espol®
AND ITS RESEARCH

2024




espol® Dean's Office for Research

Contenido

Introduction

The Escuela Superior Politécnica del Litoral (ESPOL) is a leading institution of higher education in teaching and Research in Ecuador, founded in 1958. The institution has two campuses in Guayaquil, "Gustavo Galindo," where its eight faculties are located, and the "Las Peñas" campus, where the business school is located. There are 32 undergraduate programs and 52 graduate programs.

ESPOL has been accredited by the Council for Quality Assurance in Higher Education (CACES for Consejo de Aseguramiento de la Calidad de la Educación Superior). In addition, most of its undergraduate programs have received international accreditations, such as ABET, while AASC and AMBA have accredited some of its graduates.

In 2024, ESPOL was ratified as the number 1 public university higher institution in Ecuador, whereas the QS World University Rankings: Latin America & The Caribbean 2024 placed ESPOL in the 60th position (+5 positions). According to the QS World University Ranking 2023, ESPOL is ranked among the world's 1001-1200 best universities.

The Times Higher Education Impact Rankings 2024 places ESPOL as #1 in Ecuador's overall Sustainable Development Goals (SDGs) ranking. Likewise, the university is ranked #1 in the country in SDG 7 (Affordable and clean energy), 11 (Sustainable cities and communities), 12 (Responsible consumption and production), and 17 (Partnerships to achieve the goals). This ranking also positions ESPOL as a national leader in the areas of Computer Sciences, Physical Sciences, and Social Sciences.

The Scimago Institutions Rankings 2024 (SIR) places ESPOL as a national leader in the following areas: Computer Sciences, Engineering, Social Sciences, and Earth and Planet Sciences.

The QS University Rankings By Subject positions ESPOL for the 4th consecutive year among the 100 best universities in the category of Petroleum Engineering; for the 2nd consecutive year, ESPOL remains within the ranking in the specific categories of Agriculture and Forestry Computer Science and Information Systems and Business and Management Studies, ranking first nationally in the first two categories and being the only Ecuadorian university included in the last one. In addition, ESPOL has entered this ranking for the first time in the specific Electrical and Electronic Engineering category, being the only Ecuadorian university to obtain this distinction.

The UI GreenMetric World University Rankings 2023, which aims to measure sustainability policies in universities around the world and evaluates fields related to environment and infrastructure, energy and climate change, waste, water, transportation, and education and research, positioned ESPOL as #1 nationally and in 118th place worldwide, climbing 84 positions compared to the previous year.

Mission

We cooperate with society to improve the quality of life and promote sustainable and equitable development through comprehensive and competent professional training, research, and innovation.

Vision

To be a consolidated academic community with high international standards of creative and innovative leaders who respond in a timely fashion to the needs of society.

Message from the authorities

Cecilia Paredes Verduga, Ph. D.
Rector of ESPOL

Carlos Monsalve Arteaga, Ph. D.
Vice Rector of I+D+i Research, Development, and Innovation

The work carried out during 2023 ratified us as the best public university in Ecuador, firmly advancing in its vision and being a benchmark in higher education, research, and innovation. This achievement is largely a result of the effort and commitment of the polytechnic community to fulfill the institutional strategic objectives with excellence and contribute to the country's sustainable development.

We are pleased to be recognized in SCImago Institutions' Rankings for the consecutive year as the best University in Ecuador and to continue to rank among the best universities in Latin America according to the QS World University Rankings: Latin America & The Caribbean. These recognitions are a reflection of the commitment we maintain with the training of high-level professionals, prepared to face the demands of a globalized labor market, as well as in improving our scientific production and generating more impact research, participating in multidisciplinary projects and research-oriented initiatives that have helped in solving problems and challenges facing our society.

This document highlights the most relevant results of ESPOL Research during 2023, evidencing our effort to develop research that responds to the problems of society, generating high scientific impact, transferring knowledge and results, establishing strategic alliances with national and international institutions and experts, and constantly seeking for external non-reimbursable funds to finance activities.

Authorities and Institutional Offices related to the investigation

Rector:

It is the first executive authority of ESPOL, which has the power to exercise legal, judicial, and extrajudicial representation; to preside over the highest collegiate body in a mandatory manner and those bodies indicated in this Statute and internal regulations in the exercise of its responsible autonomy; and to perform its functions on a full-time basis.

- **Rector:** Cecilia Paredes Verduga, Ph. D.
- **Email:** rectora@espol.edu.ec
- **X:** @cparedesverduga
- **Tel:** 04 2 269269, ext. 1100

Vice rectorate for Research, Development, and Innovation (I+D+i):

Its functions include organizing and coordinating matters to training related to doctoral programs through the Doctoral School; coordinating, supervising, and evaluating the proper functioning of the I+D+i management units and I+D+i centers; organizing and coordinating, at the tactical level, matters related to research and innovation and their interrelations with teaching and linkages; and designing and promoting strategies for disseminating and publicizing research, development and innovation programs, projects and activities.

- **Vice rector of I+D+i:** Carlos Monsalve Arteaga, Ph. D.
- **Email:** monsalve@espol.edu.ec
- **X:** @CarlosMonsalveA
- **Tel:** 04 2 269269, ext. 1118

Dean's Office for Research:

This is the administrative office in charge of managing requests for financial support to attend national and international scientific events, financing publications in indexed journals, supporting researchers in the formulation of proposals for internal or external funding calls, and project reviews submitted in the project management platform, and internships, among others.

- **Dean of Research:** Ángel Ramírez Mosquera, Ph. D.
- **Email:** aramire@espol.edu.ec
- **X:** @aramirez1979
- **Tel:** 04 2 269269, ext. 1304

Dean's Office of Liaison:

It is the administrative unit in charge of establishing the relationship between ESPOL and citizenship through the different ways of action and intervention. It mainly coordinates the development of community service and business practices that allow the polytechnic community to recognize the realities of the environments of the future professional and assume the search for practical solutions that lead to welfare and social transformation.

- **Dean of Liaison:** Adriana Santos Ordoñez, Ph. D
- **Email:** psantos@espol.edu.ec
- **X:** @lasantos30
- **Tel:** 04 2269 269, ext. 1283

Research Result Transfer Office (OTRI):

Its mission is to evaluate, protect, manage, transfer, and advise on the commercialization of the results of I+D+I (knowledge and technology), ensuring compliance with international, national, and institutional intellectual property policies and supporting the use of good practices for the transfer and management of intellectual property by the ESPOL community.

- **Director:** Daynet Sosa Del Castillo, Ph. D.
- **Email:** dasosa@espol.edu.ec
- **X:** @cparedesverduga
- **Tel:** 04 2269 269, ext. 240

Center Entrepreneurship and Innovation (I3lab)

It is responsible for promoting and developing the entrepreneurial culture, skills, and resources of individuals and organizations to generate value for society through innovation.

- **Director:** Guido Caicedo Rossi, M. Sc.
- **Email:** caicedo@espol.edu.ec
- **X:** @guidocaro
- **Tel:** 04 2269 269, ext. 2504

Library Information Center (CIB)

Its mission is to offer accessibility and information transmission services with cutting-edge, scientific, and investigative technology that meets the needs of the polytechnic community and the country as support for developing comprehensive training and leadership in education.

- **Director:** Otilia Alejandro Molina, Ph. D.
- **Email:** oalejan@espol.edu.ec
- **X:** @OtiliaAlejandro
- **Tel:** 04 2269 269, ext. 1205

Relevant collegiate bodies and committees

Polytechnic Council:

It is the only collegiate body of co-government and is the highest authority in ESPOL.

Research Commission:

It is an advisory body responsible for the orientation and coordination of research activities at ESPOL, which is not governed by the principle of co-governance.

ESPOL Research, Development, and Innovation Commission (I+D+i):

The I+D+i Commission is an advisory body responsible for designing processes and actions on issues related to I+D+i that is not governed by the principle of co-governance.

Ethics Committee:

It acts as a body at the service of the community and assumes general functions of information, discussion, guidance, and control in the area of Ethics of Research, development, and innovation (I+D+i), Bioethics, Ethics of Research in Human beings, Ethics of Research in animals.

ESPOL in numbers

8 Faculties

1 School of business

876 Professors
- 347 Ph. D.

216 Research technicians

9308 Undergraduate students

1338 Postgraduate students

340 Estudiantes de pregrado involved in research projects

- Students involved in research projects: 166
- Students in research assistanships: 131
- Students collaborating in resaerch projects: 346

68 Graduate students involved in research projects

32 Degree programs

68 Graduate programs

- 51 master's degrees
- 14 research master's degrees
- 3 doctorates

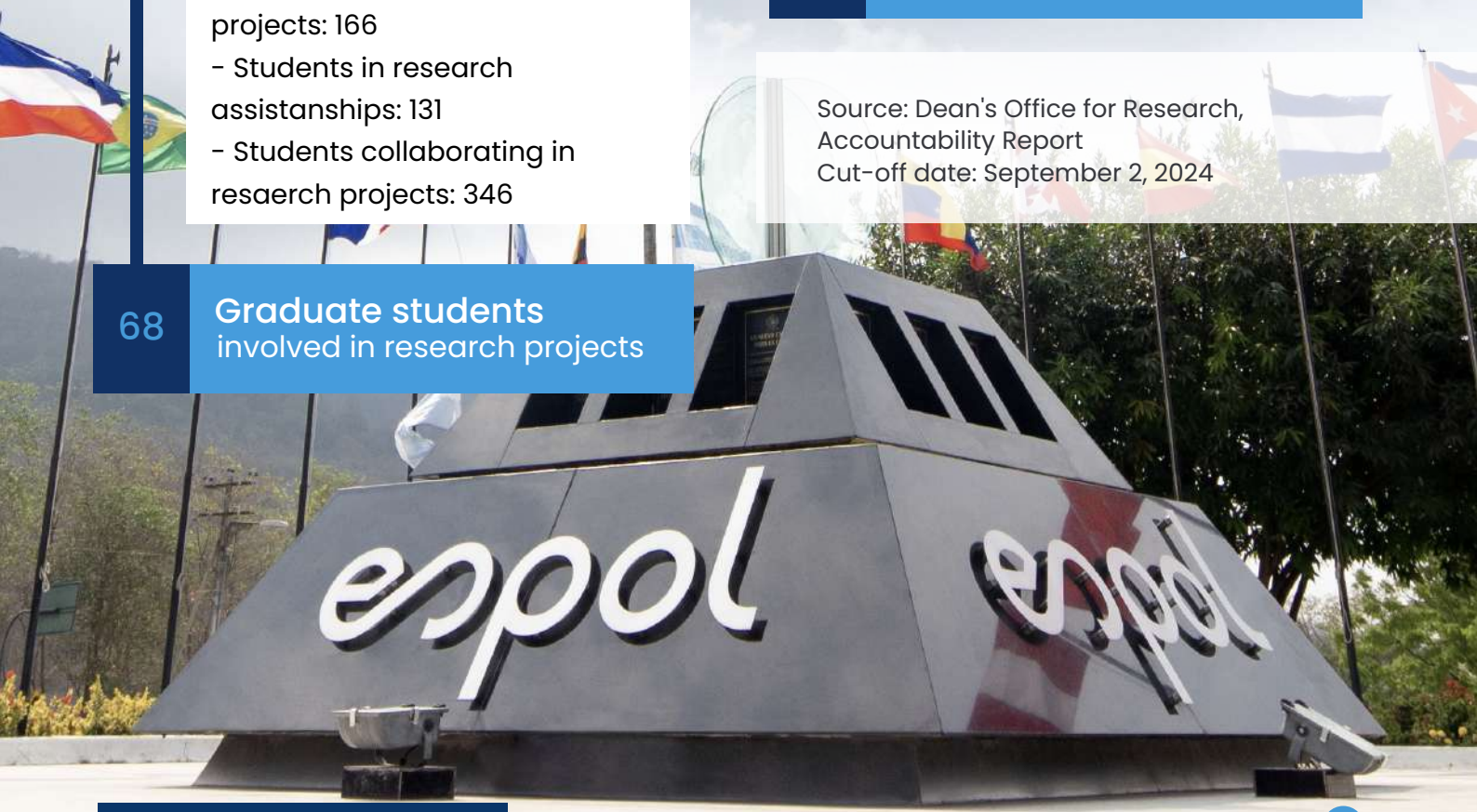
9 Institutional research centers

5 Research centers linked to faculties

1 Research centers for academic support to research

37 Research groups

Source: Dean's Office for Research, Accountability Report
Cut-off date: September 2, 2024



ESPOL Research in Numbers period 2019 – 2023

2463
Publications

18516
Received citations

7.5
Citations per publication

68.5%
Publications made with international coauthors

1.6%
Publications in collaboration with companies 0.3% Ecuador's average (1.3%)

20.4%
Journals publications in the top 10%, 4.1% per above the average of Ecuador (16.3)

68,68%
Publications in journals of quartile 1 and 2

#845
Research projects in progress

USD $9,022,891.57
External research funds allocated to ESPOL

Cut-off date: September 02, 2024

Source: Scival, Accountability Reports

Strategic Objective of Research and Innovation

Strategic Objective 1:
To develop and disseminate innovation and research with a high impact on society.

Tactical Objective 1.1:
Generate and transfer demand-oriented research.

Tactical Objective 1.2:
Generate and transfer innovation to the industry.

Tactical Objective 1.3:
Increase the volume of ESPOL's scientific production.

Tactical Objective 1.4:
Increase the raising of non-reimbursable external funds for research activities.

ESPOL's Priority Research Areas

ESPOL's priority research areas were defined considering the challenges, threats, and opportunities presented by the country to generate and transfer demand-oriented research and innovation for the industry. ESPOL has identified ten priority areas for research. It is important to mention that our researchers continuously participate in processes of inquiry and reflection on current and future lines of action.

ESPOL has established 10 priority areas of research. It is important to mention that our researchers continuously participate in processes of inquiry and reflection on current and future lines of action.

1. Supply chain and logistics

Optimize urban transportation systems; address maritime transportation problems. And guarantee efficient management and strengthening of supply chains. This is to ensure the operability of organizations and monitor the merchandise in all production phases.

2. Digital technologies

Develop technological solutions that improve the quality of education, health, social, and emotional well-being; solutions for improving telecommunications infrastructure and performance; use of data analytics to determine the market trends and technologies in the country.

3. Sustainable and Innovative Industry

Develop industrial applications for the sustainable use of local natural resources, ensure compliance with health and safety protocols, reduce waste production, and improve efficiency.

4. Economic development

Conduct research aimed at the reactivation of economic activity; determine mechanisms to mitigate the impacts of external factors on social welfare; develop and strengthen entrepreneurship; and study entrepreneurial activity and its challenges in the country.

5. Agriculture and aquaculture production and its processing

Improve agricultural and aquacultural production levels through traditional techniques and biotechnology. Reduce pollution of agricultural and aquacultural activities; take advantage of rejected products; develop sustainable technologies for aquaculture, agriculture, and livestock industry; diagnose and control diseases in plants and animals.

6. Environment, climate, and disaster risk reduction

Improve knowledge and prediction of climate variability and measures to prevent, reduce, and mitigate the impacts of climate change. Also, strengthen social resilience in response to multi-hazards. Reducing water pollution and water shortages, as well as assessing air quality.

7. Health, welfare, and human development

Conduct research on technological developments that are important for the country's public health. Also, to evaluate the nutritional value of traditional foods and study people's nutrition in Ecuador.

8. Education and communication

Adapt to the constant changes in society by incorporating ICTs in the learning process. Develop proprietary technology that improves connectivity and the use of intelligent systems. Communicate the development of technologies that contribute to social welfare.

9. Energy efficiency, renewable energies, and alternatives

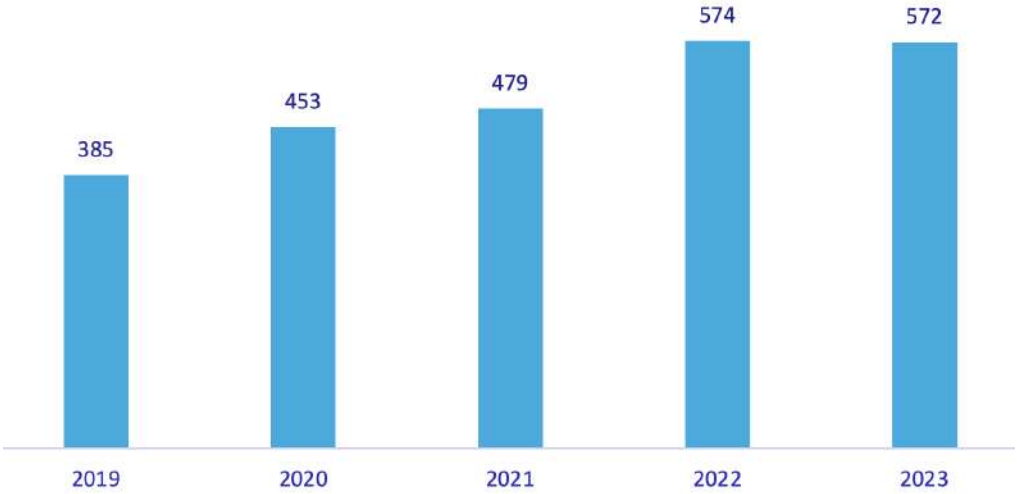
Develop technologies and materials that enable the efficient use of energy and the reduction of fuel used in the production processes. Quantify the available resources and energy demand at the industrial and consumption levels, facilitating decision-making. Study the impact of heat islands on society.

10. Development of Basic Sciences

To contribute to the development of the research system in basic sciences to generate cutting-edge scientific knowledge of science capable of facing national challenges and having a subsequent technological application.

Publications and citations

Evolution of publications per year

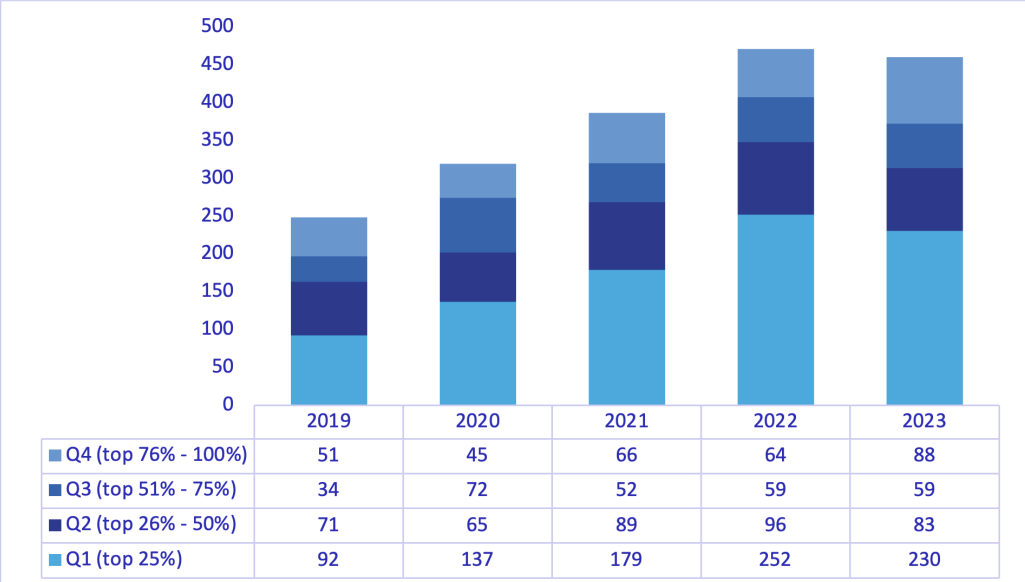


*** Data corresponds to the period 2019-2023.**

Source: SciVal (cut September 02 /2023)

Elaboration: Dean's Office for Research - ESPOL

Publications per Quartile



	2019	2020	2021	2022	2023
Q4 (top 76% - 100%)	51	45	66	64	88
Q3 (top 51% - 75%)	34	72	52	59	59
Q2 (top 26% - 50%)	71	65	89	96	83
Q1 (top 25%)	92	137	179	252	230

*** Data corresponds to the period 2019-2023, and journals are ranked according to CiteScore Percentile criteria**

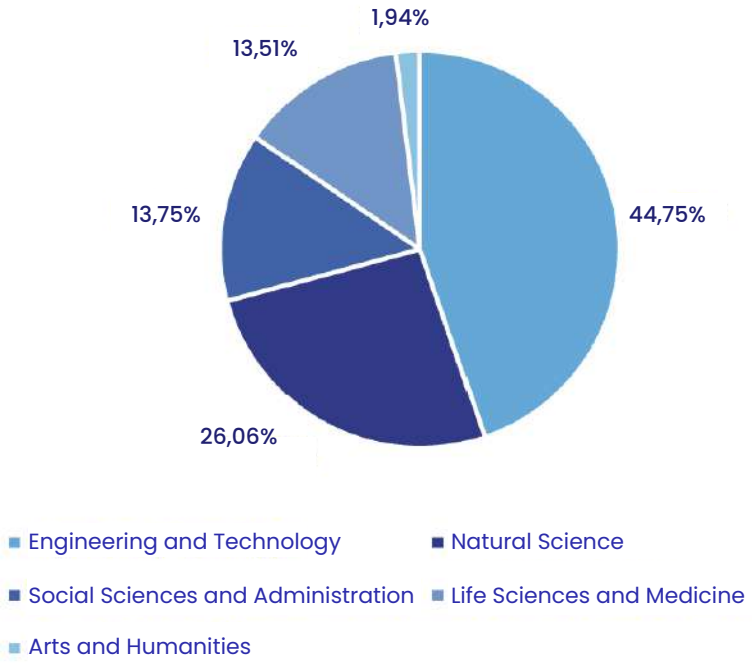
Source: SciVal (cut September 02/2024)

Elaboration: Dean's Office for Research - ESPOL

Since 2019, ESPOL has increased its scientific production, reaching during the period 2019-2023 the figure of 2283 publications indexed in Scopus, of which 1884 are publications in journals ranked by CiteScore. For the last 2 years, annual scientific production has exceeded 550 publications.

Of the 1884 publications in journals classified according to CiteScore Percentile criteria, 68.68% correspond to articles published in high-quality journals (Q1 and Q2). Of the 572 publications reported in 2022, 73.89% are in Q1 and Q2 quartile journals. It should also be noted that the number of publications in the highest quality quartile has increased considerably compared to previous years.

Publications by Research Area



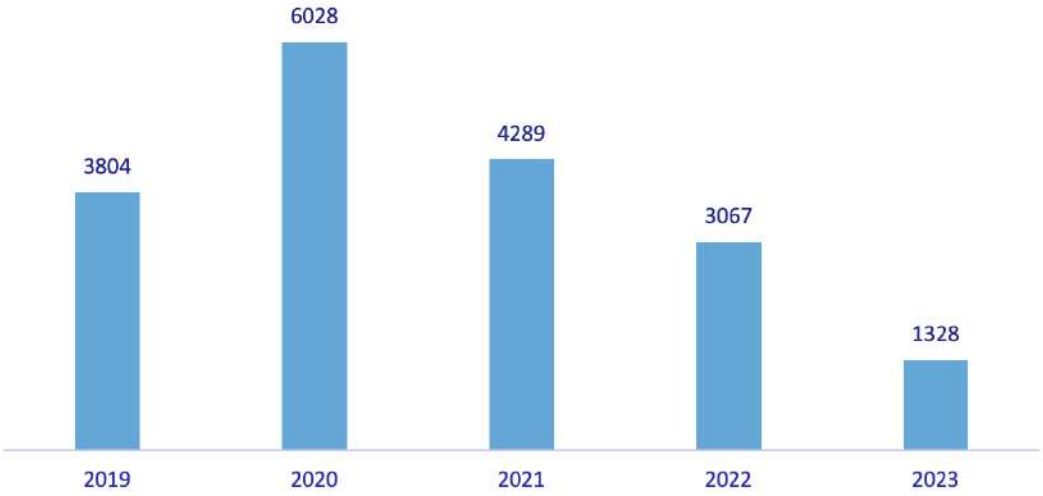
***Data corresponds to the period 2019-2023 and is ranked according to QS.**

Source: SciVal (cut August 21/2023)

Elaboration: Dean's Office for Research - ESPOL

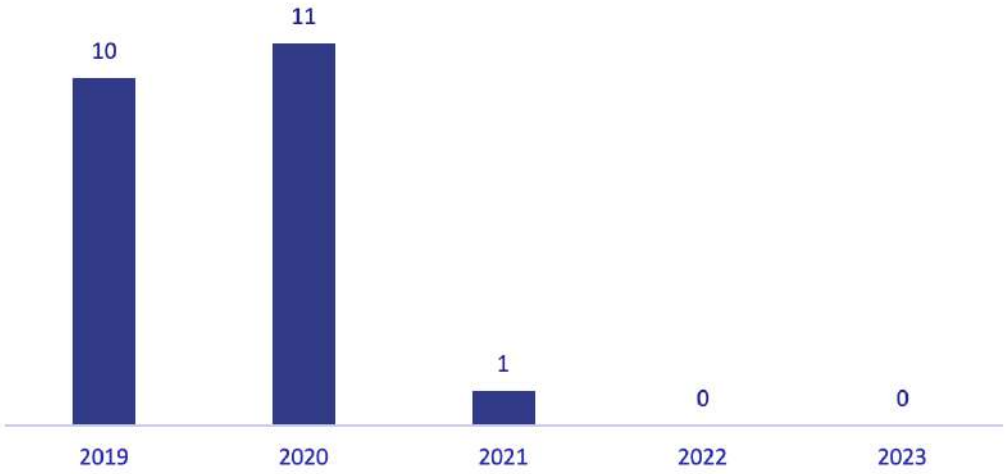
ESPOL publications are concentrated in the following areas defined by QS: Engineering and Technology (44.75%), Natural Sciences (26.06%), Social Sciences and Administration (13.75%), Life Sciences and Medicine (13.51%), and Arts and Humanities (1.94%).

Evolution of citations per year



Note: These are always the years in which the articles were published and do not refer to the years in which citations were received.
***Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

Number of patents that have cited ESPOL publications

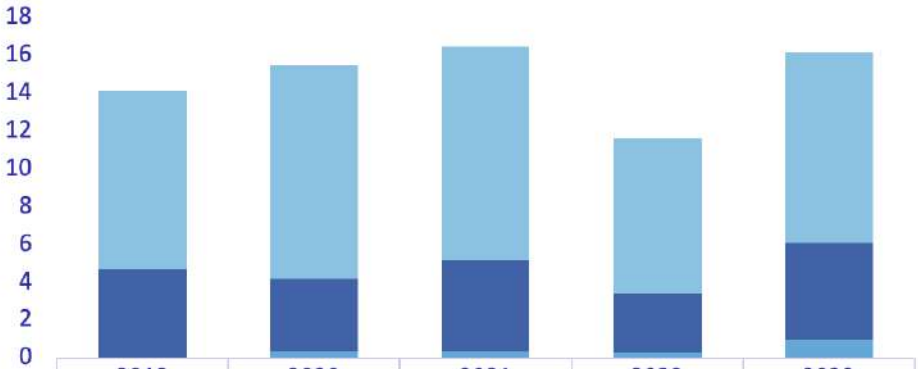


Note: These are always the years in which the articles were published and do not refer to the years in which citations were received.
***Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

The count of ESPOL publications that different authors have cited has varied during the period 2018 to 2022; however, it is notorious that publications from 2020 register a higher number of citations as opposed to articles published in previous years, and this growth is attributed to the increase in the quantity and quality of scientific production carried out by ESPOL researchers, as well as publications with COVID-19 thematic.

In addition, 22 patents have cited the scientific production of ESPOL during the same period of time, where the largest number of publications cited by patents are articles from 2019 and 2020.

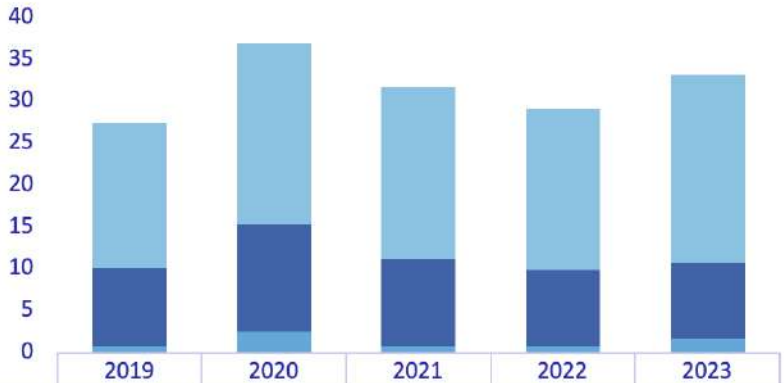
Percentage of Publications among the 10% most cited according to CiteScore



	2019	2020	2021	2022	2023
Publications in the top 10% most cited	9,4	11,3	11,3	8,2	10,1
Publications in the top 5% most cited	4,7	3,8	4,8	3,1	5,1
Publications in the top 1% most cited	0	0,4	0,4	0,3	1

*** Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

Percentage of Publications in top 10% of journals according to CiteScore

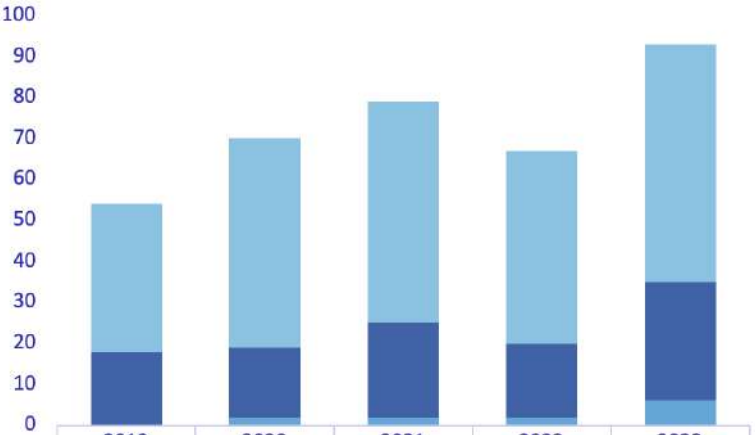


	2019	2020	2021	2022	2023
Publications in top 10% most cited journals (%)	17,3	21,6	20,5	19,3	22,4
Publications in top 5% most cited journals (%)	9,3	12,9	10,4	9,1	9,1
Publications in top 1% most cited journals (%)	0,8	2,5	0,8	0,8	1,7

*** Data corresponds to the period 2019-2023, and the journals are classified according to CiteScore Percentile criteria**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

Around 10.06% of publications by ESPOL researchers are among the top 10 most cited worldwide during the period from 2019 to 2023. During the same period of time, around 20.2 of scientific production is indexed in journals within the top 10% according to Citescore, with an annual increasing trend regarding the percentage of publications in the first decile, reaching 22.4% in 2023.

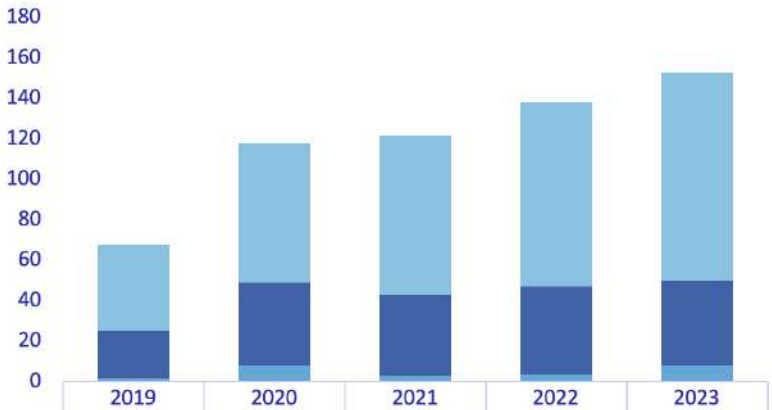
Percentage of Publications among the 10% most cited according to CiteScore



	2019	2020	2021	2022	2023
Publications in the top 10% most cited	36	51	54	47	58
Publications in the top 5% most cited	18	17	23	18	29
Publications in the top 1% most cited	0	2	2	2	6

***Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

Percentage of Publications in top 10% of journals according to Citescore

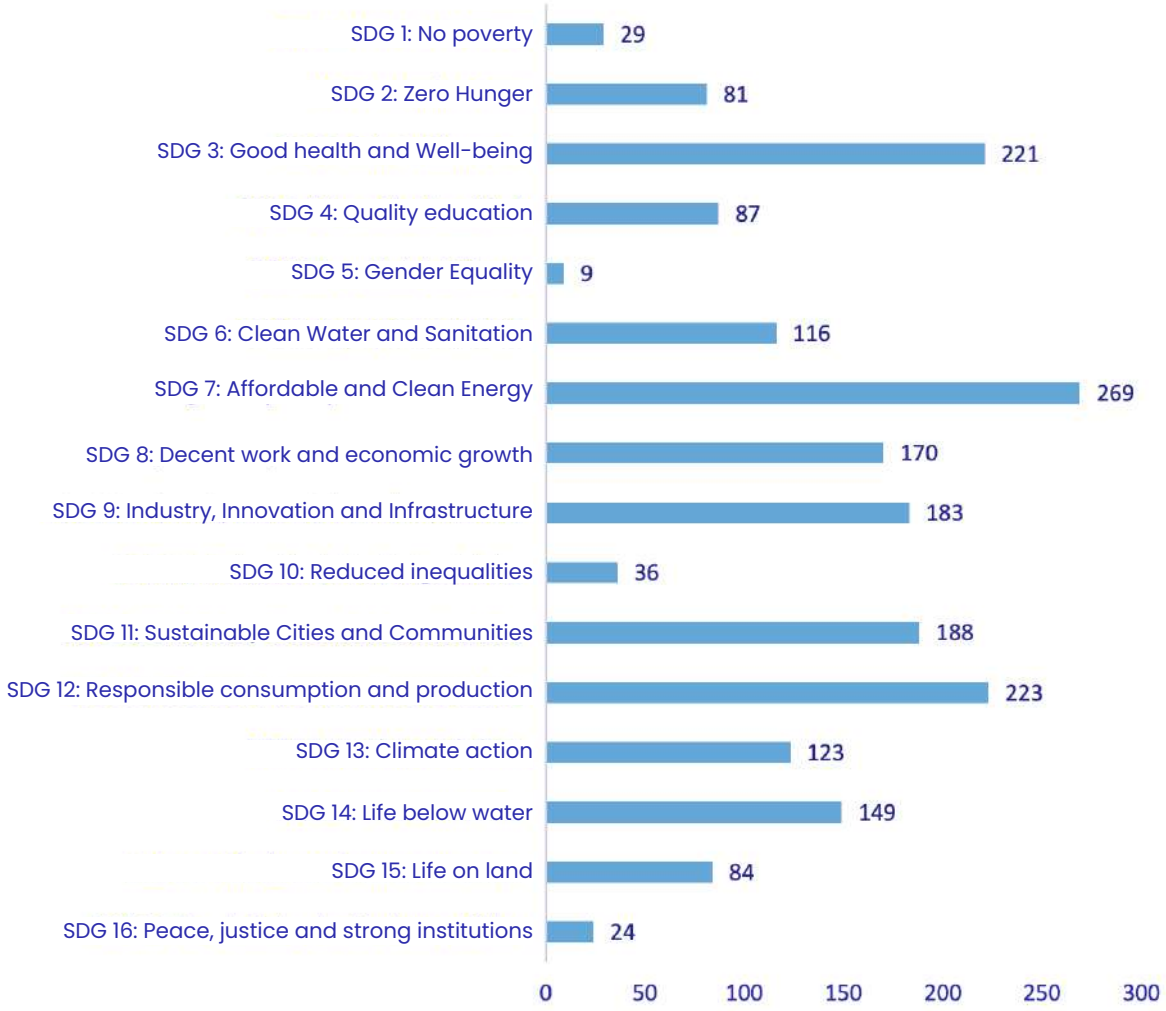


	2019	2020	2021	2022	2023
Publications in top 10% most cited journals	43	69	79	91	103
Publications in top 5% most cited journals	23	41	40	43	42
Publications in top 1% most cited journal	2	8	3	4	8

***Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

ESPOL registered a total of 246 publications within the top 10% of the most cited worldwide during the annual period from 2019 to 2023. In addition, the number of publications indexed in journals within the top 10%, according to CiteScore, has remarkably grown since 2019. In the last two years, the annual significant production of very high quality has been over 100 publications.

Publications by SDG

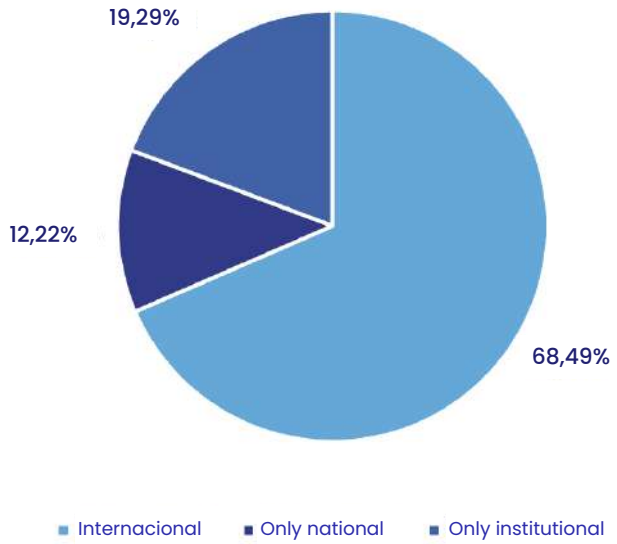


***Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

During the period 2019 to 2023, ESPOL has publications in the 16 Sustainable Development Goals (SDGs) reported by Scival, counting in first place with 269 published articles related to SDG 7, followed in second place with 223 articles related to SDG 2, and in third place SDG 3, where ESPOL has 221 articles published.

External Collaborations

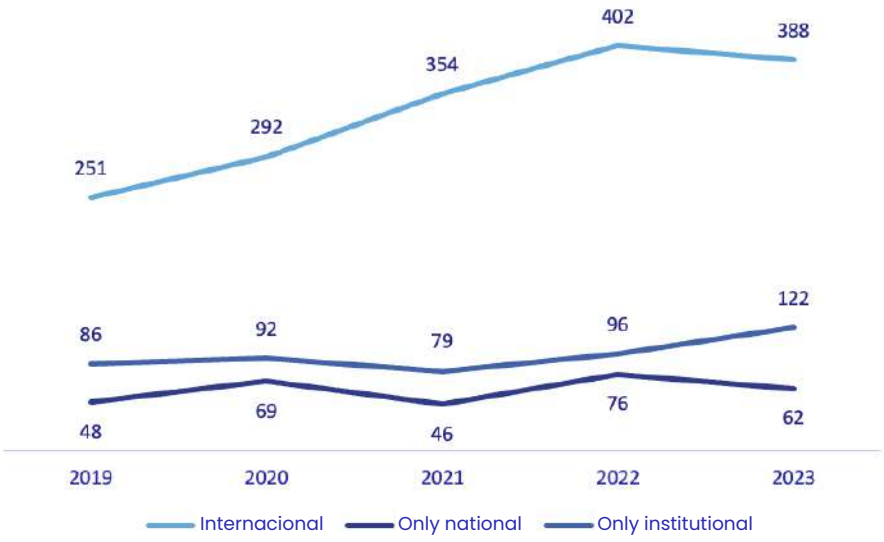
Publications by type of collaboration



***Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

The graph above shows the proportion of publications ESPOL researchers have made in co-authorship with researchers from international institutions, national institutions, and colleagues from the same institution from 2019 to 2023. Notably, of the total scientific production carried out by ESPOL, 68.49% has been with the collaboration of international institutions.

Annual evaluation of publications by type of publication

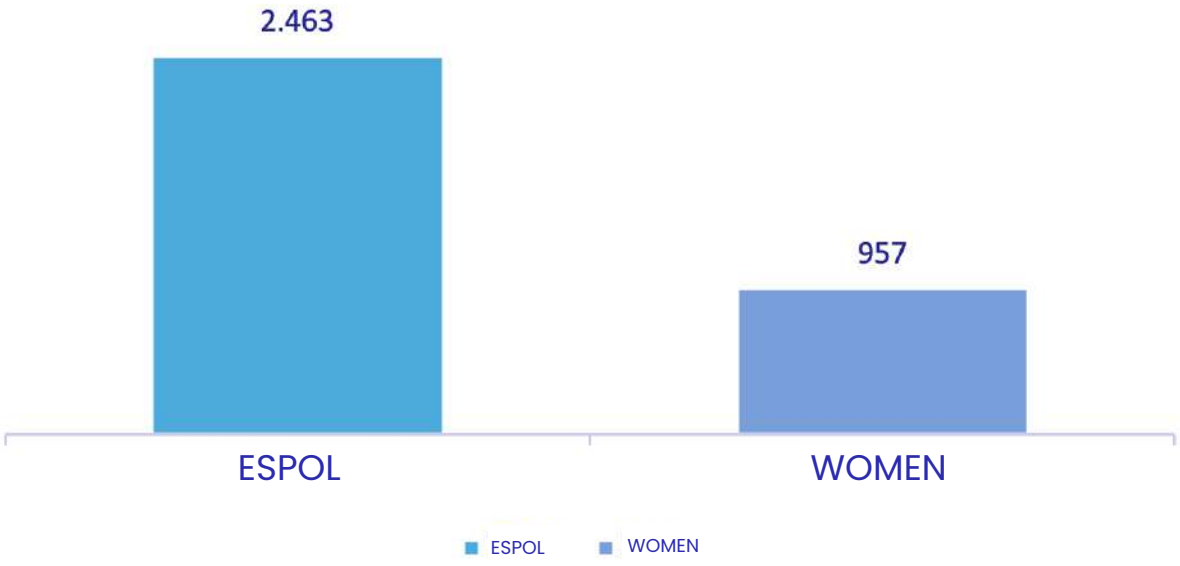


***Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

In 2019, ESPOL registered 251 publications with international collaboration, a figure that increased to 388 in 2023. This growth evidences the institution's commitment to strengthening international partnerships, which not only enhances the scientific impact but also enhances new opportunities for future collaborations.

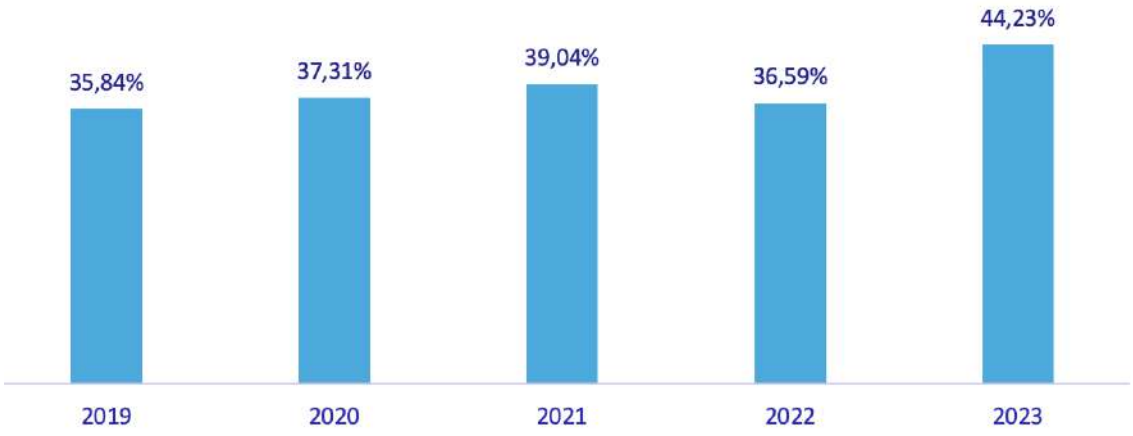
Women's participation

Publications by women with ESPOL affiliation



***Datos corresponden al período 2019-2023.**
Source: SciVal (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

Percentage of publications by women with ESPOL affiliation by year

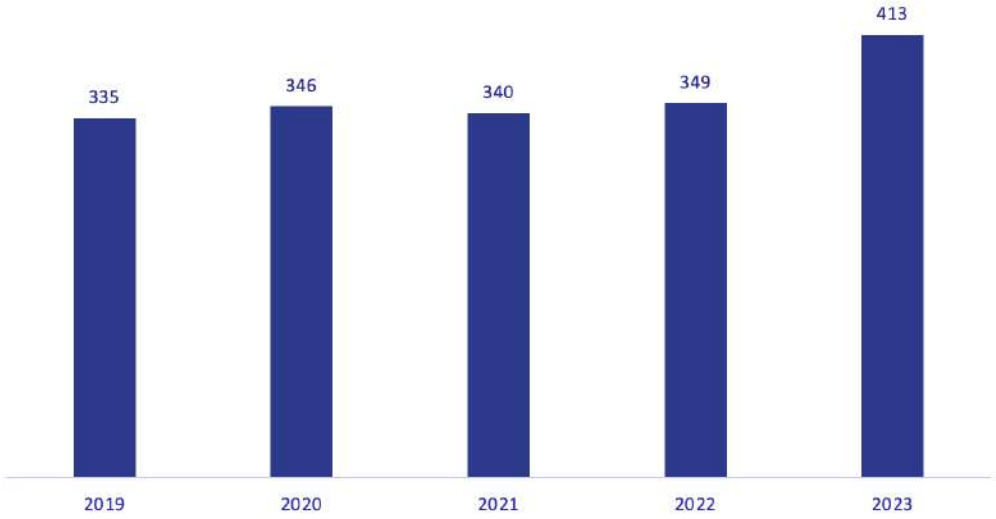


***Data corresponds to the period 2018-2022.**
Source: SciVal (cut August 21 /2023)
Elaboration: Dean's Office for Research - ESPOL

In the last 5 years, ESPOL has registered 2463 publications, among which 957 of them are authored or co-authored by at least one woman whose affiliation corresponds to ESPOL. The participation of polytechnic women in the scientific production of ESPOL has increased during this period, rising from 35.84% in 2019 to 44.13% in 2023.

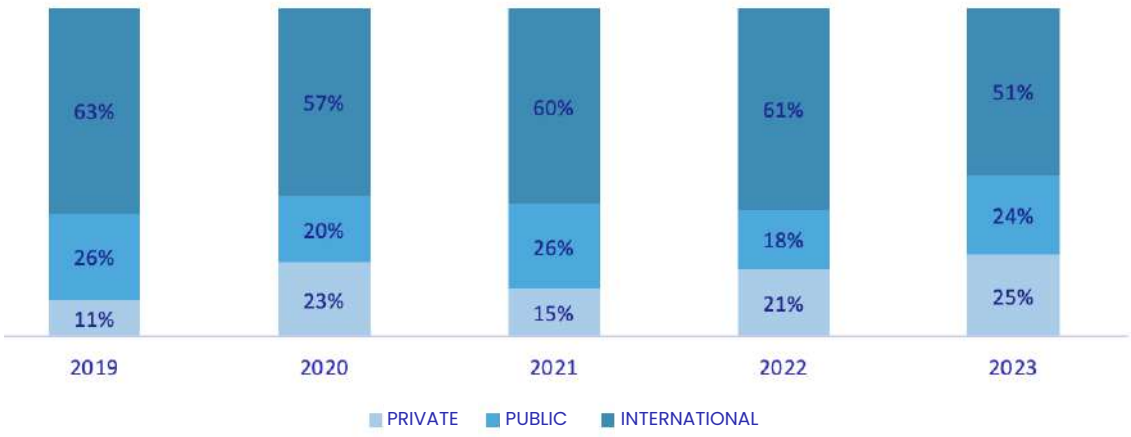
Projects and external research fundraising

Evolution of the number of ongoing projects



***Data refer to the period 2019-2023 and correspond to completed and ongoing projects**
Source: Accountability reports (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

Distribution of projects according to type of collaboration



***Data refer to the period 2019-2023 and correspond to completed and ongoing projects**
Source: Accountability reports (cut September 02/2024)
Elaboration: Dean's Office for Research - ESPOL

Each year, during the period 2019-2023, ESPOL collaborates in the development of more than 300 research projects with the public and private sector institutions in Ecuador, as well as with international institutions. Likewise, it is evident that most external collaborators are of international origin, followed by public entities and private companies in Ecuador.

Raising of non-reimbursable external research funds allocated to ESPOL.

***Datos corresponden al período 2019-2023.**
Fuente: Decanato de Investigación – ESPOL, Informes de Rendición de Cuentas (corte 2 septiembre/2024)
Elaboración: Decanato de Investigación - ESPOL

In the year 2020, despite the COVID-19 pandemic, ESPOL collected USD $1,159,943.81 in external research funds. This amount has increased in recent years, rising to $2,169,791.93 in 2023. ESPOL has obtained external funds for research projects for a total amount of USD 9,022,891.57 during the period from 2019 to 2023.

Institutions that collaborate with the Escuela Superior Politécnica del Litoral

Co-authored publications by country/region:

***Data corresponds to the period 2019-2023.**
Source: SciVal (cut September 02/2024)

ESPOL concentrates most of its international collaboration in Europe, collaborating with 418 in that region; this is followed by North America, where it has collaborated with 276 institutions, and in South America with 210 institutions; likewise, ESPOL has collaborated with institutions in Asia-Pacific, the Middle East, and Africa with 162, 43 and 30 institutions, respectively.

10 international institutions with the most co-authored publications

Institution	Country	Publications in co-authorship	Citations	Citations per publication	Weighted citations in the impact field
GHENT UNIVERSITY	Belgium	98	861	8.8	1.07
	Spain	63	587	9.3	1.08
CSIC	Spain	60	794	13.2	1.48
UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH	Spain	42	534	12.7	1.5
CVC	Spain	41	569	13.9	1.97
Instituto Geológico y Minero de España	Spain	40	565	14.1	1.82
cnrs	France	39	494	12.7	1.12
UNIVERSIDAD DE ALMERÍA	Spain	38	975	25.7	2.41
IVIC INSTITUTO VENEZOLANO DE INVESTIGACIONES CIENTÍFICAS	Venezuela	36	111	3.1	0.44
PONTIFICIA UNIVERSIDAD CATÓLICA DE VALPARAÍSO	Chile	36	316	8.8	1.64

***Data correspond to the period 2019-2023**
Source: SciVal (cut September/2024)

Of the 10 institutions that have co-authored the most publications with ESPOL researchers, 8 of these are European institutions, and two are from Latin America. These data show ESPOL's commitment to generating quality contact networks with the international scientific community.

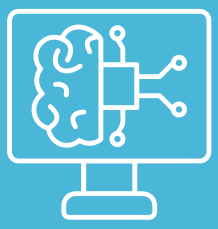
ESPOL's Research Strengths 2018-2023

The names of the areas have been specified using the All-Science Journal Classifications (ASJC) classifier that is used in Scopus to classify and categorize scientific production by research area as a reference.

Environmental sciences

- Waste management and disposal
- Environmental chemistry
- Pollution
- Environmental engineering
- Health, toxicology and mutagenesis
- Nature and lanscape conservation
- Water Science and technology
- Environmental Science (miscellaneous)
- Management, monitoring, policy and legislation
- Ecology

Computer Science



- Computer graphics and computer-aided design
- Computer vision and Science recognition
- Human-Computer interaction
- Computer applications
- Artificial Intelligence
- Software
- Information systems
- Hardware and architecture

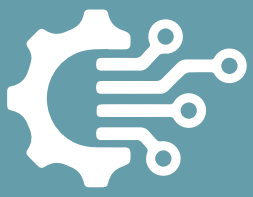
Social Science

- Cultural study
- Development
- Communication
- Transportation
- Health (social sciences)
- Geography, planning and development
- Political science and international relations

Mathematics

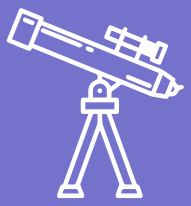
- Analysis
- Statistics and probability
- Control and optimization
- Numerical analysis
- Modelling and simulation
- Theoretical computer science

Engineering



- Media technology
- Industrial and manufacturing engineering
- Electrical and electronics Engineering
- Construction and building Engineering
- Control and systems Engineering

Physics and Astronomy



- General physics and astronomy
- Instrumentation
- Atomic, molecular and optical physics

Agricultural and Biological Sciences

- Agricultural and biological sciences (miscellaneous)
- Agronomy and crop sciences

Earth and Planetary Sciences

- Geochemistry and petrology
- General earth and planetary sciences

Medicine

- Public health, environmental and occupational health
- Health informatics

Material Science

- Geochemistry and petrology
- General earth and planetary science

Chemistry

- Analitical chemistry
- General chemistry

Biochemistry, Genetics and Molecular Biology

- Biochemistry
- General biochemistry, genetics and molecular

Decision Sciences

- Information and Management systems

Business, Management, and Accounting

- Tourism, Leisure, and Hotel Management

Immunology and Microbiology

- Microbiology

Energy

- Renewable energies, Sustainability and Environment

ESPOL'S RESEARCH CENTERS

Institutional research centers

Biotechnology Research Center of Ecuador

Generates, applies, transfers, and disseminates biotechnological solutions required by the agricultural industry of the Ecuadorian coast to support its competitiveness on a global scale, with special emphasis on the banana and cocoa industry, offering highly value-added services to agricultural producers, agribusiness, and the local food industry.

Research Areas:

- Characterization and exploitation of the Ecuadorian biodiversity.
- Improvement and yield of the plant material
- Use of by-products and agro-industrial waste material.
- Evaluation of the impact of the knowledge and products obtained from research developed at the center.

26 Research Partners

38 publications (2023)

5 Intellectual property registries

53 Ongoing projects (2023)

17.2% Publications in the Top 10% of journals CiteScore

50% Publications with international

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Center of Information Technologies

Creates, innovates, and develops through technological research projects, new learning environments, and technological solutions that meet the needs of the students, teachers, and the productive sector, industry, and society in general.

11 Research Partners

32 publications (2023)

1 Intellectual Property Registry

4 Ongoing projects (2023)

6.7% Publications in the Top 10% of journals, according to CiteScore

56.3% Publications with international collaboration

Research Areas:

- Analytics and Learning Technologies (ATA)
- Human-Centered Computing (CCSH)
- Industrial Artificial Intelligence (IAI)
- Technologies for Intelligent Environments (TAI)
- Intelligent Network Technologies (TRI).

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National Center for Aquaculture and Marine Research

Promotes the productive development of aquaculture and the sustainable use of marine biodiversity through research, training, and dissemination of knowledge to contribute to the scientific, technological, and economic advancement of the country

Research Areas:

- Aquaculture – Diversification [Technologies for reproduction, larviculture, and fattening of marine fish, bivalve, mollusks, echinoderms, and microalgae]
- Animal Health [Diagnostic tools, epidemiology, immunology, microbiology, disease control and prevention, pathogen genetics]
- Marine Biodiversity [Biological prospecting, metagenomics, logeometry, taxonomy, biological activity of compounds, & metabolites].
- Environmental [Monitoring of pollutants generated by production systems, repopulation of marine resources].

18
Research Partners

11
publications (2023)

2
Intellectual Property registries

2
Proyectos en ejecución (2023)

9.1%
Publications in the Top 10% of journals, according to CiteScore

72.7%
Publications with international collaboration

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Center for Water and Sustainable Development

It aids through research and development concerning water problems, considering the economic, environmental, ethical, and social responsibility fields.

Research Areas:

- Study of the impact of human activities and climate change on freshwater, estuarine, coastal ecosystems and the services they provide
- Modeling of future climate scenarios and their effects on the hydrology of urban and natural systems
- Development of innovative techniques for the assessment of and Monitoring of aquatic ecosystems in support of environmental management decision-making
- Development of sustainable technologies for safe water supply and sanitation
- Application of molecular techniques and environmental DNA for monitoring ecosystems and urban environments

8
Research Partners

18
publications (2023)

3
Ongoing projects (2023)

27.8%
Publications in the Top 10% of journals, according to CiteScore

94.4%
Publicaciones con colaboración internacional

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Center for Research and Projects Applied to Earth Sciences

It manages the formulation and execution of Research, Development, and Service Projects applied to Earth Sciences, establishing links of institutional, local, and international cooperation linked to research for the rational use of natural resources in a context of sustainability.

Research Areas:

- Spatial and regional planning (including landscape and land management) / Geology, tectonics.
- Geology/Hydrology.
- Bibliometrics for the management and evaluation of scientific research.
- Improvement of social resilience (epidemics, pandemics, natural disasters)
- Reduction of water pollution from domestic and industrial wastewater discharge from cities.
- Reduction of water shortages in many areas of Ecuador.
- Planning, integrated management, and monitoring of water use at domestic and industrial levels.
- Capacity for building community resilience

10 Research Partners

39 publications (2023)

20.5% Publications in the Top 10% of journals, according to CiteScore

14 Ongoing Projects (2023)

64.1% Publications with international collaboration

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Center for Research, Development, and Innovation in Computer Systems

Researches and develops intelligent technologies by using and applying computer vision techniques, robotics, machine learning, and energy systems, which will solve problems and enhance operations for the productive sectors of agriculture, aquaculture, industry, transportation, and energy.

Research Areas:

- Computer Vision
- Service and Field Robotics
- Machine Learning
- Advanced Control of Energy Systems

8 Research Partners

26 publications (2023)

2 Intellectual Property Registries

15 Ongoing Projects (2023)

50% Publications in the Top 10% of journals, according to CiteScore

84.6% Publications with international collaboration

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Center for Research and Nanotechnology Development

Its scope is Research, Innovation, and Development in science and engineering at the nanoscale, focusing its work on the characterization of materials, their processing and synthesis, and the improvement of their properties, considering the possibilities of practical engineering applications and under the premise of improving the quality of life of human beings and the protection of the environment.

Research Areas:

- Crystal Engineering
- DFT simulation of electronic properties of materials, surfaces, and interfaces.
- Functional materials of construction: nanoparticles and hydrophobicity.
- Novel Construction materials with ductility for structural applications.
- Chitosan-based composite materials
- Nanostructured-based materials on recycled polymers.
- Nanostructured polymers.

8 Research Partners

28 publications (2023)

22.2% Publications in the Top 10% of journals, according to CiteScore

7 Ongoing Projects (2023)

46.4% Publications with international collaboration

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Center of Renewable and Alternative Energies

Develops research, transfer, and technological innovation in the areas of renewable energy, energy efficiency, and sustainability.

Research Areas:

- Renewable Energies and Alternatives.
- Energy efficiency.
- Energy, society, and environment.

8 Research Partners

28 publications (2023)

21.1% Publications in the Top 10% of journals, according to CiteScore

16 Ongoing projects (2023)

64.3% Publications with international collaboration

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Pacific International Center for Disaster Risk Reduction

It contributes to building resilience, reducing the population's vulnerability, improving the understanding of risk to prevent the occurrence of new disasters, reducing the existing ones and their impacts on the population's quality of life, and sustainable development.

Research Areas:

- Impact of climate variability in the coastal zone of Ecuador.
- Impact of climate change on human health
- Generation of public policies through disaster risk reduction research
- Building resilience against COVID-19.
- Development of Early Warning systems against floods (decentralized autonomous governments for small and medium-scale communities).
- Preparation tools for GADs (GAD for Gobiernos Autónomos Descentralizados) in the face of seasonal variations and climate change.
- Application of Integrated Coastal Management for Disaster Risk Reduction in the face of tsunamis.

14 Research Partners

5 publications (2023)

3 Intellectual Property Registries

2 Ongoing projects (2023)

40% Publications in the Top 10% of journals, according to CiteScore

100% Publications with international collaboration

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ESPOL'S RESEARCH CENTERS

Centers attached to academic units.

Center for Digital Industrial Transformation

Faculty Electric and Computing Engineering

Create digital technologies that arise from the intersection of data processing and computer engineering, oriented to improving the industry's products, processes, and services at a local and industrial level.

Research Areas:

- Distributed and Operational Systems
- Software Engineering.
- Intelligent control.
- Data analysis.

8 Research Partners

20 publications (2023)

33.3% Publications in the Top 10% of journals, according to CiteScore

15 Ongoing projects (2023)

65% Publications with international collaboration

3 Intellectual Property Registries

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Center of Rural Research

Faculty of Social Sciences and Humanistic

Contributes to generating knowledge and provides inputs for decision-making in agricultural and rural society policy through analysis of behaviors of agents in local and global rural economies, using economic tools, sociology, and related applied sciences.

6
Research Partners

5
publications (2023)

25%
Publications in the Top 10% of journals, according to CiteScore

15
Ongoing projects (2023)

100%
Publications with international collaboration

Research Areas:

- Solutions that guarantee food safety and innocuousness in agribusiness.
- Study of the effect of COVID-19 on consumer behavior and preferences, evaluation of changes in credit conditions in the Ecuadorian financial market, and their effect on social welfare and economic development with emphasis on MSMEs.
- Improving social resilience in response to multi-threats (epidemics, pandemics, natural disasters, etc.), planning integrated management, and monitoring water use at both the domestic and industrial levels.
- Food safety and innocuousness in the Ecuadorian society and proposals for improvement.
- Education for the Conservation of Biodiversity and Environmental Awareness, Development of urban agriculture, and promotion of food safety and innocuousness in the Ecuadorian society.

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Center of Economic Research

Faculty of Social Sciences and Humanistic

It generates information, research, analysis, and knowledge in economics and business management to satisfy the demand and interest of the productive sectors and society in general.

Research Areas:

- Economics and public finances, policy evaluation, and public administration.
- Natural resource economics, agricultural economics, and environmental economics.
- Operations management, organizational behavior, and human resources.
- A social and economic evaluation of projects, market research, and consumer behavior.
- Microeconomics applied microeconomics (development, labor, education, etc.)
- Macroeconomics, economic growth.
- International economics, foreign trade, and international finance.
- Experimental and behavioral economics.
- Financial economics, corporate finance, and microfinance.

7
Research Partners

11
publications (2023)

72.7%
Publications in the Top 10% of journals, according to CiteScore

19
Ongoing projects (2023)

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Center for Archaeological and Anthropological Studies

Faculty of
Social Sciences and Humanistic

Develops and promotes research, dissemination, and conservation of Ecuador's cultural and archaeological heritage through the application of interdisciplinary research models for the interpretation and reconstruction of the historical, social, cultural, biological, and environmental processes through which the native peoples of Ecuador passed. This is to contribute to the construction of national identity.

5
Research Partners

2
publications (2023)

4
Ongoing projects (2023)

Research Areas:

- Archaeology as a social science.
- Archaeology of neotropical societies.
- Interdisciplinary and historical sociocultural anthropological Research in America.
- Interactions and problems in Archaeology in America.

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Center for Sustainable Technological Development

Faculty of
Electrical and Computer Engineering

It promotes the development of sustainable technologies by combining technical, environmental, and socioeconomic perspectives that include their effective transfer and application to the community.

Research Areas:

- Bioenergy and biofuel technology
- Sustainable Drying Technology
- Modeling of local energy resources
- Hybrid distributed power systems
- Hybrid distributed power systems.
- Ecovillages
- Rural and Agroproductive Technological Systems
- Training of ESD trainers

8 Research Partners

9 publications (2023)

55.6% Publications in the Top 10% of journals, according to CiteScore

3 Ongoing projects (2023)

1 Intellectual Property Registry

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Research Groups by Priority Area

GROUP/ PRIORITY AREA	Supply chain and logistics	Digital technologies	Sustainable and innovative industry	Economic development	Agricultural, aquaculture, and processing operations	Environment, climate, and disaster risk reduction	Health, welfare, and human development	Education and communication	Energy efficiency, renewable and alternative energies	Basic science development
Big data	■	■								
Bioeconomy			■	■	■				■	
Algae bioproducts (BPA)			■	■	■				■	
Value Chains in Agribusiness	■		■	■	■					
Materials Science and Engineering			■							■
Aquaculture Sciences and Fisheries			■		■					
Quality control and Actuarial Mathematics	■			■						■
Visual, Communication, and Decoloniality culture (CUVICODE)							■	■		
Ecology and Assessment of Aquatic Systems			■	■		■				
Energetic Energy and Renewable Energy of Guayaquil (E.N.E.R.G.Y.)			■						■	
Entrepreneurship, Innovation, and S.M.E.s			■	■						
Chemical and Biological Studies of Bioproducts (ESQUIBIO 2)			■		■					■
Radiation physics									■	■
Geosciences			■			■				■
Geo-Resources and Applications (GIGA)						■				
Innovation, Management, Market, and knowledge economy research I2Maker Research Group			■	■				■		
Educational Technology and Animation production for children Research Group (ETAP)		■						■		
Industrial Automation and Control Research Group (GIACI)	■	■	■							
Bioengineering Research Group			■		■					
Mobile Communications Research Group (GICOM)		■						■		
International Taxation and Development Research Group (GIFID)				■				■		
Research Group in Environmental and Human Toxicology						■	■			
Coastal Marine Tourism and Sustainable Development Research Group						■				
EcoCuencas Group						■				
Marine and Coastal Geosciences Group (GEMAC)						■				
IDEAL- Food Research and Development			■		■		■			
Sustainable Engineering			■						■	
Innovation in Building Materials			■	■						■
Integration of Technologies		■								
Artificial Intelligence		■								
Research in “Electrical Systems” (G.I.S.E.)									■	
Research on biodegradables for packaging (BIOEM)	■		■		■					
Marketing Analytics Research			■	■						
Business Processes and Software		■	■	■						
Pattern Recognition and its Applications	■	■								
Data Networks and Technological Infrastructure (REDIT)		■						■		

Academic Units

Faculty of Art, Design and Audiovisual Communication

Cooperate with society through research, innovation and professional training of creative leaders in the field of arts, design and audiovisual communication, responding to the needs of the cultural industry and the productive sector.

8 Professors with research load

14 Ongoing projects (2023)

11 Publications (2023)

11.1% Publications with international collaboration

27 Intellectual Property Registries

Research Areas:

- Design, culture, and sustainability
- Audiovisual communication, society and culture
- Art and technology

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Faculty of Life Sciences

To facilitate the development of skills and the acquisition of knowledge in an innovative way in the training of professionals in life sciences; we generate research at the service of society and the environment.

34 Professors with research load

55 publications (2023)

61.8% Publications with international collaboration

22% Publications in the Top 10% of journals, according to CiteScore

74 Ongoing projects (2023)

6 Intellectual Property Registries

Research Areas:

- Development of bioproducts
- Genetics improvement
- Environmental pollution and remediation
- Animal, plant, and microbial biodiversity
- Human and molecular nutrition
- Food safety
- Soil and water environmental management
- Diagnosis-control of pests and diseases
- Information technologies and precision agriculture
- Extension and adoption of agricultural technology

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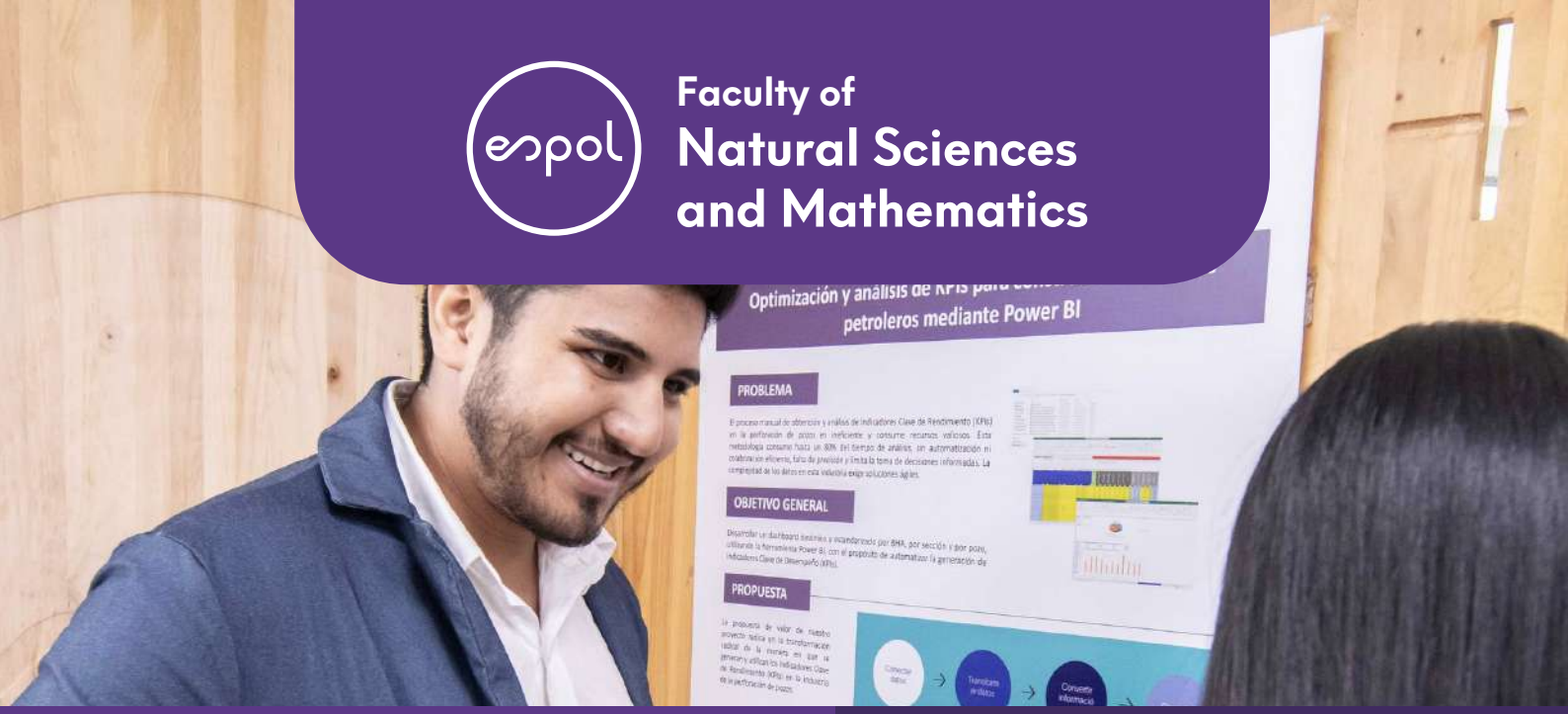
Faculty of Natural Sciences and Mathematics



We promote research, societal engagement, and contribute to the scientific and technological education of future professionals with high academic standards in natural sciences and mathematics, both across the institution and in our undergraduate programs in the fields of Statistics, Logistics and Transportation, Chemical Engineering, and Mathematics. Our education is based on ethical principles, innovative educational strategies, inclusion, and sustainable development.

Research Areas:

- Study of strategic alternatives of synthesis, design, and isolation of molecules, radiation-matter interaction and its link with physical phenomena, and knowledge of the structural aspects of matter from the molecular to the supramolecular.
- Development of the solution of a problem in science or engineering through the approach and analysis of mathematical models based on dynamic systems or differential equations.
- Study and predict behaviors and logical consequences of random phenomena and develop statistical methods and techniques to understand the data coming from a probabilistic model.
- The study of open problems based on algebraic and topological structures generates new mathematical knowledge. It provides theoretical resources to be used by researchers in mathematics and other areas of science and engineering.
- Optimization of processes applied to the planning of operations, subject to restrictions or not, of organizations to minimize the costs involved.

61
Professors with research load

132
publications (2023)

69.7%
Publications with international collaboration

30.7%
Publications in the Top 10% of journals, according to CiteScore

76
Ongoing projects (2023)

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Faculty of Social Sciences and Humanistic

Cooperate with society to enhance the quality of life and promote the sustainable and equitable development through a trustworthy and competent education, research and innovation in social sciences and humanities.

Research Areas:

- Public Administration, Economics, and Public Policy
- Natural resources Economics, Behavioral and Experimental Economics.
- Innovation, Marketing, and Strategy.
- Microeconomics: Microeconometrics; Labor Economics; Economics Of Human Development And Welfare
- Theory, planning, communication, pedagogy, and innovation in education and foreign language teaching and learning.
- Behavioral, linguistic, sociolinguistics, and cultural perspectives on the nature and learning of foreign languages.
- Public policy, governance, and tourism planning.
- Innovation and creation in the value of tourism.
- Diverse and alternative tourism economies.
- Sustainable development in tourism.
- Mobility, hospitality, and leisure.
- Archaeology as a social Science.
- Interactions and issues in Archaeology in America.
- Administración, Organizational Behavior, Operations Management, and Management Control.
- Finance, Accounting and Auditing, Microfinancing and Financial Economy,
- Macroeconomy: Macroeconometrics, Economic Growth; International Economics
- Educational Research
- Interdisciplinary, inclusion, equity, and diversity in education and foreign language teaching.
- Policy, quality, evaluation, ethics, management, and educational leadership.
- Information and communication technologies in tourism.
- Tourism marketing
- Business management in tourism
- Coastal and marine tourism.
- Inequalities and injustices in tourism.
- Archaeology of neotropical societies.
- Interdisciplinary and Historical Cultural Anthropological Research in America

40
Professors with research load

66
publications (2023)

66.7%
Publications with international collaboration

10.2%
Publications in the Top 10% of journals, according to CiteScore

82
Ongoing projects (2023)

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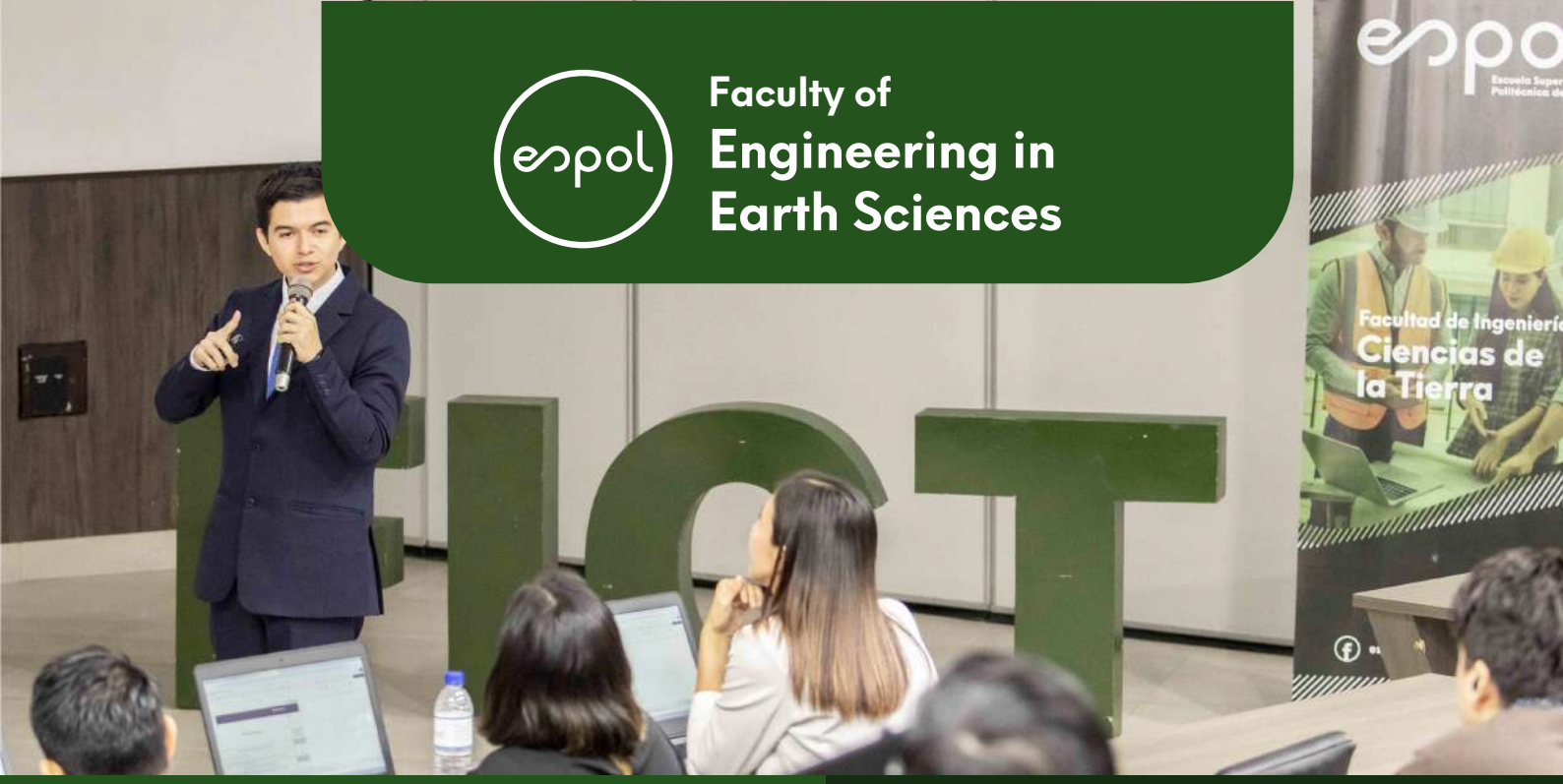
Faculty of Engineering in Earth Sciences



Train competent, entrepreneurial professionals with socio-environmental responsibility. Generate, adapt and transfer knowledge related to oil, mining, geological and civil works activities.

Research Areas:

- Surface and Groundwater Resources
- Mining evaluation and exploitation
- Sustainability and mining responsibility
- Geological Risks
- Geoscience Applied to the Environment
- Structures and Constructions
- Geotechnics Applied to Engineering
- Sustainability in the Oil Industry
- Drinking water treatment, purification, and sewage systems

27 Professors with research load

78 publications (2023)

66.7% Publications with international collaboration

27.3% Publications in the Top 10% according toCiteScore

41 Ongoing projects (2023)

1 Intellectual Property Registry

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Faculty of Electric and Computing Engineering

We cooperate with society to improve the quality of life and promote sustainable and equitable development, through comprehensive and competent professional training, research and innovation; in the fields of Electrical Engineering and Computer Science.

Research Areas:

- Automation systems
- Control systems
- Artificial Intelligence and Data Science
- Electric power systems
- Electrical power systems
- Electronics
- Human-centered computing
- Distributed networks and systems
- Optimal communications
- Signals processing
- Intelligent environments and telematic systems
- Software engineering
- Security systems
- Wireless communications

62 Professors with research load

145 publications (2023)

60% Publications with international collaboration

25.8% Publications in the Top 10% of journals, according to CiteScore

89 Ongoing projects (2023)

6 Intellectual Property Registries

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Faculty of Mechanical Engineering and Science Production

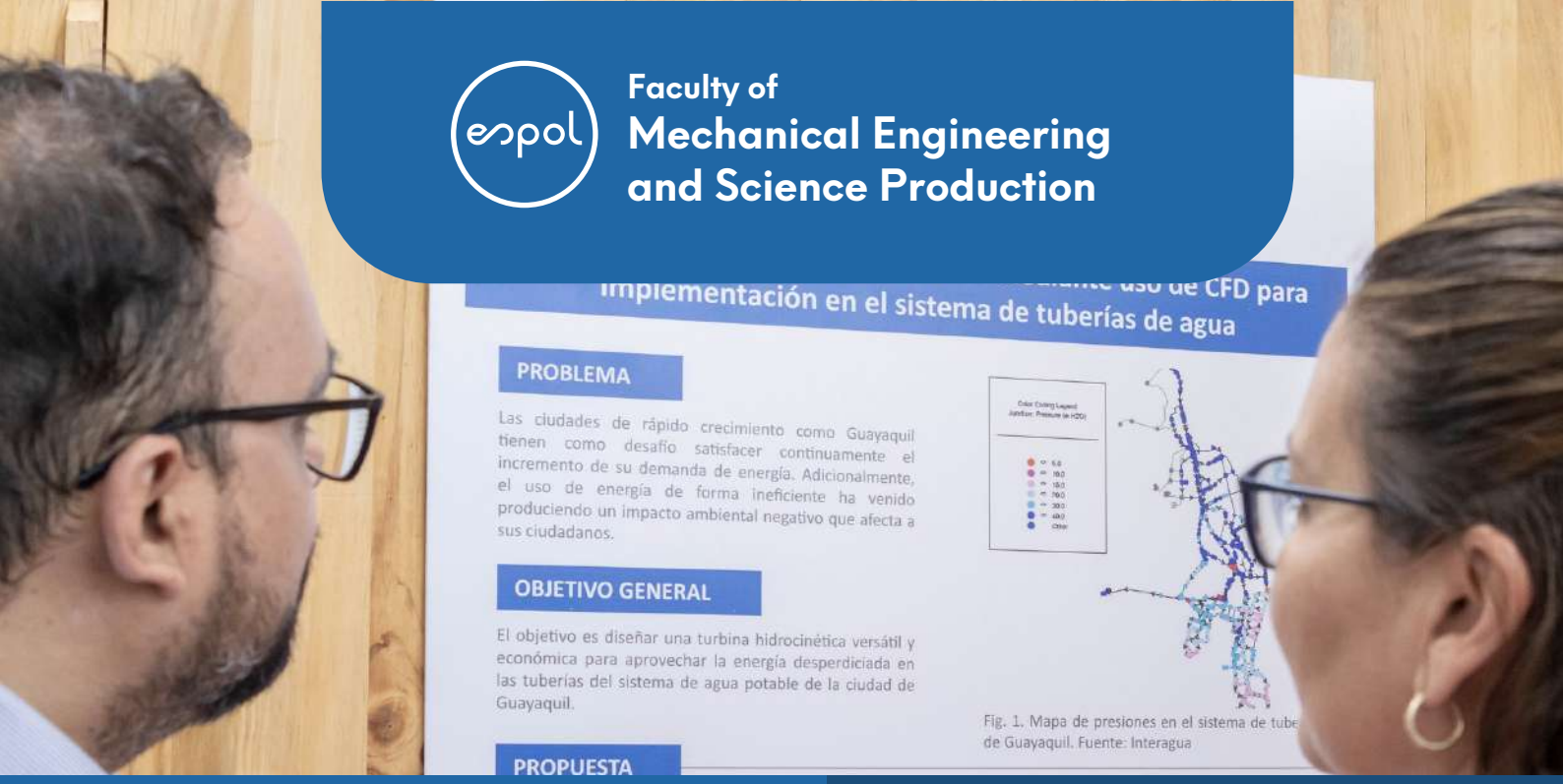

Fig. 1. Mapa de presiones en el sistema de tube
de Guayaquil. Fuente: Interagua

The Faculty of Engineering in Mechanics and Production Sciences has the mission of training professionals in undergraduate courses in Mechanical, Industrial, Mechatronics, Materials and Food Engineering with academic excellence, with a solid background in basic sciences and a curricular structure that promotes the comprehensive training and entrepreneurial spirit of its students. Our main activities are focused on excellent teaching, applied research and provision of services to meet the requirements of the state and private productive sector in the aforementioned areas.

Research Areas:

- Thermal sciences and alternative energy systems
- Hydrogen and Fuel Cells
- Containers and Packaging for the Food Industry
- Bioengineering and neuroimaging
- Materials – Polymers and Ceramics
- Dinámica de fluidos Computacionales y Aeroacústica
- Computational Fluid Dynamics and Aeroacustics
- Sustainable Engineering
- Optimization and Logistics
- Machine Learning and Data Mining
- Biofuel Process Optimization
- Functional Food Products

52 Professors with research load

93 publications (2023)

74.2% Publications with international collaboration

23% Publications in the Top 10% of journals, according to CiteScore

70 Ongoing projects (2023)

7 Intellectual Property Registries

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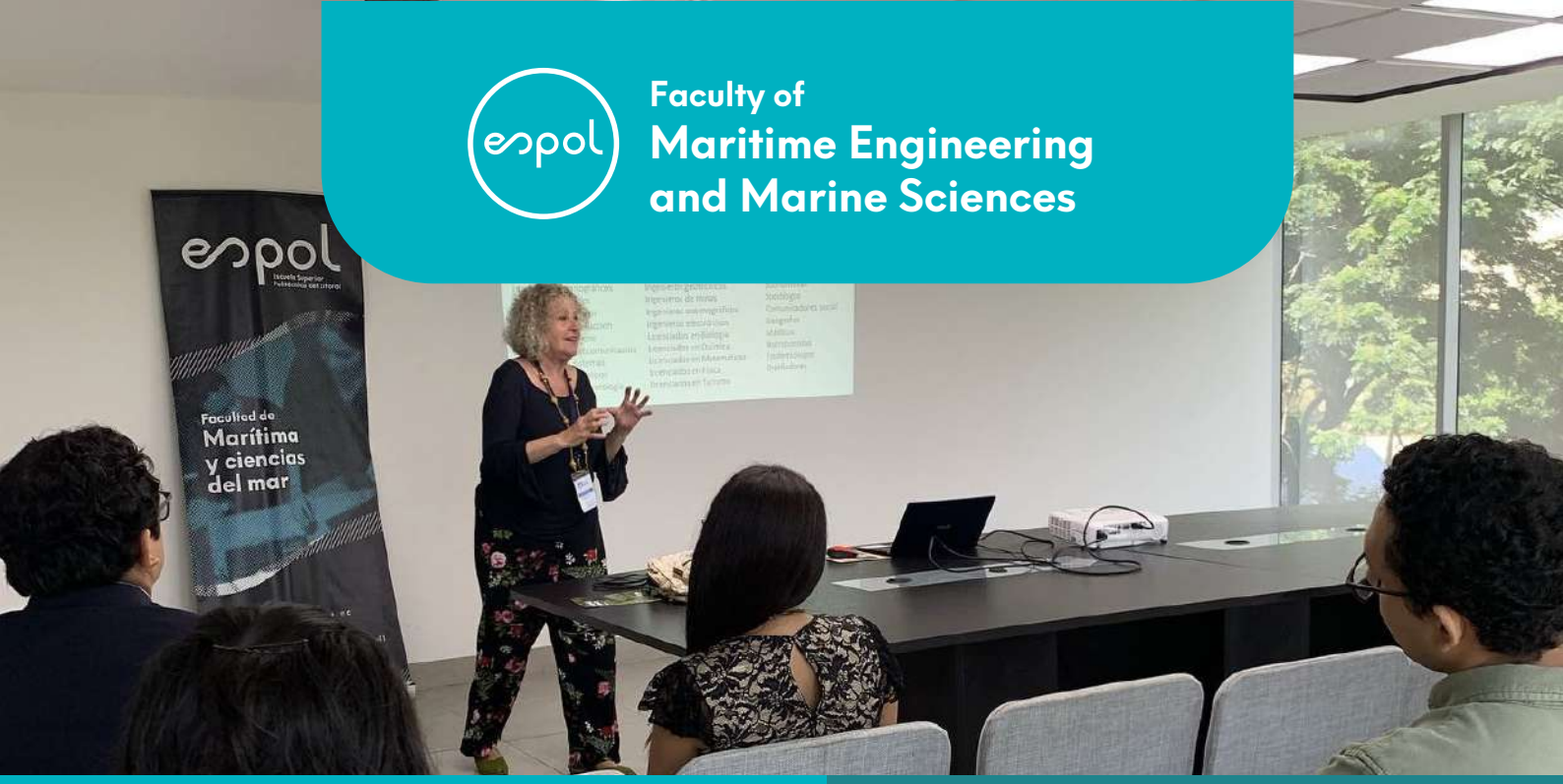

Faculty of Maritime Engineering and Marine Sciences

We cooperate with society to improve the quality of life, and to promote sustainable and equitable development, through integral and competent professional training, research, and innovation.

Research Areas:

- Interaction between human groups and the coastal marine environment
- Management and conservation of the Biodiversity of natural resources of Galapagos
- Processes of engineering and innovation of sustainable systems
- Processes of global changes, ocean-atmosphere interactions
- Knowledge transfer and research capacity building

17 Professors with research load

20 publications (2023)

80% Publications with international collaboration

15% Publications in the Top 10% of journals, according to CiteScore

25 Ongoing projects (2023)

4 Intellectual Property Registries

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ESPAE
Escuela de Negocios
espol

It contributes to the generation and dissemination of knowledge together with the business community through master's programs and additionally with research and development in the areas of i) entrepreneurship and innovation, ii) administration, iii) sustainability, and iv) value chains in agribusiness.

Research Areas:

- Work, safety, occupational well-being, working conditions, and psychosocial risks.
- Climate change and psychosocial well-being.
- Digital competencies, individual and organizational factors, and performance.
- Labor competencies and organizational performance.
- Economic development, competitiveness, and international trade.
- Organization, management, and operation of family businesses.
- Individual and organizational factors influencing project management and results.
- Social and organizational interactions, preferences, and use of digital media.
- Entrepreneurship development, social entrepreneurship, and bio-entrepreneurship.
- Family businesses
- Business innovation
- Agricultural value chains, food security, and agricultural sustainability.
- Agricultural public policy, production, and climate change.
- Business sustainability and its contribution to the Sustainable Development Goals.

7
Research Partners

14
publications (2023)

10
Ongoing projects (2023)

9.1%
Publications in the Top 10% of journals, according to CiteScore

64.3%
Publications with international collaboration

2
Intellectual Property Registries

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ESPOL Research Postgraduate Programs

Research Master's and Doctoral Programs by Faculty

Faculty of Life Sciences

Masters:
- Applied Biosciences

Faculty of Social Sciences and Humanistic

Masters:
- Economic Sciences
- Rural Development

Faculty of Electric and Computing Engineering

Masters:
- Computer Sciences

Doctorates:
- Applied Computer Sciences
- Electrical Engineering

Faculty of Mechanical Engineering and Science Production

Masters:
- Food Sciences
- Mechanical Engineering Science
- Materials and Science Engineering
- Sciences in Industrial Engineering Systems

Doctorates:
- Engineering

Faculty of Engineering in Earth Sciences

Masters:
- Earth Sciences

Faculty of Art, Design and Audiovisual Communication

Masters:
- Art and Technology

Posgrados de Investigación de la ESPOL

Programas de Maestría de Investigación y Doctorado por Facultad

Faculty of Natural Sciences and Mathematics

Masters:

- Engineering Sciences for Water Resource Management
- Physics
- Chemical Engineering

Faculty of Maritime Engineering and Marine Sciences

Masters:

- Marine Sciences

Internal research funds

Collateral Benefit 2023: Call for Research Project Financing

Collateral Benefit 2023 is a call for proposals created by the ESPOL Dean's Office for Research with the purpose of financing scientific research projects that have an impact on the institutional priority areas of "Agricultural and aquaculture production and its transformation," "Environment, climate, and disaster risk reduction," and "Digital technologies." The call is aligned with the institutional objective of promoting research, development, and technology transfer, as well as innovation and dissemination of knowledge that contribute to the integral development of the country.

Objectives

- Develop scientific research projects focused on the institutionally lines of research and linkages.
- Provide economic resources to finance the development of research projects
- Promote the creation of integral solutions that require a multidisciplinary approach
- Optimize the use of the existing infrastructure and equipment in the institution.
- Offer learning opportunities and experience in the development and direction of scientific research proposals.

Winning projects

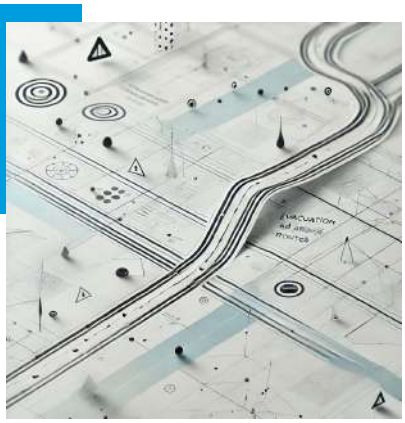
Design of agricultural bio inputs applicable to agroecological of exportable food

Description:
The project seeks to design and develop agricultural bio inputs with antifungal and biostimulant properties using plant extracts, industrial residues, and microorganisms such as Trichoderma and Bacillus. These products will be developed and tested on a pilot scale to meet the needs of the agricultural export sector, promoting sustainable agroecological practices. The stability and effectiveness of the bio inputs will be evaluated against conventional production, considering both the environmental impact and the economic and social benefit, to facilitate their transfer to companies in the sector.

Director / Co-Director:
Patricia Isabel Manzano Santana, Ph. D. / Juan Manuel Cevallos Cevallos, Ph. D.

Academic Units / Research Centers:
Graduate School of Business Administration (ESPAE), Faculty of Natural Sciences and Mathematics (FCNM), Center for Biotechnological Research of Ecuador (CIBE), Center for Rural Research (CIR)
External collaborating institutions:
DIANAFOOD (SYMRISE.COM)

The platform for modeling the impact of the adverse events on the evacuation and access routes in Duran canton using historical mobility data



Description:
The project proposes a technological platform that models the impact of adverse events on evacuation and access roads in the Duran canton, using mobility historical data. This tool seeks to strengthen mobility management during emergencies or disasters by comprehensively diagnosing threats, critical infrastructure, and mobility patterns and evaluating its effectiveness in real and simulated scenarios to improve the canton's resilience to adverse situations.

Director / Co-Director:
Daniel Erick Ochoa Donoso, Ph. D. / Katherine Malena Chiluiza García, Ph. D.
Academic Units / Research Centers:
Information Technology Center (CTI), Pacific International Center for Risk Disaster Reduction (CIP-RRD), Center for Industrial Digital Transformation (CTD)
External collaborating institutions:
Decentralized Autonomous Government (GAD) Municipal Del Cantón Durán, Technology Equinoccial S.A. (TECCIAL)

Resilient climate development: innovative strategies in prioritized social-ecological systems in the Galapagos Islands.

Description:
The project seeks to strengthen climate resilience in the Galapagos archipelago's Santa Cruz and Floreana islands by analyzing climate hazards and identifying adaptation, mitigation, and resilience measures in terrestrial, freshwater, and coastal-marine systems. The study uses a co-production approach with local stakeholders to prioritize sectors such as natural heritage, water, food sovereignty, human health, and strategic infrastructure. In addition, it will develop a digital platform to integrate climate scenarios and multi-hazard risks, facilitating the planning and prioritization of adaptive and sustainable climate actions.

Director / Co-Director:
Mercy Julia Borbor Córdova, Ph. D. / Carlos Luis López Lozada, Ph. D.

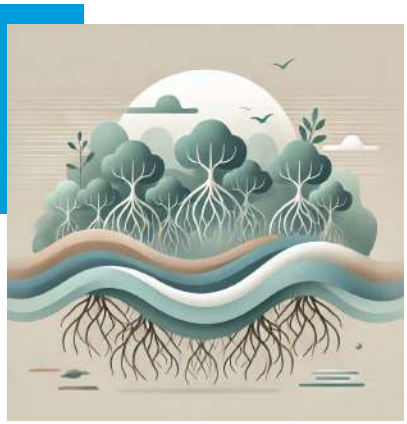
Academic Units / Research Centers:
Faculty of Engineering in Earth Sciences (FICT), Faculty of Natural Sciences and Mathematics (FCNM), Faculty of Social and Humanistic Sciences (FCSH), Faculty of Life Sciences (FCV), Faculty of Maritime Engineering and Marine Sciences (FIMCM), Center for Water and Sustainable Development (CADS), Center for Rural Research (CIR), Pacific International Center for Disaster Risk Reduction (CIP-RRD), Center for Industrial Digital Transformation (CTD).
External collaborating institutions:
Charles Darwin Foundation, Galapagos National Park, Stevens Institute of Technology (SIT), University of Minnesota, Federal University of Paraíba, Upstate Medical University at State University of New York

Exploitation of invasive solitary ascidian from molluscan cultures from biotechnological and nutritional applications.

Description:
The project seeks to evaluate the biotechnological and nutritional potential of solitary ascidians present in CENAIM-ESPOL mollusk cultures. The use of the cellulose of its tunic for biotechnological applications, the nutritional value of the muscle and the whole organism, and its metabolomic profile will be studied to take advantage of this invasive species in a sustainable manner and turn it into a useful resource for various industries.

Director / Co-Director:
Jenny Antonia Rodríguez León, Ph. D. / Karin Elizabeth Coello Ojeda, Ph. D.
Academic Units / Research Centers:
Faculty of Mechanical Engineering and Science Production (FIMCP), National Center of Aquaculture and Marine Research (CENAIM)
External collaborating institutions:
Universidad San Francisco de Quito (USFQ)

Collateral benefit of mangrove conservation to improve ecosystem quality and mitigate climate change



Description:
The project proposes to evaluate the collateral benefits of mangrove conservation in two reserves in the Gulf of Guayaquil: Manglares El Salado and Manglares El Morro. Carbon sequestration capacities, water and sediment quality, and trace metal remediation using mangroves in synergy with zeolites and native microorganisms will be analyzed. In addition, an environmental education program will be implemented for schoolchildren to raise awareness of mangrove ecosystem services and their importance in mitigating climate change. Finally, a geographic information system (GIS) will be developed to link pollution with land use in surrounding areas.

Director / Co-Director:
Katiuska Paola Calle Delgado, Ph. D. / Marynes Montiel Romero, Ph. D.
Academic Units / Research Centers:
Faculty of Engineering in Earth Sciences (FICT), Faculty of Social and Humanistic Sciences (FCSH), Faculty of Life Sciences (FCV), Center for Rural Research (CIR).
External collaborating institutions:
Ecoculture (OSFL), Ministry of Environment Water and Ecological Transition, University of Arizona

ESPOL's research initiatives in the media

Agricultural efficiency in Ecuador

ESPOL Researchers presented a mobile application to identify the presence of Fusarium, a pest that invades the vascular system of plants and prevents them from receiving water and nutrients.

Director: Freddy Magdama, Ph.D.
Email: frearmag@espol.edu.ec

See more here

Intelligent shrimp feeders

A research team developed a system for real-time—monitoring of water quality parameters and control of automatic feeders.

Director: Boris Vintimilla, Ph.D.
Email: boris.vintimilla@espol.edu.ec

See more here

Monitoring of the "El Niño" phenomenon

A team of scientists from ESPOL monitored the oceanographic situation that could determine the formation of the "El Niño" phenomenon on the Ecuadorian coast.

Director: Franklin Ormaza, Ph. D.
Email: formaza@espol.edu.ec

See more here

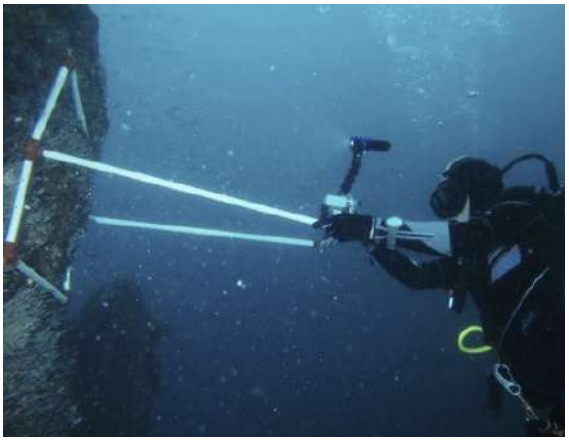
ZULE Project

Zule is the name of an ESPOL research project that seeks to offer a 100% personalized alternative for mastectomized patients through the use of additive manufacturing technology.

Director: Gabriel Helguero, Ph.D.
Email: chelguer@espol.edu.ec

See more here

Marine records in El Pelado reserve

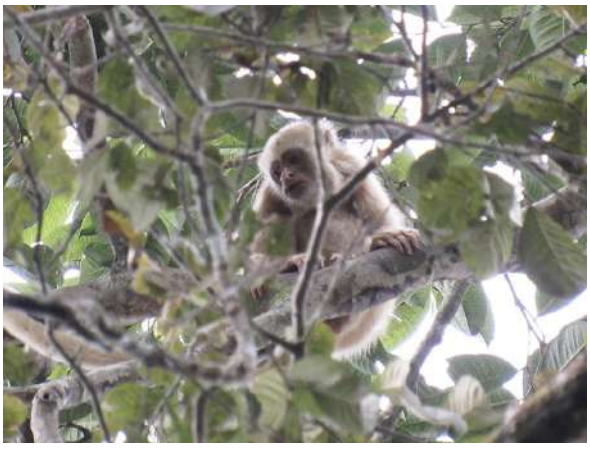


CENAIM researchers collected 547 new records of marine invertebrates and associated culturable bacteria to form a database. They later valued their application in human health and animal production, studying their biodiversity.

Director: Jenny Rodríguez, Ph.D
Email: jenrodri@espol.edu.ec

See more here

Plan to take care of the dry forest.



ESPOL scientists presented the results of two years of research on different species of birds, reptiles, spiders, and macroinvertebrates that inhabit the dry forest.

Director: Julián Pérez, Ph.D.
Correo: jupecorr@espol.edu.ec

See more here

ESPOL'S technology transfers in numbers

49

Ongoing projects in collaboration with companies (2023)

1

Transfer to industry of research derived intellectual property registration (2023)

49

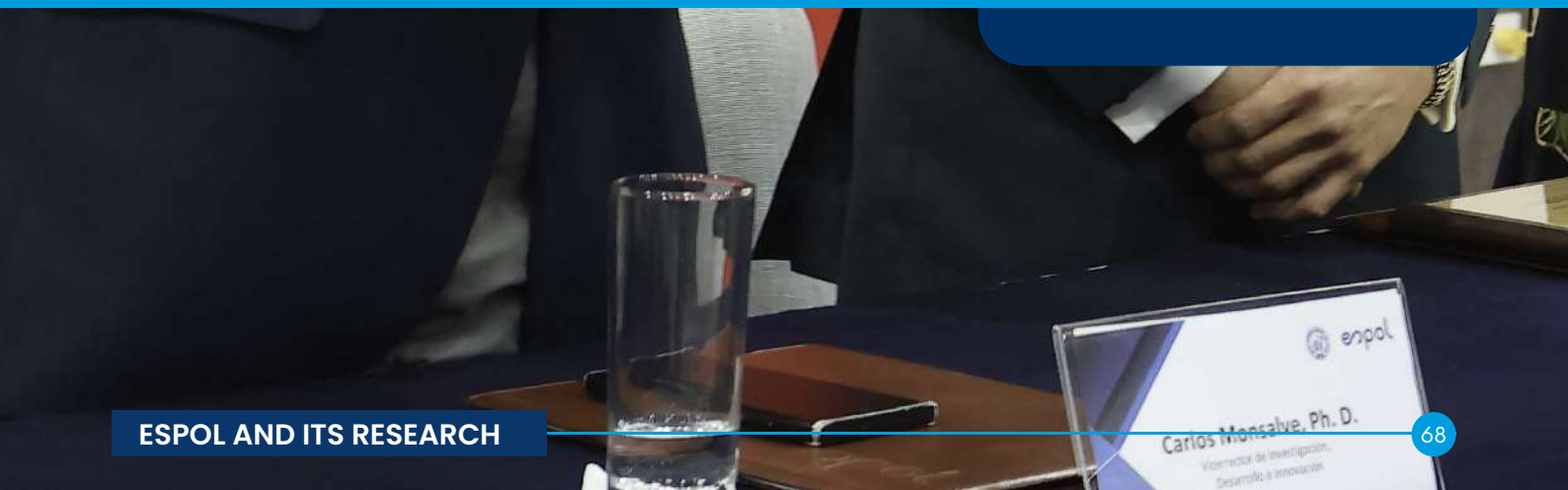
Of intellectual property derived from research (2023):

- 5 trade secrets
- 7 registered trademarks
- 6 industrial designs
- 1 trade motto
- 3 literary works
- 17 artistic and musical works
- 5 patents
- 5 softwares

$574,651.90

Funding from industry for research projects

Academic merit in the field of research



Academic merit in the field of research

2022-2023

María Alejandra Ruano, M. Sc.

She received her M. Sc. in Economics at the University of Amsterdam. Her research interests revolve around the environment, particularly the economic valuation of ecosystem goods and education, emphasizing gender.

2021

Andrés Abad, Ph.D.

He earned his Ph.D. in Industrial and Operations Engineering from the University of Michigan. His research interests include the application of deep learning, machine learning, data science, and mathematical optimization in solving industrial problems.

2020

Joseph Páez Chávez, Ph.D.

He obtained his Ph.D. in mathematics at Bielefeld University. His research interests include mathematical modeling and experimental study of real-world problems, nonlinear oscillations in mechanics, chemistry, biology, electronics, and modeling and control of infectious and plant diseases

2019

Carmen Vaca Ruiz, Ph. D.

She obtained her Ph.D. in Information Engineering at the Milan Polytechnic. Her research interests include the areas of spatial data mining, machine learning, social computing, and human mobility.

2018

Xavier Ochoa Chehab, Ph. D.

He obtained his Ph.D. in Computer Science at Katholike Universiteit Leuven (KUL), Belgium, and his Masters in Applied Computer Science at Vrije Universiteit Brussel (VUB), Belgium. He is vice president of the Society for Learning Analytics Research (SoLAR) and associate editor of IEEE Transactions on Learning Technologies

2017

Novillo Parrales, Ph. D.

He obtained his Ph.D. degree in Signal Theory and Communications and his master's degree in Mobile Communications at the Polytechnic University of Catalonia

Academic merit in the field of research

2017

Rafael Bermúdez Monsalve, Ph. D.

He obtained his Ph.D. (Magna Cum Laude) and his Master of Science degree, specializing in Biological Oceanography at the GEOMAR Helmholtz Centre for Ocean Research in Kiel, Germany. He is the director of the Plankton Laboratory of ESPOL and coordinator of the Galapagos Marine Research and Exploration Program (GMaRE).

2016

Fabiola Cornejo Zúñiga, Ph. D.

She obtained her Ph.D. (Magna Cum Laude) degree from the University of Valencia, Spain, and her Master of Food Sciences degree from the University of Massachusetts, The USA. She is the coordinator of the ESPOL Master of Food Sciences. She is the current general coordinator of the Cereal Research Network and a member of the Ecuadorian Society of Food Technology and the Institute of Food Technology (ITF).

Internal recognition for research carried out at ESPOL

The "Cuartiles Mayores" event organized by the ESPOL's Dean's Office for Research seeks to celebrate research and aims to recognize the outstanding work in scientific research of its staff, academic units, and research centers.

In April 2020, the first edition was presented, which started the tradition of celebrating and rewarding the achievements of the polytechnic community with the presentation of Digital Badges. Outstanding researchers were recognized in QS areas and sub-areas in raising competitive funds and raising non-reimbursable funds awarded for demand-driven research, innovative research, and international research collaboration.

The Academic Units and Research Centers were also recognized for their achievements.

In the second and third editions of Cuartiles Mayores, held in November 2021 and 2022, respectively, the research work of undergraduate and graduate students was also recognized with gold, silver, and bronze badges. Students who passed their research courses I and II were also recognized, with a grade of at least 80% in the evaluation year.

In the fourth edition held in December 2023, the Research Centers attached to Academic Units were also recognized for their achievements.

Recognitions 2023

Recognitions 2022

Recognitions 2021

Recognitions 2020

Recognition of the Academic Units

2023

Faculty of Engineering in Earth Sciences	Academic unit with the highest scientific productivity per researcher Academic unit with the highest Field Weighted Citation Impact
Faculty of Social Sciences and Humanistic	Academic unit with the largest amount of competitive research funds raised Academic unit with intellectual property with the greatest potential impact
Faculty of Mechanical Engineering and Science Production	Academic unit with the greatest international collaboration in its publication
Faculty of Electric Engineering and Computing	Academic unit with the greatest corporate collaboration in its scientific publication Academic unit with the greatest amount of funds raised for research on demand UAcademic unit with intellectual property with the greatest potential impact

2022

Faculty of Art, Design and Audiovisual Communication	Academic unit with the highest scientific productivity per researcher
Faculty of Maritime Engineering and Marine Sciences	Academic unit with the largest amount of competitive research funds raised
Faculty of Mechanical Engineering and Science Production	Academic unit with the highest Field Weighted Citation Impact
ESPAE	Academic unit with the greatest international collaboration in its publication
Faculty of Electric Engineering and Computing	Academic unit with the greatest corporate collaboration in its scientific publication
Faculty of Life Sciences	Unidad académica con mayor cantidad de fondos captados por investigación por demanda

Recognition of the Academic Units

2021

Faculty of Engineering in Earth Sciences	Academic unit with the highest scientific productivity per researcher
Faculty of Maritime Engineering and Marine Sciences	Academic unit with the greatest international collaboration in its publication
Faculty of Electric Engineering and Computing	Academic unit with the greatest corporate collaboration in its scientific publication
Faculty of Social Sciences and Humanistic	Academic unit with the highest Field Weighted Citation Impact
Faculty of Life Sciences	Academic unit with the highest amount of funds collected by research on demand Academic unit with the highest amount of competitive research funds raised

2020

Faculty of Art, Design and Audiovisual Communication	Academic unit with the highest scientific productivity per researcher
Faculty of Maritime Engineering and Marine Sciences	Academic unit with the highest Field Weighted Citation Impact
Faculty of Mechanical Engineering and Science Production	Academic unit with the highest scientific productivity per researcher Recognition for technology transfer efforts
Faculty of Life Sciences	Academic unit with the highest amount of funds collected by research on demand
Faculty of Electric Engineering and Computing	Unit with the highest number of competitive funds for research Unit with the greatest corporate collaboration in its publications Recognition for efforts in technology transfer Recognition for efforts in the registration of intellectual property derived from research and development

Recognition to the Research Centers

2023	**Center of Research and Applied Projects in Earth Sciences (CIPAT)**	Research center with the highest scientific productivity per researcher
		Research center with the highest Field Weighted Citation Impact
	Center of Information Technologies (CTI)	Institutional research center with the highest amount of funds raised for demand-driven research
	Center for Research, Development, and Innovation in Computer Systems (CIDIS)	Institutional research center with the greatest corporate collaboration in its publications
	Center for Research and Development in Nanotechnology (CIDNA)	Institutional research center with the greatest international collaboration in its publications
	Center for Sustainable Technological Development (CDTS)	Research center attached to Academic Unit with the highest scientific productivity per researcher.
	Center for Economic Research (CIEC)	Research Center attached to Academic Unit with greater international collaboration in its publications.
	Center for Rural Research (CIR)	Research Center attached to an Academic Unit with the largest amount of Non-Reimbursable Competitive Funds
		Research Center attached to an Academic Unit with the highest Field Weighted Citation Impact.
2022	**Center of Research and Applied Projects in the Earth Sciences (CIPAT)**	Research Center with the highest scientific productivity per researcher
	Center of Renewable and Alternative Energies (CERA)	Research Center with the highest Field Weighted Citation Impact

Recognition to the Research Centers

2022	**Biotechnology Research Center of Ecuador (CIBE)**	Institutional research center with the largest amount of non-reimbursable funds for research
		Institutional research center with the largest amount of funds raised for research on demand
		Institutional research center with the highest corporate collaboration in its publications
	Center of Renewable and Alternative Energies (CERA) and Center for Water and Sustainable Development (CADS)	Institutional research center with the greatest international collaboration in its publications
	National Center of Aquaculture and Marine Research (CENAIM)	Unit with intellectual property with the greatest potential
2021	**Center for Research, Development, and Innovation in Computer Systems (CIDIS)**	Research center with the highest Field Weighted Citation Impact
	National Center of Aquaculture and Marine Research (CENAIM)	Institutional research center with the largest amount of non-reimbursable research funds raised
		Institutional research center with the largest amount of funds raised for research on demand
	Center of Renewable and Alternative Energies (CERA)	Institutional research center with the greatest international collaboration in its publications
		Academic unit with the highest scientific productivity per researcher
	Center of Information Technologies (CTI)	Institutional research center with the highest corporate collaboration in its publications
2020	**Center of Renewable and Alternative Energies (CERA)**	Institutional research center with the highest scientific productivity per researcher

Recognition to the Research Centers

2020	**Center of Research and Applied Projects in Earth Sciences (CIPAT)**	Research center with the highest Field Weighted Citation Impact
	Center for Water and Sustainable Development (CADS)	Institutional research center with the greatest international collaboration in its publications
	Biotechnology Research Center of Ecuador (CIBE)	Recognition to Institutional Research Center for efforts to register intellectual property derived from research and development
		Institutional research center with the largest amount of non-reimbursable funds for research
	Center for Research, Development, and Innovation in Computer Systems (CIDIS)	Recognition to Institutional Research Center for efforts to register intellectual property derived from research and development
		Recognition for efforts in technology transfer

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Dean's Office for Research

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