UNIVERSIDAD SAN FRANCISCO DE QUITO

CHEMICAL ENGINEERING

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 Chemical Engineering ChemE Program at USFQ provides a comprehensive study of the physical and chemical phenomena involved in transforming matter through mechanical, thermal, and chemical processes. Students gain a deep understanding of these processes at molecular and macroscopic levels. Moreover, they learn to create innovative products and processes, contributing to the production of raw materials, intermediate products, and final goods. Analysis is conducted through experimentation, mathematical and computa-tional modeling, and the application of engineering principles and tools. Upon graduation, students possess the competencies required for responsible performance as chemical engineers. With a solid foundation in knowledge and skills, they are well-prepared for successful careers. The program offers a comprehensive education that equips students with a profound understanding of chemical engineering principles and their practical application.

Mission

The Program's mission is to train engineers with excellent technical skills and innovative, leadership, and entrepreneurial capacities, committed to personal, social, and organizational improvement based on a humanistic training in Liberal Arts and local and global perspectives.

Vision

The Program will strive to provide high quality preparation in Chemical Engineering, with a strong focus on state-of-the-art research, technological development and innovation, and engagement with the community.

UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ

College of Sciences and Engineering
INGENIERÍA QUÍMICA / CHEMICAL ENGINEERING
ON-SITE LEARNING MODALITY - 9 SEMESTERS

PRIMER AÑO / FIRST YEAR

ID	PRIMER SEMESTRE / FIRST SEMESTER	CREDITS
INQ 1002	Taller de Ingeniería Química *Chemical Engineering Workshop*	3
MAT 1201	Cálculo Diferencial + Ej *Differential Calculus + Pr*	3
ESP 1001	Escritura Académica *Academic Writing*	3
QUI 1003	Química General 1 + Lab/Ej *General Chemistry 1 + Lab/Pr*	3
ARL 1001	Autoconocimiento *Self-knowledge*	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
BIO 1102	Biología General + Lab/Ej *General Biology + Lab/Pr*	3
QUI 1004	Química General 2 + Ej *General Chemistry 2 + Pr*	3
MAT 1202	Cálculo Integral + Ej *Integral Calculus + Pr*	3
INQ 2001	Balance de Masa y Energía + Ej *Mass and Energy Balance + Pr*	3
CMP 1101	Programación en C++ +EJ *Programming 1*	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
INQ 3001	Termodinámica Química + Lab *Chemical Thermodynamics + Lab*	3
MAT 2002	Ecuaciones Diferenciales *Differential Equations*	3
QUI 2002	Química Orgánica + Lab *Organic Chemistry + Lab*	3
FIS 2701	Física para Ing. 1 + Lab/Ej *Physics for Eng. 1 + Lab/Pr*	3
ARL 2001	Ser y Cosmos *The Self and The Cosmos*	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
QUI 2101	Química Analítica + Lab *Analytic Chemistry + Lab*	3
ECN 1001	Introducción a la Economía *Introduction to Economics*	3
MAT 1401	Álgebra Lineal 1 + Ej *Linear Algebra 1 + Pr*	3
FIS 2702	Física para Ing. 2 + Lab/Ej *Physics for Eng. 2 + Lab/Pr*	3
INQ 3003	Fenómenos de Transporte *Transport Phenomena*	3
	TOTAL	**15**

TERCER AÑO / THIRD YEAR

ID	PRIMER SEMESTRE / FIRST SEMESTER	CREDITS
GST 0010	Cultura Gastronómica *Gastronomic Culture*	1
INQ 3002	Métodos Computacionales *Computational Methods*	3
INQ 4003	Flujo de Fluidos + Lab *Fluid Flow + Lab*	3
QUI 2201	Físico Química 1 *Physical Chemistry 1*	3
PRC 2000	Aprendizaje y Servicio PASEC *Service Learning PASEC*	3
HUM	Humanidades: LIT/FIL/ARH/ESC *Humanities: LIT/FIL/ARH/ESC*	3
	TOTAL	**16**

ID	SEGUNDO SEMESTRE / SECOND SEMESTER	CREDITS
DEP 0010	Deportes *Sports*	1
QUI 3102	Química Instrumental + Lab *Instrumental Analysis + Lab*	3
INQ 4001	Ingeniería de Reacciones + Lab *Reaction Engineering + Lab*	3
MAT 2008	Probabilidad y Estadística + Ej *Statistics and Probability + Pr*	3
INQ 4201	Operaciones Unitarias 1 + Lab *Unit Operations 1 + Lab*	3
CCSS	CCSS:HIS/SOC/ANT/POL/REL/PSI	3
	TOTAL	**16**

CUARTO AÑO / FOURTH YEAR

ID	PRIMER SEMESTRE / FIRST SEMESTER	CREDITS
ADM 3002	Emprendimiento *Entrepreneurship*	3
INQ 4002	Química Industrial *Industrial Chemistry*	3
IEE 4001	Control de Procesos + Lab *Process Control + Lab*	3
INQ 4202	Operaciones Unitarias 2 + Lab *Unit Operations 2 + Lab*	3
OPT 1	Optativa 1/4 *ChemE Elective 1/4*	3
	TOTAL	**15**

ID	SEGUNDO SEMESTRE / SECOND SEMESTER	CREDITS
INQ 5401	Bioingeniería 1 + Lab *Bioengineering 1 + Lab*	3
INQ 4301	Diseño de Plantas 1 + Lab *Plant Design 1 + Lab*	3
ELECTIVA 1	Electiva Libre 1/2 *Free Elective 1/2*	3
OPT 2	Optativa 2/4 *ChemE Elective 2/4*	3
OPT 3	Optativa 3/4 *ChemE Elective 3/4*	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
ELECTIVA 2	Electiva Libre 2/2 Free Elective 2/2	3
OPT 4	Optativa 4/4 ChemE Elective 4/4	3
ARTE	Arte: ART/MUS/DAN/TEA Art: ART/MUS/DAN/TEA	3
INQ 5992	Proyecto Integrador INQ *Senior Project*	5
	TOTAL	**15**

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 QUÍMICA / CHEMICAL ENGINEERING

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.

Electives

The ChemE electives requirement is fulfilled by passing at least two courses with an INQ code that are not in the curriculum, and two additional courses from any area of the College of Sciences and Engineering at the 4000 level or higher.

ADDITIONAL ACTIVITIES OF THE PROGRAM:

AIChE Student Chapter

In 2019, the Chemical Engineering Student Club became a Student Chapter from the American Institute of Chemical Engineers, AIChE. Students actively participate in different departmental activities, and competitions such as ChemE Sports, ChemE Jeopardy, Research Poster and Presentation competitions. They have organized different social activities with other chapters, such as speed friending, and friendly jeopardies. They have won awards (1st and 2nd place) in national and regional Research Poster and Presentation competitions. They are also the best Ambassadors to attract new students to the program. This activity contributes to the Program Student Outcomes as follows:

Engineering Foundations and Problem Solving: Participation in competitions such as ChemE Sports and ChemE Jeopardy challenges students to apply their foundational knowledge in chemical engineering to solve complex problems quickly and accurately.

- **Engineering Design:** While not explicitly mentioned, activities involving research poster and presentation competitions likely include elements of design, as students must develop and present solutions or innovative research findings, demonstrating their ability to create and communicate engineered solutions.

- **Effective Communication:** The Research Poster and Presentation competitions require students to communicate their research findings clearly and effectively. Additionally, organizing social activities like speed friending and friendly jeopardies helps develop interpersonal communication skills.

- **Contemporary Issues and Ethical Responsibility:** Engaging in research and presenting their findings at national and regional competitions helps students stay informed about contemporary issues in chemical engineering. They also learn to consider the ethical implications of their work when presenting to a broad audience.

- **Teamwork and Organization:** Organizing and participating in various activities and competitions require students to work collaboratively, plan events, and manage logistics, thereby enhancing their teamwork and organizational skills.

- **Experiment Design and Analysis:** Competing in Research Poster and Presentation competitions often involves conducting experiments and analyzing data, thus directly developing these skills.

- **Life-long Learning and Broad Knowledge:** Being involved in a student chapter of the American Institute of Chemical Engineers and participating in various events and competitions fosters a culture of continuous learning and exposes students to a wide range of topics and current developments in the field.

Chemical Engineering Open House

The Chemical Engineering Open House is an annual event where students showcase their class projects to diverse audiences such as professors and high school students. Each class presents a variety of projects, using posters, models, and interactive demonstrations. These projects are the culmination of extensive coursework and collaborative efforts. Students work in teams to identify real-life problems, conduct research, design experiments, and develop solutions. They apply principles from core chemical engineering courses such as thermodynamics, reaction engineering, and process design. Throughout the project development, they use advanced laboratory equipment, computational tools, to test their hypotheses and refine their designs. This event aligns with the SOs by providing students with practical experience in communication, teamwork, and problem-solving. By presenting their work, students enhance their ability to articulate complex ideas, receive feedback from faculty, and engage with diverse audiences. These interactions help prepare students for professional engineering practice. This activity contributes to the Program Student Outcomes as follows:

- **Engineering Foundations and Problem Solving:** Students apply principles from core chemical engineering courses such as thermodynamics, reaction engineering, and process design, demonstrating their ability to solve complex engineering problems.

- **Engineering Design:** The projects require students to design experiments and develop solutions for real-life problems, showcasing their ability to design systems, components, or processes that meet specific needs.

- **Effective Communication:** By presenting their work using posters, models, and interactive demonstrations, students enhance their ability to communicate complex ideas clearly and effectively to diverse audiences, including professors and high school students.

- **Contemporary Issues and Ethical Responsibility:** Although not explicitly mentioned, identifying, and solving real-life problems often involves considering contemporary issues and ethical implications, helping students develop a broader understanding of the impact of their work.

- **Teamwork and Organization:** Students work in teams to complete their projects, which fosters teamwork and organizational skills as they collaborate and manage their project timelines and resources.

- **Experiment Design and Analysis:** Students design experiments, conduct research, and use advanced laboratory equipment and computational tools, demonstrating their ability to design and analyze experiments effectively.

- **Life-long Learning and Broad Knowledge:** Engaging in extensive coursework and applying it to real-life problems encourages a habit of continuous learning and broadens students' knowledge in chemical engineering.

Chemistry Olympics "Dmitri Mendeleyev."

The Chemical Engineering Program annually organizes the Chemistry Olympics "Dmitri Mendeleyev." This event is specifically designed for high school students who are nearing graduation. Students from the Program play a crucial role in organizing and managing the logistics of the event. They are involved in coordinating venue arrangements, preparing materials, and overseeing the smooth execution of the competition. This hands-on experience in event planning and management enhances their organizational skills, teamwork, communication and fosters leadership qualities. This activity contributes to the Program Student Outcomes as follows:

- **Engineering Foundations and Problem Solving:** Although the primary focus is on event management, organizing a competition involves problem-solving skills to address various logistical challenges and ensure smooth execution.

- **Effective Communication:** Students must communicate effectively with various stakeholders, including high school students, faculty, and other team members, to coordinate and manage the event successfully.

- **Contemporary Issues and Ethical Responsibility:** Not explicitly mentioned, but organizing an event for high school students can involve considering contemporary educational issues and ensuring ethical practices in competition management.

- **Teamwork and Organization:** Organizing the Chemistry Olympics requires strong teamwork and organizational skills, as students must work together to plan, coordinate, and execute the event efficiently.

- **Life-long Learning and Broad Knowledge:** Participating in the organization of such events encourages continuous learning and the application of broad knowledge in event management, communication, and leadership.

Student Involvement in Research Projects

The Chemical Engineering Faculty actively engages in research, with one of the highest levels of scientific productivity at the College of Science and Engineering, USFQ. The program has different research groups working in areas such as circular engineering, residual biomass valorization, bioprocesses, biomaterials, catalysis, and computational and theoretical chemistry, among others. Many students from the program generally get involved in research projects starting their third year, and frequently co-author publications or patent applications. This activity contributes to the Program Student Outcomes as follows:

- **Engineering Foundations and Problem Solving:** Students apply their knowledge of mathematics, science, and engineering principles to conduct research, identify problems, and develop innovative solutions within their research areas.

- **Engineering Design:** Research projects often require students to design experiments, processes, or systems to investigate and address specific scientific questions, demonstrating their ability to apply engineering design principles.

- **Effective Communication:** Co-authoring publications or patent applications helps students develop their ability to communicate complex scientific and technical information effectively in written form. Additionally, presenting research findings at conferences or seminars enhances their oral communication skills.

- **Contemporary Issues and Ethical Responsibility:** Engaging in research areas such as circular engineering and biomass valorization involves addressing contemporary issues related to sustainability and environmental impact. Students also learn about ethical considerations in scientific research and the importance of conducting research responsibly.

- **Teamwork and Organization:** Research projects typically involve collaboration with faculty members, graduate students, and peers. This collaborative environment helps students develop strong teamwork and organizational skills as they work together to achieve research objectives.

- **Experiment Design and Analysis:** Students design and conduct experiments, analyze data, and interpret results as part of their research projects. This hands-on experience enhances their ability to perform rigorous scientific investigations and draw meaningful conclusions.

- **Life-long Learning and Broad Knowledge:** Participating in cutting-edge research encourages a habit of continuous learning and exposes students to the latest advancements and methodologies in chemical engineering. This broadens their knowledge and prepares them for ongoing professional development throughout their careers.

Chemical Engineering and Process Design Summer Camp

The Chemical Engineering Program also hosts a Summer Camp in Chemical Engineering and Process Design, specifically tailored to introduce high school students to the field and its myriad opportunities. The camp is predominantly organized by students from the program, providing them with valuable opportunities to develop essential soft skills. These students are responsible for planning activities, logistical arrangements, and curating comprehensive support materials for camp sessions, including laboratory experiments and instructional classes. Moreover, their significant interaction with camp participants necessitates the cultivation of effective communication skills, vital for engaging with diverse audiences and conveying complex concepts in an accessible manner. This activity contributes to the Program Student Outcomes as follows:

- **Engineering Foundations and Problem Solving:** Planning activities and curating support materials for camp sessions involve problem-solving skills to address logistical challenges and ensure the smooth execution of the camp.

- **Engineering Design:** While not explicitly mentioned, planning activities for the camp may involve elements of engineering design, as students must develop creative and engaging sessions that effectively introduce high school students to chemical engineering concepts.

- **Effective Communication:** Students' significant interaction with camp participants requires effective communication skills to convey complex concepts in an accessible manner, aligning closely with this Student Outcome.

- **Contemporary Issues and Ethical Responsibility:** Although not explicitly mentioned, introducing high school students to chemical engineering and its applications may involve discussions about contemporary issues such as sustainability and ethical considerations in engineering practices.

- **Teamwork and Organization:** Organizing and hosting the summer camp requires strong teamwork and organizational skills, as students collaborate to plan activities, manage logistics, and ensure the camp's success.

- **Experiment Design and Analysis:** While not explicitly mentioned, designing laboratory experiments for camp sessions may involve elements of experiment design and analysis, as students develop activities to demonstrate chemical engineering principles.

- **Life-long Learning and Broad Knowledge:** Participating in the summer camp exposes students to a broader audience and encourages a habit of continuous learning as they engage with diverse participants and adapt their communication strategies to effectively convey complex concepts to high school students.

Industrial Visits/Field Trips

As part of their curriculum, students from the Chemical Engineering Program embark on industrial visits, providing them with firsthand exposure to real-life applications of their studies. These visits offer invaluable opportunities for students to observe industrial processes, interact with professionals in the field, and gain insights into the practical implementation of theoretical concepts. By witnessing the inner workings of industrial facilities, students develop a deeper understanding of engineering principles and acquire practical problem-solving skills. Furthermore, these experiences align closely with the SOs by fostering the development of skills such as teamwork, communication, and the ability to apply engineering knowledge to real-world challenges. This activity contributes to the Program Student Outcomes as follows:

- **Engineering Foundations and Problem Solving:** Observing industrial processes allows students to see theoretical concepts applied in real-world scenarios, enhancing their problem-solving skills as they encounter and address practical engineering challenges.

- **Engineering Design:** While not explicitly mentioned, industrial visits provide students with insights into the design and operation of industrial facilities, helping them understand how engineering principles are implemented in practice.

- **Effective Communication:** Interacting with professionals during industrial visits requires effective communication skills to ask questions, engage in discussions, and understand complex engineering concepts, supporting this SO.

- **Contemporary Issues and Ethical Responsibility:** Industrial visits may involve discussions about contemporary issues such as sustainability, safety, and ethical considerations in engineering practices, contributing to students' awareness of these topics.

- **Teamwork and Organization:** Industrial visits often involve group tours, where students must work together to observe and analyze industrial processes, fostering teamwork and organizational skills.

- **Experiment Design and Analysis:** While not explicitly mentioned, students may have the opportunity to analyze data collected during industrial visits, applying principles of experiment design and analysis to understand and interpret real-world data.

- **Life-long Learning and Broad Knowledge:** Participating in industrial visits exposes students to a variety of industries and engineering practices, encouraging a habit of continuous learning, and broadening their knowledge of chemical engineering applications in different sectors.

  During the years 2022 and 2024, various visits have been made to companies such as:

  - **Abysmo (Food industry)**
  - **Cervecería Nacional (CN) (Food industry)**
  - **EPMAPS (Water treatment)**
  - **AksoNobel (Materials/Coatings)**
  - **Holcim (Concrete)**
  - **LIFE (Pharmaceutical)**
  - **UCEM (Concrete)**

Research and Alumni Talks

The Chemical Engineering Faculty arranges weekly research seminars, where guest speakers of faculty members cover different topics related to chemical engineering. Students are encouraged to attend, and these seminars count as hours for their Colloquium course. Moreover, Alumni from the program give talks about their professional activities, and give current students advise for their development within the Chemical Engineering practice. These activities expose students to new global trends in Chemical Engineering and give them a comprehensive glance of how the field develops locally and abroad. This activity contributes to the Program Student Outcomes as follows:

- **Engineering Foundations and Problem Solving:** Attending research seminars helps students deepen their understanding of engineering principles as they are exposed to cutting-edge research and real-world problem-solving strategies shared by experts and faculty members.

- **Engineering Design:** While not explicitly mentioned, discussions in seminars often include innovative design solutions and advancements in chemical engineering, providing students with insights into practical applications of engineering design.

- **Effective Communication:** Listening to and interacting with guest speakers and alumni during seminars develop students' communication skills. They learn how to articulate questions and engage in meaningful discussions, enhancing their ability to communicate effectively in professional settings.

- **Contemporary Issues and Ethical Responsibility:** Seminars often cover contemporary issues and challenges in chemical engineering, such as sustainability, environmental impact, and ethical considerations. This helps students understand the broader implications of their work and the importance of ethical responsibility in their practice.

- **Teamwork and Organization:** While the focus is on individual attendance and learning, the collaborative environment of seminars encourages students to discuss and share insights with peers, fostering a sense of teamwork and collective learning.

- **Experiment Design and Analysis:** Discussions in research seminars may include presentations on experimental methodologies, data analysis, and interpretation of results, helping students enhance their skills in designing and analyzing experiments.

- **Life-long Learning and Broad Knowledge:** Regularly attending seminars exposes students to the latest trends and advancements in chemical engineering, promoting a culture of lifelong learning. They gain broad knowledge of how the field is evolving both locally and globally, preparing them for continuous professional development.

Academic events

Every year, the Chemical Engineering Program hosts the organization of at least one academic event (i.e., Conferences) on relevant themes to the Chemical Engineering profession, with important guest speakers from Ecuador and other countries, such as USA, Japan, Germany, and France. Students attend these events and create a deeper understanding of emerging trends in fields related to chemical engineering. In 2023, the “Soft Matter Conference” was held, while in 2024 a Symposium about “New Technologies for Waste Valorization” was carried out. This activity contributes to the Program Student Outcomes as follows:

- **Engineering Foundations and Problem Solving:** Attending conferences with expert speakers enhances students' understanding of core engineering concepts and their applications to solve real-world problems. Exposure to cutting-edge research and innovations helps refine their problem-solving skills.

- **Engineering Design:** Discussions and presentations at these events often include advanced design methodologies and innovations in chemical engineering, providing students with insights into the latest trends and practical applications of engineering design principles.

- **Effective Communication:** By attending and potentially participating in discussions during these conferences, students develop their communication skills. They learn to articulate questions, engage with international experts, and present their thoughts clearly and confidently.

- **Contemporary Issues and Ethical Responsibility:** Conferences frequently address contemporary issues such as sustainability, environmental impact, and ethical practices in chemical engineering. Students gain awareness of these critical issues and understand the ethical responsibilities associated with their profession.

- **Teamwork and Organization:** While the primary focus is on individual learning, the collaborative environment of conferences encourages students to discuss and share insights with peers, fostering teamwork and collective learning.

- **Experiment Design and Analysis:** Presentations often include discussions on experimental approaches and data analysis techniques, enhancing students' knowledge and skills in designing experiments and interpreting results.

- **Life-long Learning and Broad Knowledge:** Attending conferences with international speakers exposes students to a diverse range of perspectives and the latest advancements in chemical engineering. This experience promotes a culture of lifelong learning and broadens their understanding of global trends in the field.