



جامعة تكنولوجيا المعلومات والاتصالات

كلية المعلوماتية الطبية الحيوية قسم المعلوماتية الأحيائية

*Fourth Cycle – bachelor's
degree (B.Sc.) - Bioinformatics*

بكالوريوس – معلوماتية احيائية



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1. Mission & Vision Statement

Vision Statement

To be a distinguished academic and research department in the field of bioinformatics, by employing computer technologies, data science and artificial intelligence in the analysis of biological and medical data, in a way that contributes to the development of scientific research and supports the health sector, in accordance with approved quality standards.

Mission Statement

1. To provide high-quality, interdisciplinary education that equips students with a strong foundation in computer science, biology, statistics, and data science, enabling them to address complex problems in the biomedical field.
2. To promote advanced scientific research in the fields of bioinformatics, genomics, proteomics, systems biology, and biomedical data analysis, contributing to scientific discovery and the advancement of healthcare.
3. To support the development of bioinformatics solutions that contribute to improved disease diagnosis, drug discovery, personalized medicine, and decision-making in public health.

2. Program Specification

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

Bioinformatics is a multidisciplinary field that combines biology, computer science, mathematics, and statistics to analyze and interpret biological data. It involves the development and application of computational tools and techniques to gather, store, organize, analyze, and visualize biological information. Bioinformatics plays a crucial role in various areas of biological research, including genomics, proteomics, structural biology, evolutionary biology, and systems biology. By leveraging computational methods and algorithms, bioinformatics enables scientists to make sense of large-scale biological datasets and gain insights into biological processes and phenomena. The program specification entails a comprehensive curriculum designed to equip students with the necessary skills and knowledge in bioinformatics.

This program offers students a comprehensive understanding of bioinformatics, equipping them with a diverse range of knowledge and skills. At the foundational levels, students gain a solid understanding of biology, mathematics, and computer science fundamentals. They develop essential programming skills and are introduced to bioinformatics, providing them with a strong foundation for subsequent levels.

Furthermore, students will be introduced to advanced biology topics that serve as a foundation for genetics and genomic science in subsequent levels. They will actively participate in practical modules focused on enhancing their programming and data analysis skills. Through these modules, they will gain valuable hands-on experience in working with complex biological data. Moreover, a wide range of modules will be offered, aligning with the core objective of bioinformatics to explore and utilize biological data through the application of bioinformatics tools and software.

As they progress, students learn more about advanced biology subjects like genetics, genomics, and molecular biology. They also acquire practical skills in programming, data analysis, and working with complex biological data. The curriculum covers key areas such as artificial intelligence, medical image processing, computational biology, and big data in biology. Students graduate with a well-rounded understanding of bioinformatics, ready to contribute to the field and propose innovative solutions to medical and biological challenges.

To support students throughout their studies, a variety of workshops and guidance will be available. These workshops are designed to help students become familiar with the program structure and different learning methods, ensuring they are well-prepared for their academic journey. As students advance to the final levels, they will have access to specialized workshops aimed at enhancing their proficiency in writing project reports, presentations, and self-marketing skills. These workshops are designed to equip students with the necessary tools and knowledge to effectively communicate their ideas. The program ensures that students are thoroughly prepared and confident in key areas crucial for their academic and professional growth.

3. Program Objectives

1. To prepare graduates who are scientifically and practically qualified in bioinformatics and programming languages, capable of applying computer science and biology to the analysis of biological and medical data.
2. To support scientific research in the fields of bioinformatics and biomedicine, contributing to disease diagnosis and prevention, and the development of treatments.
3. To develop students' analytical and critical thinking skills to address complex biological and medical problems.
4. To meet the needs of the labour market, healthcare, and research institutions for qualified professionals specializing in bioinformatics.
5. To contribute to the development of the healthcare system by supporting digital transformation and data-driven medicine.
6. To adhere to academic quality standards and the ethics of scientific research, and to update curricula to keep pace with global scientific advancements.

4. Student Learning Outcomes

Through successfully completing the BSc in Bioinformatics program, students should be able to:

1. **Fundamental Knowledge:** Acquire a comprehensive understanding of the basic principles and concepts in biology, computer science, and mathematics, providing a strong foundation for bioinformatics studies.
2. **Computational Proficiency:** Develop a deep understanding of computer techniques and apply them effectively to diverse biological information, enabling the analysis and interpretation of complex datasets in bioinformatics.

3. **Data Extraction and Analysis:** Utilize a combination of computer science, biology, and statistics tools and techniques to extract valuable knowledge from complex biological and medical datasets, contributing to advancements in bioinformatics research and applications.
4. **Molecular Biology and Genetics:** Gain proficiency in the language and terminology of molecular biology, genetics, and bioinformatics, facilitating effective communication and collaboration with experts in these fields.
5. **Awareness of Emerging Trends:** Stay abreast of the latest advances and challenges in bioinformatics, fostering a comprehensive understanding of the evolving landscape of the field and the potential implications for research and industry.
6. **Practical Skills Demonstration:** Exhibit essential practical skills, including computer programming, artificial intelligence (AI), analytical reasoning, problem-solving, and critical reading of scientific literature, empowering students to effectively navigate and contribute to bioinformatics projects.
7. **Research Project Management:** Plan, execute, and communicate the findings of a small-scale research project both verbally and in writing. Demonstrate independent thinking, organizational skills, and the ability to apply research methodologies, showcasing competence in conducting scientific investigations within the realm of bioinformatics.
8. **Ethical and Responsible Conduct:** Uphold ethical principles in bioinformatics research and practice. Prioritize integrity, confidentiality, and privacy when handling sensitive biological data. Promote responsible data management and ethical considerations within the field of bioinformatics.
9. **Soft Skills Development:** Cultivate strong interpersonal skills, including teamwork, adaptability, leadership, and effective communication. Enhance emotional intelligence and the ability to collaborate across multidisciplinary teams, preparing students for dynamic professional environments.

5. Academic Staff

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College of Biomedical Informatics

Academic Staff of Bioinformatics Department – 2025 -2026

6. Credits, Grading and GPA

Credits

The University of Information Technology and Communications follows the Bologna Process and uses the European Credit Transfer System (ECTS) credit system. The degree program consists of 240 ECTS, with 30 ECTS per semester. Each ECTS represents 25 hours of student workload, including both structured and unstructured tasks.

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)

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
ITC300000	Biology	63	87	6.00	C	/
ITC300011	Computer Programming I	63	87	6.00	B	/
ITC320021	Mathematics I	78	72	6.00	B	/
ITC320030	General Chemistry	78	72	6.00	B	/
ITC300020	Computer Fundamentals	63	37	4.00	B	/
ITC000000	Human Rights and Democracy	33	17	2.00	S	/

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ITC000031	English I	33	17	2.00	S	/
ITC320022	Mathematics II	78	97	7.00	B	ITC320021
ITC320012	Computer Programming II	63	87	6.00	B	ITC300020
ITC320050	Introduction to bioinformatics	63	112	7.00	C	/
ITC320060	Biophysics	63	87	6.00	B	ITC320030
ITC000041	Arabic	33	17	2.00	S	/

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ITC300030	Object Oriented Programming	63	87	6.00	C	ITC320012
ITC320080	Applied Bioinformatics	63	62	5.00	C	ITC320050
ITC300040	Data Structures	63	87	6.00	C	ITC320012
ITC320100	Fundamentals of Organic Chemistry	63	37	4.00	C	ITC320030
ITC320110	Microbiology	63	37	4.00	B	ITC300000
ITC320120	Discrete Mathematics	33	42	3.00	B	ITC320022
ITC000010	Baath Party Crimes	33	17	2.00	S	/

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ITC000032	English II	33	17	2.00	S	ITC000031
ITC321130	Bioinformatics Programming	63	62	5.00	C	ITC320050
ITC320140	Fundamentals of Biochemistry	63	62	5.00	C	ITC320100
ITC320150	Biostatistics	63	62	5.00	B	ITC320022
ITC320160	Immunoinformatics	63	62	5.00	C	ITC320110, ITC320080
ITC320170	Data analysis and visualization	63	87	6.00	C	ITC300030
ITC000042	Arabic II	32	18	2.00	C	ITC000041

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ITC320180	Bioinformatics Algorithms	63	62	5.00	C	ITC320050
ITC320190	Numerical Methods for Bioinformatics	63	62	5.00	B	ITC320120
ITC320200	Genetics	63	62	5.00	C	ITC300000
ITC320210	Database Management Systems	63	62	5.00	C	ITC320120
ITC300050	Artificial Intelligence	63	62	5.00	C	ITC300012
ITC320230	Image Processing	63	62	5.00	C	ITC320022

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ITC300060	Web Development	63	62	5.00	B	/
ITC320250	Data Science Ethics	33	67	4.00	S	/
ITC320260	Pattern Discovery in Bioinformatics	63	87	6.00	C	ITC321130
ITC320270	Molecular Biology and Genomics	63	62	5.00	C	ITC320200
ITC300070	Machine Learning	63	62	5.00	C	ITC320170
ITC320290	Computer Vision	63	62	5.00	C	ITC320230

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ITC320300	Software Engineering	63	62	5.00	B	ITC320240
ITC320310	Artificial Neural Networks	63	62	5.00	C	ITC320280
ITC320320	Computational Biology	63	62	5.00	C	ITC320080
ITC300090	Data Mining	63	62	5.00	C	ITC320210
ITC300080	Cloud Computing	63	62	5.00	E	/
ITC300101	Project I	33	92	5.00	C	/

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
ITC320360	Computer-Aided Drug Design	64	61	5.00	C	ITC320270
ITC320370	Convolutional Neural Network	64	61	5.00	C	ITC320290
ITC320380	Information Security	64	61	5.00	C	/
ITC320390	Human Diseases	64	61	5.00	C	ITC320110
ITC300110	Big Data Analytics	64	61	5.00	E	ITC300080
ITC300102	Project II	32	93	5.00	C	ITC300101

8**Contact**

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