectors, motion in one dimension, projectiles, circular motion, laws of motion and their applications, work and energy, linear momentum, collisions, kinematics of rotational motion, center of mass, torque, angular momentum, applications of static and dynamic equilibrium.		
Course Name: **General Physics Lab. 1**		Course number: **0213103**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0213101** **		Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This experimental course covers an introduction on measurements, accuracy and precision, collection and analysis of data, measurements and uncertainties, vectors: force table, kinematics of rectilinear motion, projectiles, newton's second law of motion with digital cart, force and displacement on a fixed pully, centripetal force/centrifugal force, coefficients kinetic and static friction, conservation of mechanical energy, conservation of momentum with digital-cart, simple pendulum, spring constant, moment of inertia of rigid object.		
Course Name: **General Physics 2**		Course number: **0213102**	NO. of credit hours: 3 Theoretical Hrs.
Pre-requisite: **0213101**		Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers the electric force, the electric field, Coulomb's law, Gauss's law, electric potential, electric potential energy, capacitance and dielectric materials, current and resistance, Ohm's law, electromotive force, electric circuits and Kirchhoff laws, the magnetic field, magnetic force acting on an electric charge, Lorentz law, sources of magnetic field, Biot-Savart law, Ampère's law, electromagnetic induction, Faraday's law, and Lenz's law.		
Course Name: **General Physics Lab. 2**		Course number: **0213104**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0213102** **		Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This experimental course covers experiments on electricity and magnetism: specific charge of the copper ion, electric field mapping and equipotential surfaces, Coulomb potential and Coulomb field of metal spheres, Wheatstone bridge, potentiometer, Ohm's law, power transfer, conversion of galvanometer to an ammeter and a voltmeter, charging and discharging of a capacitor, magnetic field of a straight conductor, Magnetic field of single coils / Biot-Savart's law with a teslameter, and the horizontal component of the Earth's magnetic field.		

* (High School Physics) or Prerequisite Physics 0213097.

** or concurrent.

Cours Name: **Mathematical Physics 1**	Course number: **0202251**	NO. of credit hours: 3 Theoretical Hrs.
Pre-requisite: **0213106**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The Course covers complex numbers, linear equations, vectors, matrices and determinants, straight-line equation and plane equation, partial differentiation, multiple integrals, vector analysis, Stoke's theorem and Divergence theorem, first-order differential equations, Fourier series of functions, and periodic functions.	
Cours Name: **Mathematical Physics 2**	Course number: **0202352**	NO. of credit hours: 3 Theoretical Hrs.
Pre-requisite: **0202251**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers applications of Fourier series, special functions: gamma, beta, error functions, and Dirac delta function, ordinary differential equations, series solution of differential equations, Fourier transforms, Sturm-Liouville eigenvalue problem, Bessel functions, Legendre polynomials, Hermite polynomials, spherical harmonics, angular momentum, solving the radial equation of the hydrogen atom, and solving the harmonic oscillator equation.	
Cours Name: **Mathematical Physics 3**	Course number: **0202453**	NO. of credit hours: 3 Theoretical Hrs.
Pre-requisite: **0202352**	Teaching language: **English**	Offered by: Applied Physics Program
Course Description	The course covers partial differential equations: Laplace's equation; Steady-state temperature in a rectangular plate; The diffusion or heat flow equation; The Schrodinger equation; The wave equation; The vibrating string; Steady-state temperature in a cylinder; and Poisson's equation. Calculus of variations: The Euler equation; Several dependent variables; and Lagrange's equations. Functions of complex variables: Analytic functions; Contour integrals; The residue theorem.	
Cours Name: **General Chemistry 1**	Course number: **0213107**	Number of credit hours: 3 Theoretical Hrs.
Pre-requisite: *	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers chemistry and measurement, stoichiometry of atoms and molecules, stoichiometry of chemical reactions, properties of solutions, periodic table and electronic configurations of atoms and ions, molecular structure, chemical bonding, molecular shapes, gases, thermochemistry.	
Cours Name: **General Chemistry Lab. 1**	Course number: **0213108**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **0213107** **	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This experimental course covers Lab. safety and basic Lab. techniques, formula of hydrate, empirical formula of a compound, limiting reactant, periodic chart and periodic law, spectroscopy and molecular geometry, properties of inorganic compounds and metathesis reactions, molecular weight of a volatile liquid, preparation of an alum, aspirin synthesis, standardization of NaOH solution and equivalent weight of an acid, bleach analysis.	

* (High School Chemistry) or Prerequisite Chemistry 0213099.

** or concurrent.

Cours Name: **Calculus 1**	Course number: **0213105**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: *	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers functions and their properties, types of functions, equation of a straight line, curves of functions, average equations, limits and continuity, derivative, definition of the derivative, trigonometric functions, implicit differentiation, applications to derivatives, Rolle's theorem, mean value theorem, properties of integration, the first and second fundamental theorems, the fundamental theorem of calculus, applications to integration (area, volume, surface area, arc length).	
Cours Name: **Calculus 2**	Course number: **0213106**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213105**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers exponential and logarithmic functions, Hyperbolic functions, Inverse functions, trigonometric and hyperbolic inverse functions, Integration techniques by parts, Trigonometric substations, fractions, integration of partial trigonometric functions, and improper integrals. Sequences test, series convergence test, ratio test, comparison test, root test conditional convergence, Maclaurin and Taylor series and their convergences, power series, differentiation and integration of power series.	
Cours Name: **Principles of Statistics 1**	Course number: **0213115**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers Data collection, survey, types of data, sampling techniques, data representations, measure of central location, measure of dispersion, probability, random variables and distribution, methods of counting, Independence, conditional probability, Bayes theorem, binomial distribution, normal distribution, expectations, point estimation, interval estimation for mean, hypothesis testing for mean.	
Cours Name: **Principles of Statistics Lab. 1**	Course number: **0213116**	NO. of credit hours: **1** (**3** Experimental Hrs.)
Pre-requisite: **02013115** **	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This experimental course covers data representation by graphs and tables for ungrouped and grouped data, Measures of central location (mean, median, and mode), measures of dispersion (range, variance, and standard deviation), probability distribution curves, binomial distribution, normal distribution, central limit theorem (CLT), Estimations of the confidence interval and hypothesis testing about the mean of one population, and correlation and regression. Statistical packages such as SPSS and Minitab are used for the above calculations.	
Cours Name: **General Biology 1**	Course number: **0213109**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	This course cover chemical context of life, water and the fitness of the environment, carbon and the molecular diversity of life, the structure and function of large biological molecules, cell structure and function, membrane structure and function, introduction to metabolism, cellular respiration and fermentation, photosynthesis, the cell cycle, mitosis, meiosis and sexual life cycles, Mendel and the gene idea, and the chromosomal basis of inheritance.	

* (High School Mathematics) or Prerequisite Calculus 0213098.

** or concurrent.

Cours Name: **General Biology Lab. 1**	Course number: **0207110**	NO. of credit hours: **3** Theoretical Hrs.
Pre-requisite: **0213109 ***	Teaching language: **English**	Offered by: Applied Biology Department
Course Description	This experimental course covers experiments on lab safety, types and structure of microscopes, structure and function of cells, detection, and quantifications of large biomolecules (Carbohydrates, Lipids, Proteins, and Nucleic acids), cellular respiration, photosynthesis, cell cycle and cell division, enzyme function and the effect of different parameters on the enzyme activity transport of water and solute through the semi-permeable membranes, plant and animal tissue.	

Cours Name: **Prerequisite Physics ****	Course number: **0213097**	NO. of credit hours: **0** (**3** Theoretical Hrs.)
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers measurement and system of units; Vectors; motion in one and two dimensions; Particle dynamics and Newton's laws of motion; Work and energy; Conservation of energy; Collisions, impulse; Conservation of linear momentum; Electric charge; Coulomb's law; Electric field; Gauss law; Electric potential: electric potential energy and electric potential of point charges; Current and resistance; Ohm's law; Kirchhoff's laws; Magnetic field: Magnetic force and concept of magnetic field.	

Cours Name: **Prerequisite Calculus ****	Course number: **0213098**	NO. of credit hours: **0** (**3** Theoretical Hrs.)
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers real numbers, Inequalities; Cartesian plane; Distance formula; Straight lines; Parabola; Graph of curves; Composition functions, Polynomials, Rational functions; Long division; Roots of polynomials Exponents; Logarithms; Trigonometric functions, Limits, Continuity, Limits at infinity, Definition of derivative; Differentiation rules; Applications; chain rule; Implicit differentiation; Derivatives of logarithmic and trigonometric functions; Definite integration; Principles of integration; Fundamental theorem of calculus; Applications of integration; Area between two curves.	

Cours Name: **Prerequisite Chemistry ****	Course number: **0213099**	NO. of credit hours: **0** (**3** Theoretical Hrs.)
Pre-requisite: **None**	Teaching language: **English**	Offered by: Basic Sciences Department
Course Description	The course covers basic concepts in chemistry: The study of change; Mass relationships in chemical reactions, Gases, Physical periodic relationships among the elements; Chemical bonding; Physical properties of solutions; Acids, Bases and their equilibria. The course emphasizes on developing the student's problem-solving skills by introducing examples on everyday examples whenever possible.	

* Or concurrent.

** This course is marked **PASS** or **FAIL**.

Description of the Elective University Course Offered by the Biomedical Physics Program

Cours Name: **Radiation Sources and its applications ***	Course number: **0212111**	NO. of credit hours: 3 Theoretical Hrs.
Pre-requisite: **None**	Teaching language: **Arabic**	Offered by: Biomdical Physics Program
Course Description	This course aims to enrich general knowledge of the university students in various specializations on the properties of ionizing and non-ionizing radiation. The properties of alpha and beta particles, and gamma radiation emitted from the nuclei of unstable radioactive isotopes, and their applications in medicine and industry. Explanation of a group of natural phenomena related to radiation, its impact on human health, and methods of protection. The student can share, discuss, and justify his/her ideas with peers through written, visual, and oral communication methods.	

* Can be chosen by all university students except students of the Applied Physics Department.