



FACULTY BROCHURE



FACULTAD DE
CIENCIAS QUÍMICAS
Y FARMACÉUTICAS
UNIVERSIDAD DE CHILE

Founded in
1945

As the mother
institution in Chile
for all Chemistry
courses



4
undergraduate-
degree programs



105
academics,
87 full-time equivalent
academic staff



35
Research
Areas



5 Doctoral
programs
(2 interfaculties ones),
5 Master's programs
(1 interfaculty program),
1 specialist professional
program and 10 Diplomas



More than 800
WOS publications
(ex ISI) between
2007- 2014



More than 30
laboratories



Funds for
Research
centers
in priority areas with
Excellence in Research_
ACCDiS



1315 undergraduate
students,
400 graduate
students

44 current
research
projects
(FONDECYT regular),
2 centers of international networks
in science and technology,
2 ongoing FONIS projects

3
National
Awards



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Biochemistry and Molecular Biology

The Department of Biochemistry and Molecular Biology deals with both the coordination and development of teaching within the Faculty, and the cultivation of disciplines in the field of Biology – such as promoting scientific discovery and technological advances, and researcher formation programs. As the lead teaching department in all degree courses, it covers fields such as biology, physiology, biochemistry, microbiology, physiopathology, biotechnology, immunology and clinical biochemistry.



LINES OF RESEARCH

- Neurobiochemistry – **Prof. Hernán Lara** (Lead Researcher) and **Prof. Alfonso Paredes**
- Reproductive Ageing – **Prof. Alfonso Paredes** (Lead Researcher) and **Prof. Hernán Lara**.
- Environmental Biotechnology applied to Water Decontamination – **Prof. Davor Cotoras** (Lead Researcher), **Prof. Fernando Valenzuela**, and **Prof. Jorge Mendoza**
- Neuroplasticity and Neurogenetics – **Prof. Jenny Fiedler**
- Transduction of Molecular Signals – **Prof. Sergio Lavandero** (Lead Researcher)
- Inflammation and Oxidative Stress associated with the Study of Chronic Cardiovascular and Metabolic Diseases – **Prof. Lorena García** (Lead Researcher), **Prof. Guillermo Díaz** and **Prof. Carla Delporte**
- The Study of Molecular Mechanisms involved in the Interaction between Salmonella and Eukaryotic Hosts – **Prof. Carlos Santiaviago** (Lead Researcher) and **Prof. Sergio Álvarez**
- Metabolic Signalling in Vascular Remodelling – **Prof. Mario Chiong** (Lead Researcher)

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Food Science and Chemical Technology

The Department carries out research in the field of food science, extension activities for industry and offers undergraduate courses to students of Food Engineering and a number of Chemistry, Biochemistry and Pharmacy courses. The academics are significantly involved in both graduate courses and in professional specialization and Post title specialization programs. The department is undertaking 5 areas of study:

- Food Science and Processes
- Unit Operations
- Chemistry of Food and Fatty Substances
- Applied Microbiology
- Management and Administration



LINES OF RESEARCH

- Hydrometallurgy – **Prof. Fernando Valenzuela** (Lead Researcher) and **Prof. Carlos Basualto**
- Micro and Nano encapsulation of bioactive compounds as a method of application in food and in formulating sustained release preparations – **Prof. Paz Robert** (Lead Researcher)
- Chemistry of Food and Fatty Substances – **Prof. Nalda Romero** (Lead Researcher), **Prof. Jaime Ortiz** and **Prof. Paz Robert**
- Technology of obtaining tryacylglycerides structured with omega-3 EPA and DHA through optimization of enzymatic transesterification processes in supercritical carbon dioxide (SCCO₂) from LCPUFA n-3 marine oil concentrates. The effect of physical, chemical, quality and stability properties in food systems **Prof. Alicia Rodríguez** (Lead Researcher), **Prof. María Antonieta Valenzuela** and **Prof. Nalda Romero**
- Development of biorefinery processes of bioactive compounds derived from agribusiness and marine sources including its physicochemical, functional and nutritional characterization – **Prof. Jaime Ortiz** (Lead Researcher), **Prof. Nalda Romero**, **Prof. Luis Puente** and **Prof. Eduardo Castro**

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Science and Pharmaceutical Technology

This department is highly regarded nationally as a cutting-edge guiding center from a scientific, technological and ethical approach in the field of dispensation, rational use of medication, pharmaceutical care programs, development and innovation, and quality assurance for pharmaceutical and cosmetic products, as well as in participation in committees where normative and regulatory policies are generated. This Department is therefore at the heart of the profession, the Faculty, the University and the country's needs and requirements.

LINES OF RESEARCH

- Vehiculization of active molecules in nano, micro and macrometric systems for their use in chronic therapies – **Prof. Felipe Oyarzún** (Lead Researcher).
- Nanostructured polymeric materials as delivery systems controlled and directed by biological drugs (biomacromolecules) and conventional drugs – **Prof. Javier Morales Montecinos** (Lead Researcher).
- Pharmaceutical Physical chemistry – **Prof. Javier Morales Valenzuela** (Lead Researcher), **Prof. Karina Valdés** and **Prof. Javier Morales Montecino**.
- Medical, economic and social consequences of the use of medication – **Prof. Marcela Jirón** (Lead Researcher) and **Prof. Elena María Vega**.



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Pharmaceutical and Toxicological Chemistry

As a functional and structural unit of the Universidad de Chile's Faculty of Chemical and Pharmaceutical Sciences, the Department of Pharmaceutical and Toxicological Chemistry's goal is the development, teaching and cultivation of the pharmaceutical and toxicological chemistry of naturally occurring and synthetic bioactive molecules.

The department cultivates disciplines related to the study of drugs and/or active principles. This Department focuses mainly on the knowledge of the chemical structure of molecules, deriving from it their chemical, physicochemical and biochemical properties, which determine the pharmaceutical and toxicological behavior of natural or synthetic molecules.



LINES OF RESEARCH

Nanomedicine and Nanotoxicology, Delivery of Drugs –
Prof. Marcelo Kogan (Lead Researcher), **Prof. Marcelo Kogan**, **Prof. Jenny Fiedler**, **Prof. Soledad Bollo**, **Prof. Alejandro Álvarez**, **Prof. Sergio Lavandero**, **Prof. Mehrdad Yazdani**, **Prof. Javier Morales M.**, **Prof. Felipe Oyarzún**, **Prof. Carla Delporte** and **Prof. Andrew Quest**

Pharmaceutical Analysis and (Bio)sensors –
Prof. Soledad Bollo (Lead Researcher), **Prof. Alejandro Álvarez** and **Prof. Claudia Yáñez**

Chemical and Pharmo-toxicological study of vegetable species –
Prof. Carla Delporte (Lead Researcher), **Prof. Olosmira Correa**, **Prof. Lorena García**, **Prof. Claudio Olea** and **Prof. Alfonso Paredes**

Cellular, Molecular and Cardiovascular Pharmacology –
Prof. Guillermo Díaz (Lead Researcher)

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Inorganic and Analytical Chemistry

The Department of Inorganic and Analytical Chemistry is responsible for providing foundation knowledge for the integral education of students in Inorganic Chemistry and Analytical Chemistry, which are the basis of its undergraduate and graduate activities.

As a research entity, the department has ten lines of research recognized by the university which cover the fields of Inorganic Chemistry and Analytical and Environmental Chemistry, and which are supported through funded external projects in the fields of science and technology. This allows for the development of research activities and the interaction with national and international scientific communities.

LINES OF RESEARCH

- Soil and water contamination by inorganic and organic compounds – **Prof. Inés Ahumada** (Lead Researcher), **Prof. Loreto Ascar** and **Prof. Pablo Richter**
- Analytical developments in the preparation of environmental samples and food for measuring persistent and emergent organic contaminants and trace elements – **Prof. Pablo Richter** (Lead Researcher) and **Prof. Inés Ahumada**
- Inorganic Materials – **Prof. Evgenia Spodine** (Lead Researcher)
- Molecular Modelling and Quantum Mechanics – **Prof. Gerald Zapata** (Lead Researcher)
- Analytical Chemistry associated with the study of organic compounds and trace elements in food and the environment – **Prof. María Estrella Báez** (Lead Researcher), **Prof. Edwar Fuentes** and **Prof. Jeannette Espinoza**
- Free and Antioxidant Radicals – **Prof. Claudio Olea** (Lead Researcher), **Prof. María Carolina Zúñiga** and **Prof. Hernán Speisky**
- Synthesis and characterization of Coordination Compounds and their use as homogenous catalysts – **Prof. Pedro Aguirre** (Lead Researcher) and **Prof. Santiago Solezzi**



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Organic Chemistry and Physical Chemistry

The Department of Organic Chemistry and Physical chemistry is committed to passing on scientific knowledge in their own fields of Organic Chemistry and Physical chemistry.

They are dedicated to providing superior quality teaching, research, extension, external connections and academic administration.

The development of these activities falls under the Faculty and Institution's fundamental aims and are in accordance with the country's needs and requirements. The Department offers teaching at the undergraduate and graduate levels, and carries out research in the fields of Organic Chemistry and Physical chemistry.



LINES OF RESEARCH

- Photoconversion of Energy and Mechanistic Photochemistry – **Prof. Julio de la Fuente** (Lead Researcher), **Prof. Claudio Saitz** and **Prof. Carolina Jullian**
- Crystalline Liquid Materials and Nanomaterials – **Prof. Eduardo Soto** (Lead Researcher) and **Prof. Julio de la Fuente**
- Modification of Natural and Synthetic Polymers – **Prof. Mehrdad Yazdani-Pedram** (Lead Researcher)
- Chemistry of the Atmosphere – **Prof. Margarita Préndez** (Lead Researcher)
- Medical Chemistry – **Prof. Hernán Pessoa** (Lead Researcher)
- Molecular Electrochemistry – **Prof. Arturo Squella** (Lead Researcher), **Prof. Alejandro Álvarez**, **Prof. Soledad Bollo**, **Prof. Patricio Navarrete** and **Prof. Claudia Yáñez**
- Kinetics and Photochemistry - **Prof. Antonio Zanocco** (Lead Researcher)
- Studies of Supramolecular Chemistry of Calixerenes and Cyclodextrines – **Prof. Claudio Saitz** (Lead Researcher) and **Prof. Carolina Jullian**

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Research Labs and Facilities



Study Center for Chemistry Development

The Specialty Laboratory, Study Center for Chemistry Development (CEPEDEQ), was established in 1995 by the Universidad de Chile's Faculty of Chemical and Pharmaceutical Sciences. This Center aims at supporting our national scientific community as well as the productive sector, providing services, laying foundations for heavy investment in state-of-the-art instrumental equipment.

CEPEDEQ consists of a group of professional Chemists, Engineers and Chemical Technicians, most of them professionals with a Ph. D or a Master's Degree and everyone committed to providing a service of the highest level, offering support in scientific research and teaching within the Faculty of Chemical and Pharmaceutical Sciences at the undergraduate and graduate levels, to individuals and groups belonging to other faculties at the Universidad de Chile, other national or international universities and to companies in the public and private sectors. The major areas of service include:

- Pharmaceutical Products.
- Certification and Control.
- Food Products.
- Environment.
- Research.

The management of this lab is carried out under the NCh-ISO 17025 standard, and is accredited by the National Standards Institute (INN) in accordance with the scope of the LE 888 (physicochemical tests on vegetable oil matrices) certificate. The laboratory is recognized and approved by the Institute for Public Health (ISP) in conjunction with the GLP (Good Laboratory Practices).



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Professor Hernán Báez Guerrero Laboratory for Anti-doping and Abused Substance Analysis

The Laboratory for Anti-doping and Abused Substance Analysis of the Faculty of Chemical and Pharmaceutical Sciences is a group specialized in the analysis of drugs banned in sport and in the detection and identification of drugs in work and clinical programs in different biological matrices.

Our laboratory also takes on an advisory role for state, private and judicial institutions, and universities on pharmaceutical and toxicological issues. We take part in talks, seminars and graduate courses in sports journalism and veterinary medicine.

Our group consists of a team of professionals with a high standard of qualifications and expertise in both the administrative and technical implementation of drug control protocol and programs.

Quality Certifications:

- Institute for Public Health (ISP): Advisory Laboratory Program for External Quality Assessment on Abused Substances (PEEC).
- Chilean National Sports Institute (IND): Reference Laboratory for the National Commission for Doping Control.
- Association of Official Racing Chemists (AORC): Appointed Laboratory for doping control in thoroughbred racehorses.
- South American Organization for the Promotion of Racing Thoroughbreds (OSAF).
- World Association of Anti-Doping Scientists (WAADS).
- Latin American Anti-doping Association (ALA).

Current Doping Control Programs:

- National Professional Football Association (ANFP)
- National Sports Institute (IND)



- Superior National Horseriding Council (CSHN) and numerous racetracks in the country (Soc. Hipódromo Chile, Club Hípico de Santiago, Valparaíso Sporting Club y Club Hípico de Concepción).

Current Abused Substance Control Programs:

Institutions and State Companies

- CODELCO Corp.
- Mutua de Seguridad Cámara Chilena de Comercio.
- ENAP (National Petroleum Company)
- UAF (Financial Analysis Group)
- Banco Central
- General Accounting of the Republic
- Del Cobre Hospital
- Chilean Navy
- Chilean Investigative Police
- Viña del Mar Naval Hospital

Private Companies

- Pacific Mining Company
- Enaex S.A.
- Minera Escondida Company
- Hospitals, clinics, laboratories, etc.

Find out more by contacting:

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Tels.: +56 22978 2800
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Secretary: Valeria Arias
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Polhammer 1007, Independencia

Center for the Advanced Study of Chronic Diseases (ACCDIS)

Chronic diseases are the main cause of diseases and death in Chile and around the world. ACCDiS was founded in order to investigate this issue. ACCDiS is a FONDAP Center of Excellence oriented towards the development of “Medicine for the Chronic Diseases of the 21st Century”, based on scientific and clinical collaboration between academics and researchers of the Universidad de Chile and Pontificia Universidad Católica de Chile. The Center started functioning in December 2014 and is financed for 10 years by the FONDAP 15130011 Project. Its major objective is to become an international scientific center that produces the scientific basis to understand and prevent the two main chronic diseases in Chile: cancer and cardiovascular disease.



Its goals include the following:

- Developing multidisciplinary research that will allow the analysis of the natural history of cardiovascular diseases and cancer in the Chilean population through the installation of the first epidemiological cohort for chronic diseases in Chile (MAUCO).
- Establishing specific research into cancer and cardiovascular diseases, covering aspects of basic, clinical and epidemiological research, and their consequences to public health.
- Establishing new service centers of a high technological standard which support basic, clinical and epidemiological research.
- Forming an advanced labor force in chronic diseases.
- Diffusing general information to the public related to these diseases and educated them as to their prevention.

Contact Details and Information:

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Email: comunicacionesaccdis@u.uchile.cl
Tels.: +56 9 5859 5971, +56 2 2978 1693
www.accdis.cl

LINES OF RESEARCH

- Energetic Metabolism and cardiovascular diseases – **Dr. Sergio Lavandero**, Universidad de Chile.
Biomarkers of cardiac insufficiency and cardiovascular remodelling – **Dr. Pablo Castro**, Pontificia Universidad Católica de Chile.
- Tumor cell biology and inflammation – **Dr. Andrew Quest**, Universidad de Chile.
- Biomarkers for the early detection of gastric tumors – **Dr. Alejandro Corvalán**, Pontificia Universidad Católica de Chile.
- The Natural History of Gallbladder Cancer – **Dr. Catterina Ferreccio**, Pontificia Universidad Católica de Chile.
- Nanomedicine and Nanoteranosis – **Dr. Marcelo Kogan**, Universidad de Chile.

Purified Water Production Unit

The Purified Water Production Unit (UPAP) provides purified water easily, efficiently and effectively to fulfill the Faculty's internal demands to the highest standard of certified quality and intends to become a sustainable business unit for the academic team.



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Confocal Microscopy Unit

This unit has a Zeiss model LSM 700 confocal microscope at its disposal. It employs four stable lasers that allow longitudinal waves of 405nm, 488nm, 555nm and 639nm. Additionally, the new pinhole precision design allows for a completely motorized opening and positioning that adapts to light and detection wavelength.

The new software allows you to save your configurations for future experiments and shortens image acquisition time. This unit has a CO₂ incubator in order to maintain the user cultured cells and the equipment necessary to record data in real-time (CO₂ and temperature regulated). Mrs. Carolina Hernández, equipment operator, assists in the use of this equipment, and is on hand to advice during your experiments.

Opening Times:

The Microscopy unit is available Monday-Friday during the following hours:

Morning: 09:00-13:00.

Afternoon: 14:00-17:00.

For queries or bookings, please contact the email address microscopia@ciq.uchile.cl or by telephone: 29781670.

GROUP ESTABLISHED WITH FUNDS U-moderniza, Fondecup EQM120114,
Department of Biochemistry and Biology.

Head Academics:

Prof. Jenny Fiedler Temer
Prof. Hernán Lara Peñaloza

Head of Confocal Microscopy

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UNDERGRADUATE AND GRADUATE PROGRAMS





Undergraduate Programs

The Faculty currently offers students the opportunity to follow one of four university degree programs: Pharmacy, Biochemistry, Chemistry and Food Engineering. All graduates will ultimately possess a solid framework of training in Chemistry and its direct link to the corresponding fields of medicines, food, biochemistry or the chemical industry.

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Head of Chemistry Courses:
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Head of Food Engineering Courses:
Prof. José Mario Romero Reyes
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PHARMACY

Pharmacists from the Universidad de Chile are health professionals, specialized in the understanding, development, production and application of drugs, cosmetics and other biologically active substances – in addition to beneficial effect such as the handling of their toxic effects for human and animal health and wellbeing.

Students receive solid training in the chemico-biological and pharmaceutical sciences, which enables them a number of skills. Among these are: the ability to develop and produce drugs and cosmetics; to manage their pharmacological and clinical application; to promote responsible drug use and to be responsible, engaging both patients and treating physicians, of the pharmacotherapeutic outcomes, by monitoring and making continuous follow-up procedures to optimize drug use, thus helping effectively to reach the therapeutic objectives; to ensure pharmacovigilance and the quality use of medicines; to manage laboratories, work teams, research teams, and to become involved in both clinical and scientific projects for the improvement of public health, taking into account criteria of quality adjusted to policy and regulatory frameworks.

The education and training that students receive will allow them to practice their profession in a manner dedicated to ensuring patient's wellbeing, life quality and the environment, and the improvement of public health. This training also promotes leadership and teamwork skills, ability to innovate and adapt to changes, the continued desire to learn, a code of ethics and social responsibility for national public health.

CHEMISTRY

Chemists from our Faculties are professionals dedicated to the study of theories, models and chemical phenomena as well as the study of their related disciplines. They possess solid theoretical and experimental training in Chemical Sciences complemented by Mathematical and Physical understanding, all of which allows them to efficiently work within their own disciplines under ethical parameters and quality standards.

The training we offer allows them to efficiently apply themselves to basic and applied research, productive processes, quality management, and allows them to develop their understanding and logically solve complex and diverse scientific problems. Graduates will also be equipped to use and apply new knowledge, technology and developments related to the field. They are able to contribute, providing innovative solutions, conscious of community quality of life and environmental preservation, both in their own individual work and when part of interdisciplinary work teams in the public and private sectors.

Chemists from our Faculty have been trained to professionally work in a determined and critical way, and work with a commitment to the improvement of society. This quality is distinct of the Universidad de Chile's professional graduates.



BIOCHEMISTRY

Biochemists from the Universidad de Chile are professionals specialized in the understanding of the molecular structure and function of cells, which they use to solve problems and issues related to living organisms and their applications.

Their scientific training and continual desire to learn allow them to efficiently adapt to a dynamic and complex world. They are exemplary due to their creative, analytical and critical abilities. This allows them: to determinedly take part in the development, management, execution and evaluation of basic, applied or technological research projects; to manage clinical analysis laboratories in hospitals or related; to carry out further education teaching programs, as well as an advisory role in an academic, business or production environment in either the public or private sectors. Additionally, they are able to independently work as part of a team and to effectively share their knowledge and results from their professional work.

All of this lets them conduct their work with a sense of ethical, cultural, economic and environmental responsibility for their actions, and work with a commitment to the improvement of society. This quality is distinct of the Universidad de Chile's professional graduates.

FOOD ENGINEERING

Food Engineers from the Universidad de Chile are professionals with a solid framework of training in food science, technology and engineering. This allows them: to design and implement projects and equipment related to the production and preservation of raw or constructed materials; to do research and guide teams and productive processes with technical precision, leadership and applying quality and safety criteria; to work as a part of multidisciplinary teams and applying their knowledge and expertise to developing innovative solutions for the continued improvement and optimization of processes and products.

By following current legal and health regulations, they conduct themselves as professionals with a social responsibility, and are ethically dedicated to ensuring human health and environmental preservation as well as attending to the country's and population's nutritional needs and requirements, and to considering the technical and economic restrictions related to decision making in their profession.

Graduates in Food Engineering will be adequately prepared to enter the industry, laboratories, research centers or other public or private organizations of their field, becoming invaluable in their desire to apply their knowledge and expertise and to adapt to the daily challenges of the working world.

They will become specialized in the fields of Applied Research, Industry, and Engineering and Management.

Graduate School

Through our programs, we look to provide leadership training through doctorates in the fields of Biochemistry, Pharmaceutical Sciences, Pharmacology, Nutrition and Food, and Chemistry. These doctorates are all accredited by the National Graduate Accreditation Commission (CONAP), which enables our applicants to opt for CONICYT doctoral grant funding. A number of these doctoral programs are offered in collaboration with other faculties of the Universidad de Chile. The trained doctors are researchers capable of autonomously directing and carrying out original research, the results and findings become significant contributions to the scientific or technological understanding of their respective disciplines.

Additionally, the School encourages professional development for those specialized professionals who want to keep updated and seek to consolidate their understanding and competencies through Master's, Post title and specialty programs in the professional fields of Food, Pharmacology, Chemistry, Biochemistry and Pharmaceutical Sciences.

Our School also offers Refresher Courses, Diplomas, Graduate qualifications and expertise in the various professional fields offered by our Faculty.

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Deputy Graduate School Director:

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**DOCTORATES:**

- Pharmacology
- Pharmaceutical Sciences
- Biochemistry
- Nutrition and Food
- Chemistry

- In Clinical Pharmacy
- In Management of Improvements to processes and Organizational Development

MASTER'S:

- In Food: with Management, and Food Safety and Control
- Biochemistry
- Food Science
- Pharmaceutical Sciences
- Chemistry

REFRESHER COURSES

- Field of Chemistry
- Field of Food
- Field of Pharmacy

SPECIALIZED PROFESSIONAL COURSES

- In Clinical Pharmacy and Pharmaceutical Care

REFRESHER COURSES**DIPLOMAS:**

- In instrumental organic analysis
- In regulatory issues of drugs, biological products and cosmetics
- In updating current good manufacturing practices with emphasis on audits of quality systems, validation and risk analysis
- In Management, and Food Safety and Control
- In Therapeutic Equivalency
- In Pharmacy Healthcare Management
- In Clinical Research and Clinical trials Monitor

- Design Tools and statistical interpretation of measurements
- Modern analytical simple preparation strategies for organic analyses
- Validation of Analytical Methods and Lab. ISO 17025 Accreditation
- Atomic Absorption Course
- High Resolution Liquid Chromatography and its applications
- Chromatography of Gasses and its applications
- Latin American Course in Clinical Pharmacy
- Analysis of protein identification and quantification in food samples through use of high resolution liquid chromatography coupled with mass spectrometry
- IATA Certification Course



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