Computer Science
Undergraduate Programs

Computer Science Department

USAL
جامعة العلوم والآداب اللبنانية
UNIVERSITY OF SCIENCES & ARTS IN LEBANON

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Vision

Achieving excellence in education and research in the field of computer science and communication at the computer science departments in Lebanese universities, by ensuring a pioneering level of education and publishing scientific research in prestigious international conferences and journals.

Mission

Preparing distinguished graduates capable of contributing to serving the community and providing economic prosperity for the country, by equipping them with the latest techniques related to problem-solving, self-learning, and leadership skills, as well as imparting work ethics.

Goals

- Providing high-quality education in the fields of computer science by enhancing the effectiveness of education in both theoretical and practical aspects, and developing curricula that keep pace with technological development and meet the needs of the job market.
- Strengthening the teaching of computer science and contributing to the creation of a productive young generation in this field in general and in the world of programming in particular.
- Building a partnership with the local community through the utilization of the available scientific capabilities in the implementation of projects that contribute to the development of its various aspects.
- Providing an academic and research environment capable of contributing to the development of sciences related to the world of informatics.

Overview

With the advent of technological progress, it has become increasingly evident that computers have surpassed their initially assigned role of mere computation. They have evolved into electronic brains capable of much greater generality, revolutionizing various fields. One such field that has greatly benefited from this progress is computer science itself.

Computer science is a multidisciplinary discipline that not only advances its own domain but also contributes significantly to other fields such as health care, environmental science, and

engineering. The impact of computer science can be seen in the way it has transformed these fields, enabling breakthroughs and innovations that were previously unimaginable.

Within the realm of computer science, the Computer Science (CS) department in USAL plays a crucial role in equipping students with the necessary knowledge and skills to navigate this rapidly evolving landscape. The CS department offers an undergraduate major that provides students with a broad and solid knowledge base, supported by technical skills and a high capability for problem-solving.

The undergraduate majors of computer science aim to provide students with a well-rounded education that covers both theoretical foundations and practical applications. Students are exposed to a wide range of topics, including algorithms, data structures, programming languages, computer architecture, artificial intelligence, software engineering, and more. This comprehensive curriculum ensures that students have a solid understanding of the fundamental concepts and principles of computer science.

In addition to theoretical knowledge, the CS department also emphasizes the development of technical skills. Students are given opportunities to apply their knowledge through hands-on projects, programming assignments, and real-world case studies. This practical approach helps students develop the necessary skills to tackle complex problems and find innovative solutions.

Problem-solving, critical thinking, and mathematical analysis are key focuses of the CS department. Students are trained to approach problems analytically, break them down into smaller components, and apply their knowledge and skills to devise effective solutions. This analytical mindset is highly valuable in a wide range of industries and sectors, where there is a constant need for individuals who can tackle complex challenges and drive innovation.

Academic Degrees

The majors' programs also allow students to obtain a Bachelor of Science (BS) in Computer Science with one of the following three major areas of high needs for the labor market in Lebanon and worldwide:

- Computing
- Computer and Network Security
- Computing for Data Science (Artificial Intelligence)

Registration Requirements

Candidates applying for the Computer Science Department at USAL must undergo four placement tests to determine their level:

1. English Language
2. Arabic Language
3. Mathematics
4. Information Technology

Students who do not successfully pass these tests are required to take a number of remedial courses, determined according to their results.

Graduation Requirements

- Obtaining a minimum cumulative GPA of 2.0 over
- Achieving successfully 104-105 credits depending on the enrolled program as follows:

University Requirement	10 credits
College Requirement (Core)	52 credits
Concentration Requirements	30 - 31 credits
Elective Requirements	
Department Elective	6 credits
Free Elective	6 credits
Total credits	104-105 credits

Program Duration

- 3 years for non-transfer students, with an official Lebanese BACC II degree, who successfully pass their placement tests (English, Arabic, Math, and IT).
- 3 -3.5 years for non-transfer students, with an official Lebanese BACC II degree, who need some remedial courses (English, Arabic, Math, and IT).
- Transfer students' study duration depends on the amount of transferred credits.

Curricula Common Courses

➢ **University Requirements (22 Credits)**

Code	Subject	Credits
GENR201	Religion and public life	1 credit
ENGL201	English communication skills I	3 credits
ENGL202	English communication skills II	3 credits
ARAB201	Arabic communication skills I	3 credits
	General elective 1	3 credits
	General elective 2	3 credits
	Department elective 1	3 credits
	Department elective 2	3 credits
Total		22 credits

➢ **Core Courses (52 Credits)**

Code	Subject	Credits
MATH203	Linear Algebra	3 credits
MATH201	Calculus	3 credits
MATH210	Discrete Mathematics	3 credits
MATH204	Probability and Statistics I	3 credits
CSCI205	Computer Science Overview	3 credits
CSCI206	Introduction to Programming	4 credits (3;1)
CSCI207	Object Oriented Programming	4 credits (3;1)

CSCI210	Computer Architecture and Logic Design	3 credits
CSCI212	Computer Networks I	3 credits
CSCI311	Introduction to Database Systems	3 credits
CSCI315	Web development	4 credits (3;1)
CSCI316	Data Structure and Algorithms	3 credits
CSCI317	Software Engineering	3 credits
CSCI320	Operating Systems	4 credits (3;1)
CSCI410	Artificial intelligence and Machine learning	3 credits
CSCI420	Final Year Project	3 credits
	Total	52 credits

Concentrations

I. **Computing Concentration**

Overview

This undergraduate program is one of the oldest specialties of computer science, but it still occupies the advanced positions in terms of the need of the labor market due to the constant technological development and the continuous need to develop programs in various fields relying on information and communication technologies. The computing program design is conceived to fill out the gap between industries and academies. It prepares specialists and consultants in software and applications, able to develop computer-based solutions to various problems in working life in a professional and distinct manner.

It stands on criteria such as IEEE/ACM joint CS curricula while allowing students to get certified from organizations such CISCO and Oracle. After the completion of the study program, the students can choose between continuing their graduate studies and directly entering the work field.

The program covers both theoretical and practical CS aspects through core and specialized courses sustained with solid lab-work. The core courses include: foundation math for CS, fundamental, OOP and advanced programming (Java, PHP, Python, asp.net, JavaScript …), computer architecture and Operating systems, Relational and Non-relational databases, database management systems, web programming and application development, computer networks, artificial intelligence, data structure, Design and analysis of algorithm, cloud computing, and a graduation project.

Major/Concentration Courses (30 Credits)

Code	Subject	Credits
SECU301	Introduction to Computer Security	3 credits
COMP301	Introduction to Linux	3 credits
COMP305	Advanced Programming	3 credits
COMP310	Game Design and Development	3 credits
COMP411	Advanced Data Structure and Algorithms	3 credits
COMP412	Advanced Databases	3 credits
COMP413	Mobile Computing	3 credits
COMP414	Cloud computing	3 credits
COMP420	Application development	3 credits
MATH310	Numerical Computation and Analysis	3 credits
	Total	30 credits

II. **Computing for Data Science Concentration**

Overview

The Computer Science department at USAL offers a Bachelor of Science (BS) with a major in Computing for Data Science. The program provides students with cross-disciplinary knowledge

and skills in computer science, mathematics, statistics, machine learning, artificial intelligence, and information visualization, to pursue effective careers in computing and data science.

The main focus of this program is turning data into useful knowledge through artificial intelligence and machine learning. Graduates will gain the skills in collecting and analyzing data, solving problems using intelligent techniques, and effectively communicating the solutions. Such skills are required in almost all industries making skilled data scientists increasingly demanded in companies all over the world. This field opens the door to diverse professions such as data analyst, data consultant, machine learning scientist, and data architect.

Major / Concentration courses (31 credits)

Code	Subject	Credits
DTSC301	Introduction to Data Science	3 credits
DTSC302	Data Visualization	1 credit
DTSC420	Natural Language Processing	3 credits
DTSC422	Time series and statistical forecasting	3 credits
DTSC424	Deep learning	3 credits
MATH304	Probability and Statistics II	3 credits
MATH307	Statistical Models	3 credits
MATH310	Numerical Computation and Analysis	3 credits
COMP305	Advanced Programming	3 credits
COMP411	Advanced Data Structure and Algorithms	3 credits
COMP412	Advanced Databases	3 credits
	Total	31 credits

III.   Computer and Network Security

Overview

Computer and Network Security field, also known as Cybersecurity, is the study of the systems and techniques developed to prevent and mitigate online threats coming from various sources of attack. It is one of the most important information security branches, which in turn is one of the most vital areas of information technology. A Bachelor of Science (BS) in Computer Science with a major Computer and Network Security prepares students to recognize, understand, and practice a wide range of computer and network security issues and cyber-attacks.

The developed BS program will help students to create protected computing systems for corporations, hospitals, government offices as well as any organization with IT based infrastructure. Graduates will gain the skills to explore different network and system vulnerabilities from the perspective of hackers, which is crucial to developing a security strategy, while building solutions to prevent malicious attacks and the forensic knowledge to show where attacks have occurred and identify their origins.

Major/Concentration courses (30 courses)

Code	Subject	Credits
SECU301	Introduction to Computer Security	3 credits
COMP301	Introduction to Linux	3 credits
SECU313	Computer Networks II : Routing and Switching Essentials	3 credits
SECU314	Computer Networks III : Scaling and Connecting Networks	4 credits
SECU316	Systems and Network Administration	3 credits
SECU420	Network Security	3 credits
SECU422	Web Application Security	3 credits
SECU424	Ethical Hacking and Penetration Testing	3 credits
SECU426	Information Security Management	3 credits
SECU430	Introduction to Digital Forensics	2 credit
	Total	30 credits