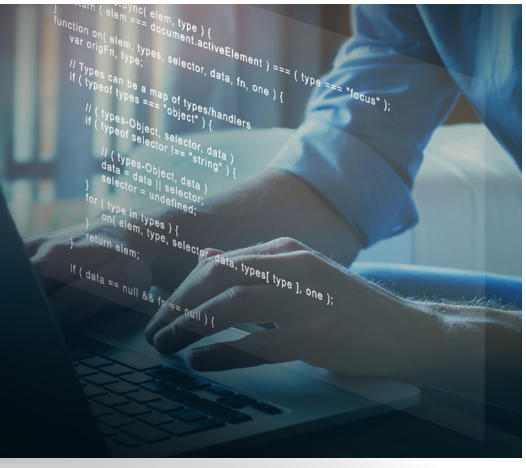
UNIVERSIDAD SAN FRANCISCO DE QUITO

BACHELOR IN COMPUTER SCIENCE



Description of the College of Sciences and Engineering

The College of Sciences and Engineering (Politécnico) at Universidad San Francisco de Quito USFQ trains professionals with sharp critical thinking, excellent levels of scientific and technological preparation, a comprehensive humanistic education in the liberal arts, and solid ethical principles.

Politécnico offers a wide variety of scientific and technical programs: Physics, Environmental Engineering, Civil Engineering, Agronomy Engineering, Food Engineering, Computer Science, Electronic and Automation Engineering, Industrial Engineering, Mechanical Engineering, Chemical Engineering, Applied Mathematics and Computing Engineering, and Mathematics. Additionally, Politécnico offers sub-specializations and postgraduate programs in various fields. The numerous research projects carried out by professors and students across different programs focus on both basic and applied aspects, proposing technological solutions to society's needs. The results of these projects are evidenced by the large number of specialized scientific publications, which have a high impact at the international level, as well as by the collaborations that Politécnico maintains with the local industry.

For more information, visit our website, where you can also find scholarship contests for all the programs at Politécnico to help finance your studies at the #1 University in Ecuador (https://www.usfq.edu.ec/es/colegios-academicos/colegio-de-ciencias-e-ingenierias).

Description of the Program

The Computer Science program focuses on the study of the fundamentals of computational theory that serve as the basis for the use, design, and development of software tools and applications. This includes the development of applications for desktop computers, server-side applications, and mobile devices with access to the internet and cloud resources. In this way, the curriculum focuses on addressing the needs of the current market.

Technologies used for the implementation and management of Information Systems are also studied, such as data bases and data mining, operating systems, computer architecture, and computer security, as well as various project management and evaluation tools, in addition to current technologies such as mobile devices and wireless networks. Our curriculum prepares professionals who can stay up-to-date and be creative agents in the computational technologies of the future

Mission

The Computer Science program nurtures professionals within an atmosphere of freedom, interdisciplinarity, and a rigorous academic environment. It fosters creativity, the thrill of discovery, and self-directed learning. The program aims to develop leaders who can transform ideas into practical solutions, bringing about positive changes for the communities in which they live.

Vision

To cultivate individuals who embody honesty, a love for truth and freedom, and who project themselves into society as self-motivated professionals. These individuals are committed to their community and personal development, exhibiting enthusiasm, creativity, and a proactive approach in initiating and promoting concrete and innovative solutions.

UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ

College of Sciences and Engineering

INGENIERÍA EN CIENCIAS DE LA COMPUTACIÓN / BS. IN COMPUTER SCIENCE

ON-SITE LEARNING MODALITY - 9 SEMESTERS

PRIMER AÑO / FIRST YEAR

ID	PRIMER SEMESTRE / FIRST SEMESTER	CREDITS
ESP 1001	Escritura Académica *Academic Writing*	3
CMP 1001	Taller de Ing. Cs. Computación *Computer Sc. Eng. Workshop*	3
MAT 1201	Cálculo Diferencial + Ej *Diferential Calculus + Pr*	3
QUI 1003	Química General 1 + Lab/Ej *General Chemistry 1 + Lab/Pr*	3
ARL 1002	Cosmos *The Cosmos*	3
ESL 0001	Inglés Nivel 1 *English Level I*	0
ESL 0002	Inglés Nivel 2 *English Level II*	0
	TOTAL	**15**

ID	SEGUNDO SEMESTRE / SECOND SEMESTER	CREDITS
MAT 1202	Cálculo Integral + Ej *Differential Calculus + Pr*	3
CMP 1101	Programación en C++ +EJ *CMP1101- C++ Programming +Pr*	3
ARL 1001	Autoconocimiento *Self-knowledge*	3
ARL 2001	Ser y Cosmos *The Self and The Cosmos*	3
HUM	Humanidades: LIT/FIL/ARH/ESC Humanities: LIT/FIL/ARH/ESC	3
ESL 0003	Inglés Nivel 3 *English Level III*	0
ESL 0004	Inglés Nivel 4 *English Level IV*	0
	TOTAL	**15**

SEGUNDO AÑO / SECOND YEAR

ID	PRIMER SEMESTRE / FIRST SEMESTER	CREDITS
MAT 2004	Matemáticas Discretas *Discrete Mathematics*	3
ECN 1001	Introducción a la Economía *Introduction to Economics*	3
FIS 2701	Física para Ing. 1 + Lab/Ej *Physics for Eng. 1 + Lab/Pr*	3
CMP 2102	Programación Avanzada en C++ *CMP 2102- Advanced C++ Programming*	3
MAT 2203	Cálculo Vectorial *Vector Calculus*	3
ESL 0005	Inglés Nivel 5 *English Level V*	0
ESL 0006	Inglés Nivel 6 *English Level VI*	0
	TOTAL	**15**

ID	SEGUNDO SEMESTRE / SECOND SEMESTER	CREDITS
DEP 0010	Deportes *Sports*	1
MAT 1401	Álgebra Lineal 1 + Ej *Linear Algebra 1 + Pr*	3
ARL 1001	Física para Ing. 2 + Lab/Ej *Physics for Eng. 2 + Lab/Pr*	3
CMP 2103	Programación de Apps *CMP 2103- App Programming*	3
PRC 2000	Aprendizaje y Servicio PASEC *Service Learning PASEC*	3
ARTE	Arte: ART/MUS/DAN/TEA *Art: ART/MUS/DAN/TEA*	3
	TOTAL	**16**

TERCER AÑO / THIRD YEAR

ID	PRIMER SEMESTRE / FIRST SEMESTER	CREDITS
GST 0010	Cultura Gastronómica *Gastronomic Culture*	1
CMP 3005	Teoría de la Computación *Theory of Computation*	3
IEE 2001	Electrónica Básica + Lab *Basic Electronics + Lab*	3
CMP 3002	Estructuras de Datos *Data Structures*	3
MAT 2008	Probabilidad y Estadística + Ej *Statistics and Probability + Pr*	3
CCSS	CCSS:HIS/SOC/ANT/POL/REL/PSI	3
	TOTAL	**16**

ID	SEGUNDO SEMESTRE / SECOND SEMESTER	CREDITS
CMP 3004	Organización de Computadores *Computer Organization*	3
ADM 3002	Emprendimiento *Entrepreneurship*	3
CMP 3104	Programación Avanzada de Apps *Programming 4*	3
CMP 3003	Diseño de Sistemas *Software Design & Development*	3
OPT 1	Optativa 1/3 *Optativa 1/3 (CMP Elective)*	3
	TOTAL	**15**

CUARTO AÑO / FOURTH YEAR

ID	PRIMER SEMESTRE / FIRST SEMESTER	CREDITS
CMP 4004	Inteligencia Artificial *Artificial Intelligence*	3
CMP 4002	Base de Datos *Databases*	3
ELECTIVA 1	Electiva Libre 1/2 *Free Elective 1/2*	3
OPT 2	Optativa 2/3 *Optativa 2/3 (CMP Elective)*	3
OPT 3	Optativa 3/3 *Optativa 3/3 (CMP Elective)*	3
	TOTAL	**15**

ID	SEGUNDO SEMESTRE / SECOND SEMESTER	CREDITS
CMP 4005	Redes + Lab *Networking + Lab*	3
CMP 4003	Sistemas Operativos *Operating Systems*	3
IIN 4011	Proyectos: Gerencia y Análisis *Project Management & Analysis*	3
ELECTIVA 2	Electiva Libre 2/2 *Free Elective 2/2 (CMP Elective)*	3
AAC4002	Aprendizaje Automático *Machine Learning*	3
	TOTAL	**15**

ID	VERANO / SUMMER	CREDITS
PAS 4000	Práctica Pre-Profesional PASEM *PASEM Professional Practicum*	5
	TOTAL	**5**

QUINTO AÑO / FIFTH YEAR

ID	PRIMER SEMESTRE / FIRST SEMESTER	CREDITS
ING 0001	Coloquios *Colloquium*	1
CMP 5002	Data Mining *Data Mining*	3
CMP 5001	Aplicaciones Distribuidas *Distributed Applications*	3
CMP 5006	Seguridad Informática *Computer security*	3
CMP 5992	Proyecto Integrador CMP *Senior Project*	3
	TOTAL	**13**

TOTAL CREDITS: 142

3 credits are equivalent to 144 hours

This curriculum may be subject to non-substantial changes in accordance with Article 110 of the Academic Regulations, issued by the Higher Education Council (CES). The curriculum applicable to each student will be the one in effect at the time of their graduation. Any changes that are processed will be made to this digital version published on the website of the University to which the student of USFQ must refer

INGENIERÍA EN CIENCIAS DE LA COMPUTACIÓN / COMPUTER SCIENCE

ON-SITE LEARNING MODALITY - 9 SEMESTERS

The sequence of subjects in the curriculum from the second semester onward is a recommendation considering that some subjects are prerequisites for subsequent subjects. The system is calibrated so that students can register for the number of credits listed in the curriculum.

GENERAL COLLEGE COURSES AND GRADUATION REQUIREMENTS

Some General College courses are fulfilled with designated courses for this purpose by each major. When a major designates a particular subject to meet the General College requirement, that subject requires a passing grade of C.

English as a Second Language Levels ESL (B2 Common European Framework)

Students are assigned an English level (English as a Second Language ESL) based on the proficiency test taken during the admission process. Students can also validate their English knowledge with international certificates detailed in the Foreign Language Learning Proficiency: English section of the Student Handbook. To meet the mandatory graduation requirements, all students must demonstrate English proficiency by achieving the required score on USFQs proficiency test, presenting an international certificate of English validated by USFQ, or completing USFQs ESL levels through Level 6.

To take courses in any academic area in English and courses in other languages, ESL requirements must have been formally and successfully completed.

Academic Writing (ESP 1001)

Students are encouraged to take Academic Writing early in their career. The minimum passing grade for this General College requirement is C.

Mathematics

The General College MATHEMATICS requirement is met with the course MAT 1201 Differential Calculus + Pr. The minimum passing grade for this General College requirement for this major is C.

Sciences

The General College SCIENCES requirement is met with the course QUI 1003 General Chemistry 1 + Lab/Pr. The minimum passing grade for this General College requirement for this major is C.

In some cases, to meet General College requirements, students must choose a subject from various academic areas (check in the curriculum and see details below).

Arts

The ART requirement is met by passing any course in the academic areas detailed below. The minimum passing grade for this General College requirement for this major is D.

ART - Art
DAN - Dance
TEA - Theater
MUS – Music

Social Sciences

The SOCIAL SCIENCES requirement is met by passing any course in the academic areas detailed below. The minimum passing grade for this General College requirement for this major is D.

ANT - Anthropology
EDU - Education
HIS - History
REL - International Relations
POL - Political Science
SOC - Sociology
PSI - Psychology

Humanities

The HUMANITIES requirement is met by passing any course in the academic areas detailed below. The minimum passing grade for this General College requirement for this major is D.

LIT - Literature
FIL - Philosophy
ESC - Creative Writing
ARH - Art History

Community Service Learning and Service PASEC (PRC 2000)

Community service is fulfilled through the LEARNING AND SERVICE PASEC seminar. Students must attend classes and also complete community service hours.

Professional Practicum PASEM (PAS 4000)

The students can start completing PASEMs Professional Practicum requirements from the sixth semester and/or with 75 approved credits, they must complete a minimum of 240 hours. Students must enroll in PASEM in the last summer according to their curriculum, the class is approved with the internship hours and the theory component of the class. The student must ensure that the class end date coincides with his/her last semester.

Sports (DEP 0010)

Every student must choose a SPORTS class from the various options offered each semester.

Gastronomic Culture (GST 0010)

Every student must take a GASTRONOMIC CULTURE seminar from the second semester onward.

Colloquiums

The Colloquium requirement varies by major. Check with the Academic Dean of each College.

Course in English

The student must register in any course taught in English, either from their major or from the General College. Courses with a code ending in (E), (e.g., ADM 1001E), are taught in English. Any course taught in English will have ESL 0006 English Level 6 as a prerequisite.

Writing Intensive

The student must pass any course with the Writing Intensive attribute. To register for a Writing Intensive course, students must have passed all ESL levels. Writing Intensive courses can be identified with a specific icon in the Offered Courses Catalog each semester.

Free Electives

Any subject that is not a mandatory requirement in the curriculum can serve as a Free Elective for General College. Free Electives can be used to meet the demands of a second major or a minor.

Ser Dragón (COL 2000)

Ser Dragón is an accompaniment seminar for first-semester students that aims to facilitate the transition from high school to university life. Every student who has enrolled from semester 202210 onward must take and pass COL 2000. The passing grade for this requirement is P.

GUIDE FOR TECHNICAL ELECTIVE COURSES

All courses offered by the College of Sciences and Engineering must be passed with a minimum grade of C.

To fulfill the requirements of Computer Science electives, students must pass four courses at the 2000 or 3000 level from any area of the university. Note that they must have completed the necessary prerequisites to take the courses they choose.

ADDITIONAL ACTIVITIES OF THE PROGRAM

Student Outcomes Support:

The cornerstone of the continuous improvement process is the attainment of student outcomes. In this section, we provide further information on four important activities that support the attainment of student outcomes that are not part of the ABET criteria: the existence of scholarships and awards, the influence of the IEEE Computer Society Student Chapter, the participation of faculty in Graduate Programs and the overall involvement of Faculty and Students in Research.

a. Scholarships and Awards

In February 2022, the Computer Science Program, with the support of the College of Sciences and Engineering at the Universidad San Francisco de Quito (USFQ), organized the first scholarship contest, "Ada Lovelace," to promote research and the study of Computer Science Engineering among Ecuadorian youth. The competition consists of three phases. In the first phase, participants must submit an essay of up to 1,000 words reflecting their motivation to study in this program. Next, in the second phase, a 60-minute written exam tests the students' logical and mathematical skills through 20 multiple-choice questions. Candidates who excel move on to the third phase, where they solve advanced logic exercises and present their solutions to an evaluation panel.

The contest's prizes are highly attractive and designed to support the winners' university education significantly. The first prize consists of a full "Ada Lovelace" scholarship covering 100% of the fees for the Computer Science program for four and a half years. The second prize offers a partial scholarship covering 70% of the fees under the same conditions. This opportunity not only recognizes academic merit and motivation toward computer science but also fosters the intellectual and professional development of future leaders in the field.

This contest has been regular since 2022, with editions in 2023 and 2024. In 2023, the Dean of the College of Sciences and Engineering secured $40,000 from Google to support Women in Computer Science. That year, the “Ada Lovelace” scholarship awarded an additional partial scholarship of 50% of the fees for the Computer Science program for four and a half years for the best-ranked woman in the contest. In addition, seven money awards were awarded to seven women studying in the program based on academic merit.

The Computer Science program aims to equitably involve individuals of all genders, ensuring that all have equal opportunities for participation and development in the field.

b. IEEE Computer Society Student Chapter

The IEEE Computer Society has over 75 years of history dedicated to engaging engineers, scientists, academics, and industry professionals worldwide in the continuous advancement of computer sciences and technologies. At Universidad San Francisco de Quito (USFQ), the IEEE Computer Society is a vital hub for those interested in delving deeper into computing and technology. As one of the most active branches of IEEE, this chapter is dedicated to enhancing its members' technical knowledge and professional skills, providing a robust platform for personal and professional development in a technologically advanced environment.

The activities of the IEEE Computer Society Student Chapter are diverse and designed to maximize learning and practical experience. Technical workshops and seminars covering programming fundamentals and cybersecurity to artificial intelligence and big data are regularly organized and taught by recognized professionals and academics in the industry. Additionally, the chapter promotes collaborative projects and hackathons, where students test their skills in real challenges and collaborate in teams to develop innovative solutions to complex problems. These competitions not only sharpen the students' technical skills but also foster a spirit of teamwork and creative problem-solving.

In 2021, the IEEE Computer Society chapter started at Universidad San Francisco de Quito. In 2023, Alejandra Ospina, a computer science student and winner of a Google for Women in CS award, continued the initiative. That year, several integration events among the students were held, including the IEEExtreme 17.0, a global hackathon challenge in which teams of IEEE student members, advised and supervised by an IEEE member, compete for 24 hours to solve a set of programming problems.

In 2024, Joel del Castillo took the lead in the chapter. Several integration events were held during this period, including a Pizza Party for computing students. Additionally, the Competitive Programming Club was recreated with weekly meetings attended by an average of 15 students every Friday to discuss common patterns in data structures and algorithms.

Colloquiums with industry professionals were organized to share their experiences with the Engineering community. One was "Personal Data Protection," which focused on cybersecurity and legal aspects with Luis Fernando Guerra, an expert lawyer. Furthermore, workshops were conducted to share knowledge among experienced students and the university community. Some of the workshops included:

- "Make your own chat engine," an intensive workshop to develop a functional, scalable, and secure chat engine using Firestore and React Native.
- Upcoming workshops such as "Transform $1 into your first Bitcoin," where participants will learn about the history of money, Bitcoin, the financial market, and the technical features of blockchain, with a practical component to open your blockchain and turn $1 into your first Bitcoin.
- Another planned workshop is "GitHub for Shunshos," which is dedicated to project management and collaboration through version control and open-source strategies.

The impact of involvement in the IEEE Computer Society Student Chapter is significantly positive and multifaceted. Academically, students enhance their understanding of computing concepts and acquire practical skills crucial in the modern workforce. Active participation in the chapter also offers valuable networking opportunities, allowing students to build professional connections for career development. Moreover, by working on projects and participating in competitions, students develop soft skills such as leadership, effective communication, and time management, preparing them as competent technologists and potential leaders in their respective fields.

In conclusion, the IEEE Computer Society Student Chapter not only enriches the academic lives of its members but also prepares students to tackle real-world challenges, ensuring they are equipped with the knowledge, skills, and networks necessary to thrive in the dynamic technology field.

c. Graduate Programs

At Universidad San Francisco de Quito (USFQ), we have two master's programs related to our bachelor's in computer science, i.e., Data Science and Artificial Intelligence.

In these programs, 4 of our 7 full-time professors collaborate, offering courses from advanced topics in Python programming, artificial intelligence, and supervised learning to deep learning. These programs are eager to keep incorporating new faculty from the CS program as they grow. In the meantime, this is a clear example of the compromise our current faculty have in keeping updating their knowledge. Next, we provide a summary of these programs:

i. Master's program in Data Science

The Master's program in Data Science provides students with solid advanced training in data analysis and modeling, visualization, and database management. Throughout the program, students will acquire skills in statistical techniques and cutting-edge computational tools to analyze massive datasets, build models, and communicate information effectively. Additionally, they will be instructed in programming using modern programming languages and provided with a deep understanding of the latest trends in the field, including machine learning and artificial intelligence.

As program graduates, students will be prepared to assume key roles in companies and organizations that base their decisions on data. They will be able to work efficiently in multidisciplinary teams, fostering collaboration and the exchange of ideas. The program also emphasizes the development of critical thinking and the importance of staying continuously up-to-date in this constantly evolving field. With this comprehensive training, graduates will be at the forefront of the data science field.

The Master's in Data Science is designed for professionals in the STEM areas (an acronym for Science, Technology, Engineering, and Mathematics) who are at various stages of their professional development and wish to enter or delve deeper into the field of Data Science.

This master's program accepts diverse profiles, unified by the need to use data to improve their processes. Some examples, which do not exclude other possibilities, are mentioned below: Computer Engineers or Information Technology professionals who wish to include elements of data science and artificial intelligence in their platforms, products, or

services; Mathematicians who want to use their expertise in mathematical modeling and transform it into practical computational tools for solving industrial problems. Industrial, civil, and electronic engineers, among others, wish to innovate with data in their various industries; physicists, chemists, and researchers, in general, want to incorporate mathematical and computational elements into their research processes.

ii. Master's program in Artificial Intelligence

The Master's in Artificial Intelligence is a comprehensive and cutting-edge program that trains professionals in creating and applying AI systems. Students will explore key topics such as machine learning, deep learning, natural language processing, and computer vision while acquiring solid theoretical and practical foundations in AI and programming in Python. Upon graduation, they will be prepared to lead automation in various industries, addressing ethical and privacy issues in developing responsible AI. Join us and become a leader in the transformation driven by artificial intelligence. Your path to excellence in AI starts here.

The master's program in Artificial Intelligence is aimed at professionals with backgrounds in STEM areas (Science, Technology, Engineering, and Mathematics) who aspire to apply artificial intelligence to address challenges in scientific, academic, and/or industrial fields. Profiles that fit this category include engineers in various disciplines such as computer science, information technology, information networks, electronics, electrical, industrial, civil, and telecommunications. Additionally, professionals trained in mathematics, physics, chemistry, and any other field of research who wish to incorporate artificial intelligence as a tool in their work activities will also find our program a valuable opportunity to advance their careers and contribute to developing innovative solutions.

The Master's in Data Science is designed for professionals in the STEM areas (an acronym for Science, Technology, Engineering, and Mathematics) who are at various stages of their professional development and wish to enter or delve deeper into the field of Data Science.

This master's program accepts diverse profiles, unified by the need to use data to improve their processes. Some examples, which do not exclude other possibilities, are mentioned below: Computer Engineers or Information Technology professionals who wish to include elements of data science and artificial intelligence in their platforms, products, or services; Mathematicians who want to use their expertise in mathematical modeling and transform it into practical computational tools for solving industrial problems. Industrial, civil, and electronic engineers, among others, wish to innovate with data in their various industries; physicists, chemists, and researchers, in general, want to incorporate mathematical and computational elements into their research processes.

d. Research

The CS faculty is actively involved in research. 5 out of 7 full-time professors in the program devote time to researching different topics, predominantly focusing on advanced technologies and analytical methods, particularly in areas such as artificial intelligence, machine learning, and image processing. The studies range from developing and improving algorithms for classification and detection to using neural networks for various data analysis and image recognition applications. These topics focus on applying computational and data-driven techniques to solve complex problems and enhance existing technologies.

Since 2022, 63 publications have been published in peer-reviewed conferences and journals. These publications are distributed as shown in Figure 1. Of these publications, 16 incorporated CS students in their development, and 16 are Q1 journals.

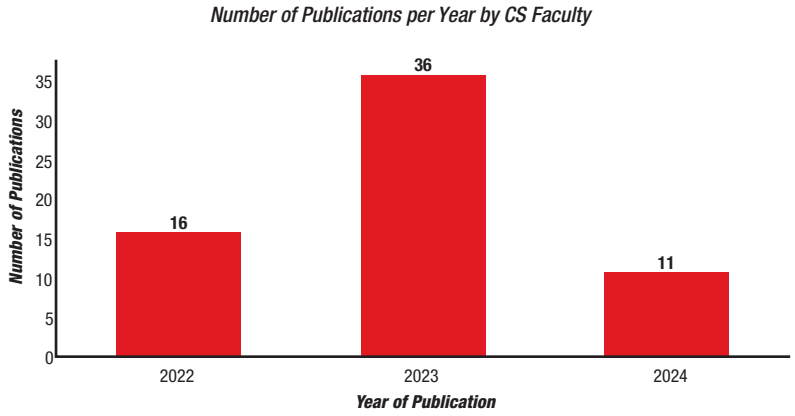


Figure 1: Number of Publications per Year by CS Faculty.