YACHAY TECH

CONTRIBUTING TO THE TRANSFORMATION OF HIGHER EDUCATION IN ECUADOR
Yachay Tech University for Experimental Technology and Research

Yachay University of Experimental Technology and Research (Yachay Tech) is a public university founded in March 2014, whose aim is to position Ecuador as a center of innovation and technological excellence in Latin America. Among Ecuadorian higher education institutions, Yachay Tech is the first and only research-focused university. It is led by a Board of Trustees, composed of professors from Caltech, a Rector, a Chancellor, Vice Chancellors for Research and Innovation and for Academic Affairs, Deans, and Department Heads, who all come to Yachay from distinguished universities around the globe. 100% of our career-curriculum faculty hold doctoral degrees and are native of more than 20 different nations. Our six Schools (Biological Sciences and Engineering, Chemical Sciences and Engineering, Engineering Design and Innovation, Geological Sciences and Engineering, Mathematical Sciences and Information Technology, Physical Sciences and Nanotechnology) embody the concept of close interaction between fundamental discovery and application, each consisting of two departments, one concentrating on basic science and the other on technology and engineering.

By combining science and engineering, Yachay Tech aims to facilitate cross-fertilization and translation of knowledge from the stage of fundamental concept through to product development and to educate a new generation of scientists/engineers and ultimately, responsible citizens, at all levels from undergraduate through PhD. Despite being in its initial stages of development, the University currently has approximately 1000 students who receive a rigorous, two-year core curriculum (taught in Spanish) in science, mathematics, and English Language; and, beginning in year three, upper level courses in the majors that are taught exclusively in English by tenure-track faculty. The undergraduate major is completed in five years.

Yachay Tech continues to grow rapidly. We are currently initiating PhD programs in some fields and have initiated research and teaching cooperative exchange agreements with top universities in Europe, North and South America, and Asia.
Yachay Tech Setting

Yachay Tech is located in the Andean highlands, approximately three hours north of Quito. The campus is located 3 km from the small, but vibrant, town of Urcuquí. The campus is surrounded by largely agricultural terrain with a strong local indigenous and Afro-Ecuadorian culture. The climate is mild with mean daily temperatures around 15˚C and low rainfall. The region abounds with a diversity of biota and geology with volcanoes, hot springs, glaciers, lakes, cloud forest, rain forest, and paramo, all within less than one hour drive from campus. Yachay Tech is also initiating an undergraduate program on Santa Cruz Island in the Galapagos archipelago.

“Yachay” in the native Quichua language means “knowledge” and Yachay Tech is the focal point of the Yachay City of Knowledge, Ecuador’s first planned city, one that aims to bring together the university, high tech companies, and national research institutes, to undertake cutting edge research and to create new products and technologies with added value.

Research at Yachay Tech and its Link with Industry

Worldwide, the linkages between universities and industry are increasingly recognized as critical to a nation’s technological and economic development. Yachay Tech has strong cooperation between academia and industry engrained in its culture which includes operational mechanisms via regular interactions with local, national, and regional players. In addition, we have created several University Based Research Centers (UBRCs), interdisciplinary research laboratories whose primary role is to promote value-added research and development. To strengthen research activities, several Public Research Institutes will be moved to the City of Knowledge over the next year, which will facilitate their work alongside that of the University, the UBRCs, the Industrial Park, and the Technology Park, in order to promote technology transfer for innovation in the country and the region.

Ecuador is one of the world’s richest biodiversity and geodiversity hot spots. From the Galapagos, to the Pacific coast, to the Choco forest, to the Paramo and inter-Andean dry forests, to the Amazon, the diversity of habitats, climates, and soils, produced by an astonishing diversity of geological terrains has produced among the highest biological diversities and largest concentration of endemic organisms on Earth. This is both a living laboratory for our students and faculty and a potential source of novel biomolecules and abundant geological resources for the nation. In view of the considerable potential of these resources, a major focus of the research at Yachay Tech in the coming years will be on research and innovation in renewable and non-renewable energy, petrochemical industry, agriculture, natural hazards, mining and pharmaceuticals, among others. These sectors and the cooperation with industry will contribute to the national economy, attract and create new investment opportunities to develop a knowledge economy for the country and beyond. At the same time, we will be equally dedicated to undertaking this research and development with a commitment to the preservation of Ecuador’s incomparable biological and cultural diversity.

Teaching at Yachay Tech is inquiry-based and experiential. It is firmly grounded in shared field- and laboratory-based activities that bring students into the world of research and discovery starting in their first weeks at the university. Research-based undergraduate education helps shape capable and well-prepared scientists and engineers, as well as well-rounded citizens with the ability to contribute to Ecuadorian development.
Yachay Tech Governance

The Yachay Tech Board of Trustees is composed of three scholars with extensive international experience. Dr. Ares Rosakis and Dr. José Andrade from Caltech, and Dr. Carlos Castillo-Chávez, the Rector of Yachay Tech, as well as Mr. Héctor Rodríguez, General Manager of Yachay Public Enterprise, and Ms. María de Lourdes Miranda, the legal secretary.

Dr. Castillo-Chávez, a well-known Mexican-American mathematician and social scientist who has most recently served as the “Regents Professor and Joaquin Bustoz Jr. Professor of Mathematical Biology” at Arizona State University, where he was also Director of The Simon A. Levin Center of Mathematical, Computational and Modeling Sciences, Director of the Mathematical and Theoretical Biology Institute, and Director of the Institute for Strengthening the Understanding of Mathematics and Science.

Academic Leadership

Yachay Tech’s Chancellor, Dr. Catherine A. Rigsby, serves as the university’s Chief Academic Officer. Working closely with the Rector, Rigsby – a geoscientist with an international research portfolio and experience in academic leadership – is supported by Vice Chancellors of Academic Affairs and Research & Innovation and is responsible for academic program planning and for oversight of the academic, research, and student services operations of Yachay Tech. Our Vice Chancellor for Research and Innovation, Dr. Juergen Reichardt, oversees research endeavors and the Center for Technology Transfer. Reichardt is an experienced and well-published biomedical researcher.

Yachay Tech’s Schools are led by scientists who all have significant research credentials and global experience that position them to build world-class academic and research programs and to attract excellent faculty from around the world.

These leaders have international collaborations throughout the world. The Deans are:

- Spiros Agathos, PhD: School of Biological Sciences and Engineering
- Vladimir Mujica, PhD: School of Chemical Sciences and Engineering
- Paul Baker, PhD: School of Geological Sciences and Engineering
- Andreas Griewank, PhD: School of Mathematical Sciences and Information Technology
- Paola Ayala, PhD: School of Physical Sciences and Nanotechnology
- The Dean of the School of Engineering Design and Innovation has not yet been named

Rector Carlos Castillo-Chávez

Dr. Castillo-Chávez

Department of Biology

Specialization areas: Basic biology; evolution; plant biology and genomics; infectious diseases; marine biology and diversity; crop genetics; biomass conversion; bio pharmaceuticals; and disease resistance.

Bachelor of Science in Biology

The Biology profession has a solid background in botany, zoology, ecology, and evolution. It also encompasses cell and molecular biology and microbiology, bacteriology, parasitology, biochemistry, and genetics. Its field of action covers research and industry activities, business and technological innovation related to environmental problems and natural resource management, conservation, biotechnology, public health and medical applications, among others. This profession also addresses biological problems in areas of social concern, to resolve them properly according to the scientific method.

Department of Biomedical Engineering

Specialization areas: General engineering of medical devices; medical imaging and sensing; medical electronics and nano-devices; cell and tissue engineering; biomaterials; biomechanics; biocompatible prostheses; and micro-fluids and bio-inspired design.

Bachelor of Biomedical Engineering

The Biomedical Engineering profession is at the interface between biology and engineering, with components of nanotechnology, physiology, mathematics, chemistry and materials science. Its field of action is aimed at research and industry, business and technological innovation related to the creation of the enabling technologies for the improvement and care of human health. This profession works with researchers and other professionals in the application of engineering principles and techniques in the medical field.

Department of Geology

Specialization areas: Petrology; mineralogy; geophysics; geochemistry; tectonophysics; earthquake seismology; volcanology; ocean and climate dynamics; earth observation; petroleum and mineral exploration, history of Earth and life.

Bachelor of Science in Geology

The professional geoscientist may be able to develop: exploration and exploitation of mineral, energy or water resources; they may work on engineering and construction of infrastructure such as dams or roads; they may mitigate seismic, volcanic or hydrological risks; they may study the mechanisms, structures and evolution of the Earth, its relief and its biodiversity; they may study the dynamics of ocean and atmospheric circulation and climate change.

Department of Geological Sciences and Engineering

Specialization areas: Resource engineering which includes renewable and non-renewable energy, minerals and mining, geothermal energy, water resources, carbon capture and storage, hazard assessment, monitoring and mitigation; sea floor mapping and exploration; mineral resource mapping; mineral extraction; and processing; pathways to sustainable development.

(*) A Major (career) in Geological Engineering is under development for presentation to the Council for Higher Education of Ecuador
Department of Mathematics

Specialization areas: PDE Modeling and Numerics; Stochastic and Functional Analysis; Simulation; Optimization and Control; Complex Analysis and its Generalizations; Hamiltonian Dynamics and Geometric Integration.

Bachelor of Science in Mathematics

In all natural sciences, many fields of social sciences and even the humanities rigorous methods based on mathematical formalisms including stochastics have become indispensable tools for analysis and predictions. Mathematicians know the fundamental theoretical results and constructive methods to formulate and resolve mathematical models in cooperation with experts in the various application fields. Graduates are aware of the inherent limitations of mathematical models and the dangers of their exploitation for purposes that do not benefit human society and global environments. In their particular area of expertise they can conduct research activities, initially under supervision of experienced academics.

Department of Computer Science and Engineering

Specialization areas: Machine Learning; Artificial Intelligence, Neural Networks; Data Analytics; Bioinformatics; High Performance Computing; Distributed Computing.

Bachelor of Science in Information Technology Engineering

The design and operation of modern knowledge, monitoring, production and transport systems is heavily reliant of efficient algorithms and their efficient implementation on distributed computing platforms. Software and Computer Engineers can adopt, combine and tune existing software for various IT applications on stand-alone or distributed computer systems. They are aware of the inherent limitations and dangers of unrestricted information gathering, mining and distribution. In their particular area of expertise they can conduct research activities, initially under supervision of experienced academics.

Department of Chemistry

Specialization areas: physical, organic, inorganic and analytical, into a seamlessly view of fundamental molecules that provide the understanding at the molecular level of complex processes and systems.

Bachelor of Science in Chemistry

A chemist is a professional who acts in an interdisciplinary manner applying basic scientific knowledge to the understanding of the behavior of chemical systems. Since chemistry is present in all manifestations of life and also in many industrial processes, chemists are capable of taking part in understanding and controlling complex processes to obtain products of added value within the framework of a global view in favor of mankind and society, protecting the environment and ensuring the good use of energy and water.

Department of Petrochemical Engineering

Its effort is directed to combining research and teaching oriented to a molecular understanding of chemical processes with a view in engineering applications in the area of valorization of products from the oil and energy industry, especially polymer and petrochemical engineering, oil refining techniques, petro-products, material synthesis and properties. Specialization areas: Polymer engineering; oil refining technology; synthetic petro-products; and materials synthesis and properties.

Bachelor of Science in Petrochemistry

The Petrochemical Engineering professional has theoretical and practical skills in key branches of chemistry, and introduces the fundamental principles of physics and mathematics, computational chemistry, analysis and structure elucidation. The graduates are qualified to practice their profession in quality control of petroleum products, creation and modification of petro-products, material synthesis and properties.

Bachelor of Science in Polymer Engineering

The Polymer Engineering professional has knowledge of polymers, their properties, applications, and the performance and behavior of polymers such as plastics, nylon and rubber. To obtain a degree in Polymer Engineering, students receive training in research and innovation so that they may apply their career in the industries of thermoplastics (polymers that change state from liquid to solid based on temperature) or elastomers (flexible polymers often used as seals, gaskets or adhesives).

Bachelor of Science in Nanotechnology

Specialization areas: Nanostructured materials and nanofabrication, Nano-biotechnology.

Bachelor of Science in Nanotechnology Engineering

The career programs offered by the Nanotechnology department is clearly devoted to promote research in three sub-areas: nanobiotechnology, materials science and engineering, fabrication of nanodevices. It has a strong orientation to understanding phenomena at nanoscale prioritizing the comprehension of physics behind the behavior of structures and processes in the nanoworld.
Laboratories

New teaching and research laboratories for Biology, Geology, Chemistry, Mathematics, Physics and Nanotechnology are being designed and constructed to a standard comparable with the laboratories in research universities in North America and Europe.

Campus Life

Yachay Tech University is located in a valley in the Andes Mountains in the San Miguel de Urcuquí canton, in the northern Imbabura province of Ecuador. The campus infrastructure has been fashioned to create a welcoming atmosphere for the university community and offers housing for all students with 24 hours services and security.

The campus grew from a renovated historic Hacienda, Chalet, and Sugar Mill. It now includes modern teaching laboratories and classrooms, extensive new student housing, a 24 hour library, a botanical garden, and facilities for sports and recreation.

Dorms

The dormitories are composed of two to four rooms which are shared by two to four students; equipped with beds, cupboards, desks and supplies, full bathrooms, a dining room and a kitchen. Assigning students to the residences is done by gender, and, as a rule, regional diversity is sought.

Internationalization and Exchanges

Yachay Tech has International and Research Offices which actively promote and disseminate information on cooperation and exchange opportunities for staff and students. We have agreements with higher education institutions in Germany, Japan, Spain, US, Venezuela, and other countries.

Yachay Tech participates in national and international networks and associations for internationalization, is the seat of the multinational, United Nations-sponsored Andean Sustainable Development Solutions Network, and collaborates in projects from the EU’s Erasmus+ and Horizon 2020 programs as well as other bilateral programs with European, North and South American, and Asian countries.

Taking advantage of Ecuador’s unique biological and geological diversity, new science-based Study Abroad Programs are being created, with teaching and field experiences in the Galapagos and the Amazon as well as on the Yachay Tech Andean campus. All courses in these programs will be taught in English. The programs will include cultural tours and activities and offer Spanish language instruction to interested international students.

Food Options

At the University there is a restaurant, a cafe and a student cafeteria. The student housing units are equipped with kitchens for food preparation. A new marketplace with a variety of shops and eateries is being completed on campus.

Also in the town of Urcuquí, which is a 15 minute walk from campus, there are several restaurants and shops where different products are offered.

Student Clubs

Over 25 academic, cultural, sports and art clubs are offered for the Yachay Tech community. Students, staff, and faculty are encouraged to participate in rugby, football, theater, astronomy, kickboxing, salsa classes and many other diverse activities on campus.

General Services

Free Bus Service to and from Ibarra; Free Wi-Fi on campus; Laundry Services; Rental Bicycles; ATM Machines; Mini Market; Copying and Printing Services, 24 hour Medical Center; Social and Psychological services including mentoring and coaching.

Message from the Rector

Yachay Tech is a young, research-intensive university in Ecuador immersed in the creation of knowledge, the fostering of technological innovation and a commitment to do first rate science and engineering education, as we confront the challenges and opportunities of the 21st century.

Yachay Tech houses a diverse group of students and researchers driven by their passion, dedication to excellence and the persistence needed to succeed. We are determined to facilitate access to science, technology and mathematics to all, including to members of underrepresented and vulnerable populations.

Welcome to Yachay Tech!

Carlos Castillo-Chávez
Yachay Tech University Rector