



UNIVERSIDAD  
DE SANTIAGO  
DE CHILE



FACULTAD DE  
**INGENIERÍA**  
UNIVERSIDAD DE SANTIAGO DE CHILE

# 2023 GLOBAL ENGINEERS PROGRAM

Research Internships  
for undergraduate  
and graduate students

VICEDECANATO  
**VINCULACIÓN  
CON EL MEDIO**





For more than 100 years, we have believed that the role of engineering and technology-based sciences must respond to the needs of the national productive sector. For this reason, the Faculty of Engineering of the Universidad de Santiago de Chile (USACH) is a pioneer in contributing to the country's industrial development. With 14 engineering specialization areas in undergraduate and graduate programs, research centers, and high-tech laboratories, our faculty is committed to creating a positive impact on Chilean society and in the region, through technological innovation, applied research, entrepreneurship, and technology transfer.

At USACH we understand that a globalized world requires a multidisciplinary approach to address modern-day problems. In that sense, we are certain that connecting foreign students with national institutions and local laboratories will prepare them to acquire good operating practices in the Latin-American engineering field, as well as our faculty obtains new knowledge and perspective of international human capital.



# CIVIL ENGINEERING DEPARTMENT

<https://obrasciviles.usach.cl/>



DEPARTAMENTO DE  
**INGENIERÍA  
OBRAS CIVILES**  
UNIVERSIDAD DE SANTIAGO DE CHILE

## Sanitary Engineering Laboratory

Fields of study: water sciences and technology

This laboratory shares teaching and research activities. The Research Group, Ko-Yaku, who is dedicated to water technology and sciences, works in four areas: environmental matrices, treatment technology development, water, waste, and subproducts revaluation, and indicators management.

More information in <https://koyaku.usach.cl/>

### Main task



Develop analytical techniques for GC FID. The student should be capable of elaborating a protocol for using a gas chromatographer, developing techniques to define contaminants in solid and liquid environmental samples, and supporting any other tasks in the lab.

### Student profile



This internship is aimed at Ph.D. students from civil engineering, chemical engineering, environmental engineering, bioengineering, sustainable engineering, or any other similar discipline. Students need to have analytical competencies in water quality and basic knowledge of chromatography.

English, Spanish and Portuguese Languages are accepted.

### Period



Six months.

40 hours per week.

### Benefits



Possibility to participate in the elaboration of a scientific research paper.

Possibility to participate in academic events.

Lunch tickets for university dining.

### Supervisor



Dr. Cristina Villamar, Faculty Member of the Department of Civil Engineering



## Sanitary Engineering Laboratory

Fields of study: civil engineering

This laboratory shares teaching and research activity. The research group, Ko-Yaku, who is dedicated to water technology and sciences, works in four areas: environmental matrices, treatment technology development, water, waste, and subproducts revaluation, and indicators management. More information in <https://koyaku.usach.cl/>

### Main task



Test materials for pollutants adsorption. The student should be capable of developing adsorption tests and monitoring the pollutants in filter systems.

### Student profile



This internship is aimed at Ph.D. students from chemical engineering, environmental engineering, civil engineering, bioengineering, biochemistry, chemistry, or any other similar discipline. Students need to have analytical competences in adsorption tests.

English, Spanish and Portuguese Languages are accepted.

### Period



40 hrs. per week

The length of time will be determined by the supervisor and intern.

### Benefits



Possibility to participate in the elaboration of a scientific research paper.

Lunch tickets for university dining.

### Supervisor



Dr. Cristina Villamar, Faculty Member of the Department of Civil Engineering



# MINING ENGINEERING DEPARTMENT

<https://dim.usach.cl/>



DEPARTAMENTO DE  
**INGENIERÍA  
EN MINAS**  
UNIVERSIDAD DE SANTIAGO DE CHILE

## Rock Mechanics Laboratory

Fields of study: rock mechanics

The Laboratory of Rock Mechanics is equipped to develop rock sample analysis for the mining industry and other laboratories in Chile. All rock tests are based on ASTM and ISRM standards.

## Main task



Classification and tests development of the index properties of rocks. The task could vary according to the supervisor's needs and prior agreement with the intern.

## Student profile



This internship is aimed at undergraduate students from geology, mining engineering, civil engineering, or similar discipline. Knowledge about geology or material resistance is required.

Spanish and English languages are accepted.

Check out a previous  
experience in the lab here:



## Period



30 hrs. per week

The length of time will be determined by the supervisor and the intern.

## Benefits



Flextime.

Lunch tickets for university dining.

A small stipend could be given according to the intern's job performance.

## Supervisor



Mr. Miguel Vera. Faculty member Department of Mining Engineering.



## Analogue Models Laboratory

Fields of study: structural geology, and analogue modeling of deformation

In this lab, researchers are able to analyze the mechanical response of analogue materials by simplifying the rheological properties of the rocks found in nature, as well as the evolution scale (time and size) of deformation. The lab includes a modeling board, a motor-drive that controls different variables of each study case, and data acquisition systems, among other materials.

### Main task

Design and develop analogue models.

For this, students will need to develop the following specific tasks:

- Literature research according to the study case (it is recommended to have at least one virtual meeting before the internship for objectives definition)
- Analyze the scales and design (set-up) of the analogue modeling of a project to be defined (2-3 weeks)
- Develop two or three analogue modeling of a study case (3-4 weeks including data collection). The supervisor will support this task.
- Data analysis –like pictures– (2-3 weeks)
- Support for the elaboration of an abstract with the results that will be presented at the XVI Congreso Geológico Chileno (2-3 weeks)

### Student profile

This internship is aimed at undergraduate and master's level

students from geology, or similar disciplines. The competencies of the intern should include structural geology skills (macroscopic, regional geology, structural analysis at lithosphere or outcrop scale) and knowledge of geometry, physics, and mechanics for modeling design. Previous experience in analogue modeling of deformation is advisable.

Spanish and English languages are accepted.

### Period

Three months is desirable.

Working hours will be determined by the supervisor and intern.

### Benefits

Flextime.

After the internship, the student may participate in the elaboration of a scientific research paper, according to the job performance.

Lunch tickets for university dining.

### Supervisor

Dr. Pamela Jara. Faculty member of the Department of Mining



## Analogue Models Laboratory

Fields of study: structural geology, geotechnics, and mechanics.

In this lab, researchers are able to analyze the mechanical response of analogue materials by simplifying the rheological properties of the rocks found in nature, as well as the evolution scale (time and size) of deformation. The lab includes a modeling board, a motor-drive that controls different variables of each study case, and data acquisition systems, among other materials.

### Main task

Design, development, and test of a device for mechanical analysis (cohesion and internal friction angle) of granulated materials used in analogue modeling in geology and mining.

For this, students will need to develop the following specific tasks:

- Literature research regarding analogue modeling and the commonly used materials (it is recommended to have at least one virtual meeting before the internship for objectives definition)
- Analyze the scales and mechanical properties of the materials used for analogue modeling (around 2 weeks)
- Design and built a Hubbert device, or similar, to define the internal friction and granulated material coefficients (around 2 weeks)
- Develop the test of the necessary granulated material to obtain new data (around 2 weeks)
- Data analysis (around 2 weeks)
- Possible support for the elaboration of a scientific paper, according to the results and data analysis that the supervisor already possesses).

### Student profile

This internship is aimed at undergraduate and master's level students from civil engineering, mechanical engineering, mining engineering, geology, or similar disciplines. Knowledge of physics, and soil and rock mechanics is required.

Spanish language only.

### Period

Two months as a minimum. In case the research includes the publication of the results and analysis of data, four months of length will be appropriate.

Working hours will be determined by the supervisor and intern.

### Benefits

Flextime.

After the internship, the student may participate in the elaboration of a scientific research paper, according to the job performance.

Lunch tickets for university dining.

### Supervisor

Dr. Pamela Jara. Faculty member of the Mining Engineering



# MECHANICAL ENGINEERING DEPARTMENT

<https://www.dimec.usach.cl/>



DEPARTAMENTO DE  
**INGENIERÍA  
MECÁNICA**  
UNIVERSIDAD DE SANTIAGO DE CHILE

## Biomechanics and Biomaterials Laboratory

Fields of study: mechanical engineering, biomechanical engineering

Since 2012, the Biomechanics and Biomaterials Lab has been a research and scientific knowledge hub in Chile. This is one of the very first laboratories in Chile focusing on biomechanics with proper infrastructure allowing top-level research with Chilean and foreign institutions/companies. Combining the fields of chemistry, biology, and mechanics, this laboratory also expands research alongside national and international Research Centers. More information on: <https://biomat.usach.cl/>

### Main Task



Support mechanical experiments development and biomechanical simulation. Some specific tasks include uniaxial and biaxial traction tests, analysis of experimental results and numerical simulation with finite elements.

### Student profile



This internship is aimed at undergraduate, master's, and Ph.D. level students from mechanical engineering, biomedical engineering, and civil engineering. The competencies of the

intern should include basic knowledge of solids mechanics, programming, experimental techniques, computational mechanics, and biomechanics.

Spanish and English language are accepted.

### Period



Two months.

35 hours/per week

### Benefits



Flextime.

Possibility to participate in the elaboration of a scientific research paper.

Possibility to participate in academic events

Lunch tickets for university dining.

### Supervisor



Dr. Claudio García Herrera, Faculty Member of the Department of Mechanical Engineering.



## Fluid-structure Interactions and Vibrations Laboratory

Fields of study: mechanics, fluid-structure interactions

The main experimental facilities are 2 high-speed cameras, a particle image velocimeter, 2 shake tables, ultrasonic sensors, and fill sensors. See as examples FSI-LAB here. Facilities to make numerical simulations and develop formulations and models.

### Main task



Perform numerical modeling or PIV experiments. The intern will need to collaborate in the development of numerical or experimental modeling and the analysis of the results.

### Student profile



This internship is aimed at undergraduate, master's, and Ph.D. level students in mechanical engineering; in the case of graduate students, specialization in numerical (computational mechanics) or experimental analysis is required. Students need to know basic programming (Fortran, C, or Python), and interest in theoretical and experimental mechanics.

Spanish, English, and French languages are accepted.

### Period



The length of time and working hours will be determined by the supervisor and intern.

### Benefits



Flextime.

Possibility to participate in the elaboration of a scientific research paper.

Possibility to participate in academic events.

A small stipend could be given according to the intern's job performance.

Lunch tickets for university dining.

### Supervisor



Dra. Marcela Cruchaga, Faculty Member of the Department of Mechanical Engineering.

Check out a previous experience in the lab here:



## Thermal Energy Storage Laboratory

Fields of study: energy

In this Lab (LAT, in Spanish), students and researchers develop research and teaching in the thermofluids area. The lab includes different techniques for the characterization of thermophysics of solids and fluids mainly used in applications of thermal storage and energy efficiency. Additionally, tools for computer simulation are implemented for evaluating materials, building processes, and thermal systems. LAT seeks to be a national referent in the thermal area, by offering opportunities for scientific cooperation and other services.

More information on <https://lat-usach.cl/>

### Main task

Perform thermal characterization of materials by using different techniques.

For this, students will need to develop the following specific tasks:

- Prepare heat transfer materials based on PCMs and nanomaterials.
- Develop thermal characterization of these materials.
- Data analysis
- Reports generation

### Student profile

This internship is aimed at undergraduates from mechanical engineering, chemical engineering, and master's and Ph.D. students of engineering sciences. Students need to have experience in the use of lab equipment and analysis of experimental results in the field of thermal storage or nanofluids.

Spanish and English Language are accepted.

### Period

35 hours per week.

Length of time will be determined by the supervisor and intern.

### Benefits

Flextime.

Possibility to participate in the elaboration of a scientific research paper.

Possibility to participate in academic events.

A small stipend could be given according to the intern's job performance.

Lunch tickets for university dining.

### Supervisor

Dr. Diego Vasco, Faculty Member of the Department of Mechanical Engineering.



# ELECTRICAL ENGINEERING DEPARTMENT

<https://die.usach.cl/>



DEPARTAMENTO DE  
**INGENIERÍA  
ELÉCTRICA**  
UNIVERSIDAD DE SANTIAGO DE CHILE

## Sustainable Energy Systems Research Center

Fields of study: sustainable energy systems

This new research program is focused on doing research on different topics concerning sustainable energy systems. This team of multidisciplinary scholars seeks to collaborate on projects with public institutions, and other academic entities, to strengthen the engagement with the external affairs.

## Main task



Participate in one of the research projects in electrical sustainable projects, H2 green, the impacts of electromobility, and sustainable energy in facilities.

## Student profile



This internship is aimed at undergraduate, masters, and Ph.D. students of any program in engineering with a specialization in sustainable energies.

Spanish, English, and Portuguese Languages are accepted.

## Period



Length of time and working hours will be determined by the supervisor and intern.

## Benefits



Flextime.

Possibility to participate in the elaboration of a scientific research paper.

A small stipend could be given according to the intern's job performance.

Lunch tickets for university dining.

## Supervisor



Dr. Héctor Chávez, Faculty member of the Department of Electrical Engineering.

Check out a previous experience in the Department of Electrical Engineering here:



# APPLICATION PROCESS

The documents required are the following:

- Curriculum Vitae (for Ph.D. level applicants, CV must contain personal statement, research objective, and academic experience)
- Cover letter
- Academic transcript for undergraduate and master's level applicants
- Passport or ID scanned

Documents need to be sent to [fing.international@usach.cl](mailto:fing.international@usach.cl) with the subject "Internship application".

# GENERAL CONDITIONS

Once you are selected, students will have access to the following:

- Lunch tickets for university dining
- Orientation for arrangements and arrival planning by the Coordinator of Global Education of the Faculty of Engineering
- USACH student card
- Internship Completion Certificate



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