

# CALL FOR APPLICATIONS

## RESEARCH ABROAD PROGRAM AT UNIVERSITY OF ILLINOIS CHICAGO (UIC)

ESTANCIA INTERNACIONAL  
FALL 2024

Tecnológico de Monterrey aims to offer its high-performing students a multicultural environment that provides a global perspective, and academic and personal development in prestigious international institutions. The Vice Rector's Office for Internationalization, in collaboration with the EIC and the research laboratories of UIC, invite pre-graduate students to carry out research abroad in Fall 2024 term.

This call is aimed at Tec21 study plans.

### GENERAL REQUIREMENTS

- Period: August – December 2024
- To be enrolled in the sixth semester by the time of applying to this call.
- To have completed a minimum of 90 credits by the time of applying.
- A minimum general average of 90.
- High English language level: TOEFL iBT 80, TOEFL ITP 550, or IELTS: 6.5 (current).
- Previous participation and experience in research projects are especially desirable and considered an asset.

### GUIDELINES

- It is the candidate's responsibility to carefully read the information on possible research projects and additional information on the center or laboratory, and scientists associated with the research project of their interest.
- This call does not include funds to pay for accommodation, food, or personal expenditure. Thus, students must have sufficient funds and appropriate Medical and Liability Insurance as per hosting university guidelines to support themselves at UIC for the duration of the respective research stay. Please, consider the [living costs](#).
- Students are required to pay a fee for the University visa DS-2019: 685 USD.
- A professor from Tecnológico de Monterrey will supervise the student's performance and monitor the compliance of the research objectives to assign a grade to the student.

## PROJECTS

Laboratory	# Spots	Major	Project	Description
Supply Chain Management and Logistics	4	IIS, LEC	Impact of Supply Chain and Economics Indexes in Environmental Performance	This study explores the relationship between nearshoring practices, transportation modes, and their collective impact on the Environmental Performance Index (EPI) and logistic performance index (LPI). As global supply chains continue to evolve, environmentally friendly conditions have become essential for our future. The primary objective of this paper is to test the hypothesis that specific supply chain environmental index has an influence on Latin America logistics performance index (LPI).
Physics	1	INA	Surface modification of nano-particle cathodes for rechargeable batteries	Rechargeable battery cathodes often consist of transition metal oxide host materials that allow for facile diffusion of Li (or multivalent ions, such as Mg or Ca). The most promising materials are based on the spinel structure, where the redox-active transition metal sites are distinct from the intercalation sites. While the overall capacity of the cathode materials to host Li (or multivalent) ions determines the power density of a battery, which is important for the development of carbon-free energy sources for transportation and grid-scale energy storage, capacity fade, the long-term loss of storage capacity after repeated charge-discharge cycles, limits the useful lifetimes of many high-energy-density cathodes. In this project, we will explore the effects of surface corrosion, including structural changes to the spinel structure of the battery cathodes and correlate the observed changes to the loss in storage capacity. Atomic-resolution scanning transmission electron microscopy imaging and spectroscopy will be performed on various cathode materials in their pristine, charged and discharged states. Surface modifications will be explored that will limit the modification/dissolution of the cathode surfaces, while maintaining the high mobility of Li (or multivalent) ion from the electrolyte into the cathode (and vice versa). The outcome of this study will have significant impact on the lifetime of future battery powered devices and ensure that the clear energy revolution will be successful.
Physics	1	INA	Graphene liquid cells to study anti-bacterial nanoparticles	The progression of dental caries and odontogenic infection is attributed to robust biofilm formation by Streptococcal strains. Nanoceria prepared from Ce (IV) salt hydrolysis were previously shown to limit Streptococcus mutans biofilm adherence in complex growth media via non bactericidal mechanism(s). However, their preparation requires highly acidic conditions (pH < 2.5) that readily form non-tractable agglomerates at physiological pH and in the presence of sodium fluoride – a common occurrence with pristine metal oxides. In this project, we study cerium oxide nanoparticle aggregates formulated with chondroitin sulfate A (CSA) resulting in superior chemical stability under physiological conditions - while maintaining biofilm reduction efficacy and minimal toxicity toward human cells populations. CSA formulated aggregates of CeO <sub>2</sub> -NP demonstrates dose-dependent aggregation of S. mutans while having minimal effect on bacterial growth. Using a combination of atomic-resolution scanning transmission electron microscopy (STEM) imaging and spectroscopy, we will develop novel graphene liquid cells that will enable us to characterize the effects of CSA on the ceria aggregation, the valence state and nano-particle structures. The outcome of this study is anticipated to have implications for future daily administration of anti-caries products
Rehabilitation Robotics	2	IMT	Actuator system design in the field of exoskeletons.	This project provides students with the opportunity to design the actuator system and explore the state-of-art research of the exoskeleton field in the Rehabilitation Robotics Lab
Urban Planning and Policy	1	LUB	Urban Transportation in Chicago	The student will explore the impact of Electric Vehicles (EV) in Illinois, including analysis of adoption and the effect of EV infrastructure
Information and Decision Science	1	ITC, IRS	Improving Object Detection in Images and Videos using Generative AI Tools (Image Generation Models)	Object detection, a specific technology under AI, serves as a foundational technology in an array of fields that rely on images, from autonomous vehicles to healthcare. This proposal outlines a unique approach to enhance object detection capabilities, and bridge the gap between advanced AI tools and business use cases. We aim to incorporate counterfactual learning via image inpainting techniques during training as well as inference (specifically using image generator models such as stable diffusion / DallE 3 etc). We will test these enhancements on custom

## HOW TO APPLY

### 1. Update your profile at:

MITEC -> **MI EXPERIENCIA INTERNACIONAL** -> ESTUDIANTE INTERESADO -> ACTUALIZA TU PERFIL

Tutorial: <https://www.youtube.com/watch?v=Vnr9vVDgY1w>

It takes 16 working hours to validate it.

### 2. Once your profile has been validated, you can send your application:

MITEC -> **MI EXPERIENCIA INTERNACIONAL** -> ESTUDIANTE SOLICITANTE -> REALIZA TU SOLICITUD

Code: EUA-5EVI-359A

Period: August – December 2024 (Preselección)

Tutorial: <https://www.youtube.com/watch?v=qdl18kp7DeI>

#### Key points:

- The preselection programs are not part of the regular application calendar for the study abroad and international exchange programs. Therefore, if this is the research abroad program you are most interested in, **EUA-5EVI-359A** is the only code you must register for on your application. You do not need to include any other program.
- Shortly after the application has been sent, you will receive an e-mail notification indicating you must accept a “pre-selection.” Please, consider this is only an automated status of the platform to continue with the next step and it is NOT the official selection of students. The International Programs Office will inform the official selection by e-mail on April 17, 2024.

### 3. Submit your documents:

MITEC -> **MI EXPERIENCIA INTERNACIONAL** -> ESTUDIANTE SOLICITANTE -> ENTREGA DE DOCUMENTOS DE ADMISIÓN

Once you have accepted the pre-selection status on the platform, you must submit the listed documents.

**Application deadline: March 8, 2024**

## DOCUMENTS TO SUBMIT

Submit all documents in **PDF** format:

1. **Motivation letter.** Present a letter addressed as “Dear Professor” to explain the reasons and interest to participate in the project, and the contributions you might add; 1 page maximum in English.
2. **Curriculum Vitae.** Free format in English.

3. **English language proficiency certificate:** TOEFL iBT 80, TOEFL ITP 550, or IELTS 6.5 (current).
4. **2 letters of recommendation** in English issued by your teachers.
5. **Evidence of teamwork skills, leadership, and proactivity** (participation in student groups, social activities, representative teams, outstanding work done as a team leading the respective team, etc.) The evidence may be photos that include a brief description and/or a portfolio.
6. **Scanned copy of the passport.** It must be valid for at least 6 months after your return to Mexico.
7. **Project selection.** On this [format](#), the candidates are required to register to the project they are interested in according to their major.

**Document submission deadline: March 8, 2024**

Applications will not be accepted after the deadline, without exception. Incomplete documents will not be considered to participate in the program. Candidates with incomplete documentation will be disqualified.

## SELECTION PROCESS

It is divided into two parts:

1. **Pre-selection by the Tec de Monterrey.** It involves a review of the files, an analysis, and evaluation of the candidates based on the documentation and requirements. Tec de Monterrey will send the pre-selected candidates' files to the UIC professors for the next phase.
2. **Selection by the researchers from UIC.**
  - a. They will analyze each candidate's file.
  - b. If selected for the interview, an appointment will be arranged with the UIC researchers via video call in English.
  - c. Report from UIC leading researchers to the Tec de Monterrey delegate.

Once the selection process concludes, the selected students will receive an e-mail from the International Programs Office on April 17, 2024, and the instructions to complete the enrolment.

**IMPORTANT:** If your selection is not positive, you cannot postulate to another program as the last day to do so is March 28, 2024; besides, you cannot submit two applications on the International Programs platform simultaneously. Therefore, you will have to plan another academic activity for the next semester.

## TO THE SELECTED STUDENTS

- Be fully aware that, as a selected student, you are representing this institution. Thus, in addition to complying with the norms and standards of the respective research center or laboratory, without exception, you will be obliged to always comply with the institutional values and the General Regulation of Students of Tec de Monterrey, which applies when the students of our institution are abroad.

- The commitment of the selected student to participate in the research project in an active and committed way, with an attitude of learning and contribution always.
- Under no circumstances the selected student will be able to seek additional work to support themselves during the stay. It is important to take this point into account since it is a very serious matter for the immigration authorities of the United States.
- The work schedule will be defined by the mentors of the project in which they will participate and must be fully complied with.
- Due to the nature of the projects and the intellectual property involved, the student must sign a confidentiality agreement.
- The time will be determined by the UIC researcher together with the Tec student, as well as any change in dates.
- Students must have sufficient funds to support themselves in UIC Illinois for the duration of their stay. This call does not include funds for accommodation, food or any other type of expense derived from your research stay in the selected laboratory or center.
- Selected students are expected to complete and pay for the corresponding visa process including any related fee of 685 USD that UIC dictates for reimbursement.

## REGISTRATION AND ACCREDITATION OF COURSES

The program has a minimum duration of 18 weeks. Students will be enrolled at Tecnológico de Monterrey in the academic period August – December 2024.

Students will enroll in 18 credits per semester. Students, in conjunction with the Academic Coordinator, should evaluate the transfer of the credits to the study plan before the student participates in the research abroad program.

The academic units (subjects) that will receive credits for the research abroad program must be defined and authorized by the Academic Coordinator. It is the student's responsibility to validate with the Academic Coordinator the availability of the academic units of the study plan to be accredited by the project they will participate in. Once this plan has been determined, students must complete their registration in the International Programs platform:

**MITEC -> MI EXPERIENCIA INTERNACIONAL -> ESTUDIANTE SOLICITANTE -> REGISTRA TUS MATERIAS**

A professor from Tec de Monterrey will evaluate the student's research abroad and grade the academic performance according to the [policy](#).

## TUITION AND OTHER FEES

The tuition fee to be paid will be directly at the corresponding Tecnológico de Monterrey campus. Payment will be made according to the number of units/credits registered in the period of August – December 2024.

Selected students will pay a participation fee: 1,600 MXN. Payment may be made in MiTec.

Students are required to pay a fee of 685 USD related to the corresponding visa process, in addition to visa fees paid to the US Embassy.

## ADDITIONAL INFORMATION

Any point not covered in this call will be resolved by the selection committee in conjunction with the proper authority of Tecnológico de Monterrey as the case may be. Please consider that this call is subject to change without notice; this might involve costs, projects, vacancies, dates, or any other. Any problem or doubt regarding the application process should be communicated promptly to the [International Programs Office at your campus](#).

