CALL FOR STUDENT NOMINATIONS

Research Abroad Program in Engineering and Sciences at
McGill University

September-December 2023

Tec de Monterrey has the aim of offering to its high-performing students a multicultural environment that contributes to their global perspective, academic, research and personal development in institutions of recognized international prestige. The Vice-Rector's Office for Internationalization, in collaboration with the research groups and centers at McGill Univeristy, invites pre-graduate students to carry out research stays from September to December 2023.

This call is open for students enrolled in academic plans prior 2019 and Tec21 Model.

GENERAL REQUIREMENTS

- To be enrolled in the sixth semester by the time of submitting the application to this call.
- To have accredited a minimum of 90 credits by the time of submitting the application.
- A minimum general average of 90.
- High English language proficiency certificate: TOEFL iBT 80, TOEFL ITP 550, or IELTS: 6.5 (current or expired).
- Previous participation and experience in research projects.

GENERAL GUIDELINES

- It is the candidate's responsibility to carefully read the information on possible research projects as well as additional information on the center or laboratory and scientist associated with the research project of interest.

- This is a full-time internship, from Monday to Friday.

- This call does not include funding for accommodation, food or any personal expenditure.

- Financial support will not be provided by the McGill Professors.

- Students must have sufficient funds to support themselves in Canada as well an appropriate Medical Insurance. Please, consider the living cost for a semester in Montreal [Cost of Living in Montreal. Jan 2023. Prices in Montreal (numbeo.com)](#)

- Students work under the supervision of a McGill academic staff member and do not register courses at McGill. Therefore, students do not obtain official McGill transcripts.

- A professor from Tec de Monterrey will supervise the student's performance and monitor the compliance of the research stay's goals to assign a grade to the student.

- Students do not pay any fees to McGill therefore are not eligible for access to the McGill athletics facilities or other student services.

HOW TO APPLY

1. The student must update his/her profile at:

   Mi Tec -> Mi Experiencia Internacional -> Estudiante Interesado -> Actualiza tu Perfil

2. The student must send his/her application by March 08, 2023, including the program key: **MEX-5EVI-005A** at:

   Mi Tec -> Mi Experiencia Internacional -> Estudiante Solicitante -> Realiza tu solicitud

3. Shortly after the application is sent, the application status will be updated, and the student must accept the preselection. It is particularly important to keep in mind that this is NOT the final result. The final result will be communicated by the International Programs office by mid-April.

4. The student will have access to the Document Submission and must upload the required documents by March 08, 2023.

DOCUMENTS TO SUBMIT

Documents must be digitized in two PDF files.

1. The first PDF file must be named with the prospective student ID and full name, it must include:
   - English language proficiency certificate: TOEFL iBT 80, TOEFL ITP 550, or IELTS 6.5 (current or expired)
   - Copy of a valid passport (more than 6 months of expiration after coming back to Mexico)

2. The second PDF file must be named with the prospective student's name and last name, and the last name of McGill's Research Professor in charge of the project. For example: Dafne Peña_Cooperstock
   It must include:
   - Motivation letter (in English, maximum 1 page, and addressed to the Professor)
   - CV (in English, free format)

Students are allowed to apply up to 2 different internships/projects in the same call. The motivation letter must be modified according to the lab description and addressed to the Professor.

Some recommendations when writing the motivation letter:
   - Always start out your letter with a polite "Dear" or "Hello" followed by the professor's last name.
   - Mention academic background, previous research experience, interests, qualifications, and skills.
   - Demonstrate interest and familiarity with the professor's research area.
   - Mention what you could add to the research group or project.
   - How this research internship will benefit you on a personal, academic, and professional level.

Enter info and requested documentation in the following link McGill – Research Abroad Spring 2023

The deadline for the submission of the documentation will be March 8, 2023. Without exception, applications will not be accepted after the deadline. Candidates with incomplete documentation will not be considered to participate in the program.

SELECTION PROCESS

The selection process is divided into **two parts:**

1. **Pre-selection** by the Tec de Monterrey.
   An analysis and evaluation of the candidacy will be carried out by Tec de Monterrey.
   a) Analysis and review of documentation.
   b) Pre-selection of candidates according to the program.
   c) Sending the file directly to the professors from McGill for their consideration.

2. **Selection** by the researchers from McGill University.
   a) Analysis of the candidates sent. In some cases, candidates are interviewed.
   b) Final report from McGill leading researchers to the Tec de Monterrey Director of the International Liaison Office-Montreal and the International Programs Office at Tec de Monterrey.

Once the process is completed, the selected students will be contacted by email by mid-April 2023 and will receive instructions to move forward with his/her register process at McGill and Tec de Monterrey.

TO THE SELECTED STUDENTS

- The first and last of the research stay day will be agreed separately in each case by the student and the McGill researcher. Official academic fall term at McGill is from August 30 to December 21 including final exams. Students need to complete at least 16 weeks of research stay.

- Students that work as researchers do not require work permit. To qualify for a work permit exemption for researchers, students cannot stay more than 120 days in Canada. The students must consider this point when they agree on the first and last day of the research stay.

- The selected students must be aware that they are part of the image of the institution, so in addition to complying with the norms and standards of McGill University they remain under the code, rules, values, and the General Regulation of Students at Tec de Monterrey when being abroad.

- The selected students are encouraged to be proactive and committed with their learning process, dedication, and contribution during their research internship. Occasionally, students might be asked to read some bibliography and dedicate some hours to the project before arrival, so they are better prepared.

- Students may sign a confidentiality agreement at McGill, depending on the nature of the project and agreed terms by the professors.

REGISTRATION AND ACCREDITATION OF COURSES

The students will be enrolled at Tec de Monterrey in the academic period August-December 2023.

Students of academic plan prior to 2019:

The number of units to be accredited will be defined by the Academic Coordinator prior to the student´s participation. The number of units to be enrolled and credited in each semester is:

> Minimum: 8 units
> Maximum: 32 units

Students of academic plan Tec 21:

The student will enroll 18 credits per semester. Prior to participation the student should review with the Academic Coordinator the accreditation in the study plan.

The courses to be revalidated from the student's study plan will be defined by the Academic Coordinator and informed to the International Programs Office of the student´s campus.

Once accepted, students must complete their course registration for each period in the International Programs platform.

It is student's responsibility to validate with the Academic Coordinator the availability of the subjects to be revalidated by a project in which they participate.

Students will have assigned a Tec professor who will evaluate and define the student final scores of the research abroad experience, considering the following policy.

TUITION

The tuition to be paid will be directly at the corresponding Tec de Monterrey campus. Payment will be made according to the number of units/credits registered in the period August-December 2023.

ADDITIONAL INFORMATION

Any point not covered in this call will be resolved by the selection committee in conjunction with the competent authority of Tec de Monterrey as the case may be. Any problem or doubt regarding the application stage should be communicated in a timely manner by sending an email or attending to the International Programs Office at your campus.

PROFESSORS, LABS AND RESEARCH WORK

PROFESSOR	LAB	Places	PROGRAM	RESEARCH WORK DESCRIPTION
Prof. Mary Kang	Subsurface Hidrology and Geochemistry Research Group	1	IC, IDS	Research areas are groundwater hydrology and environmental impacts of subsurface-based energy development. Application areas include groundwater impacts and greenhouse gas emissions related to oil and gas development and geologic storage of carbon dioxide. The current projects involve (1) the development of analytical, numerical, and combined analytical-numerical multi-scale models of multi-phase flow through porous media, (2) field measurements of gas fluxes, and (3) geospatial and statistical data analysis. Fluids of interest include carbon dioxide, methane and other hydrocarbons, and water.

Prof. Jeremy Cooperstock	Shared reality Lab	2	IRS, ITC, IE, IMT	Current Research: multimodal immersive systems, augmented reality, telepresence, mobile computing, haptics. Shared Reality lab is broadly concerned with human-computer interaction technologies, emphasizing multimodal sensory augmentation for communication in both co-present and distributed contexts. This research tackles the full pipeline of sensory input, analysis, encoding, data distribution, and rendering, as well as interaction capabilities and quality of user experience.
Christopher Thibadeaux	Thibadeaux Lab	1	IQ, IBT	Research Themes: Chemical Biology and Synthesis/Catalysis. Prof. Thibodeaux research applies a diverse set of experimental tools spanning the realms of biochemistry, analytical chemistry, biophysics, molecular biology, and bioinformatics to study the biosynthesis of antimicrobial natural products and the biological processes that contribute to bacterial virulence and pathogenesis. The research program addresses the growing threat of drug-resistant human pathogens through several distinct, yet inter-related and cohesive approaches.
Anthony Mittermaier	Mittermaier Lab	1	IQ, IBT	The focus of Mittermaier lab is biomolecular dynamics. The goal is to understand how proteins, DNA, RNA, and metabolites change shape, react, and assemble with one another. This knowledge aids the development of new types of drugs and bioinspired materials and sheds light on the physical chemical principles that underlie living systems. The Lab's approach is based on three complementary pillars: experiments –design new methods to measure WHAT biomolecules are doing, as they do it; theory –use Physical Chemistry to better explain WHY they behave the way they do; and computation –write computer code that integrates experimental data and theoretical models to give detailed descriptions of biomolecular function that are thermodynamically and kinetically correct. Individual projects lean more heavily toward one pillar or another, or to practical applications.
Luis Miranda	IMAts Lab	2	IC	IMAts Lab is and interdisciplinary, multi-cultural research hub with solid bonds with other universities, industry, and government agencies. The research team covers areas around sustainable urban mobility, road safety, and emerging technologies using innovative and state-of-the art methodologies. The current research focuses on the impact of transportations systems and infrastructure on wellbeing.
Inna Sharff	McGill Aerospace Mechatronics Laboratory	1	IRS, ITC, IM, IMT, IFI.	The group's research goals are to increase the autonomy of these systems for a range of applications. In the context of UAVs, we are working towards increasing the autonomy of small multi-rotor vehicles for landing and take-off maneuvers, autonomous collision recovery control, and, of fixed-wing slow moving aircraft for acrobatic flying. Research with large indoor helium blimps related to control and docking of multiple blimps for artistic applications is also being pursued. A range of problems are being addressed including dynamics modeling and controller design, state estimation, localization and mapping, motion planning and parameter identification. In the context of Space Robotics, the current thrust of the research is related to Active Space Debris removal. The research group is investigating dynamics modelling and control algorithms for robotic debris removal as well as the use of tethered nets for debris capture. Work is also ongoing on space debris attitude and orbital propagation taking into account environmental uncertainties.
Georgios Mitsis	Biosignals and Systems Analysis Lab	1	IBT, ITC, IMD, IMT	The research group is interested in the application of signals and systems theory to the life sciences. In this context, the team is conducting research related both to algorithm development with a focus on nonlinear and time-varying systems modeling, and their applications to biological/physiological signals and systems, with a focus on cerebral hemodynamics and autoregulation. Specifically, the team is conducting research in the following areas: Modeling of nonlinear and time-varying dynamic systems; Cerebral hemodynamics and autoregulation; Time-varying functional brain connectivity; Computational oncology and optimal therapy design for cancer treatment.
Jan Nicolau	Nicolaus Lab	1	IBT, INA	Nicolau Lab's focus on: Design and fabricate dynamic hybrid nanodevices comprising linear protein molecular motors working on semiconductor manufactured electro-mechanical devices. Design and fabricate 'smart' micro/nano-profiled and electrically active surfaces that combinatorially probe the response of biomolecules for micro/nano-array applications. Study effective, non-denaturing technologies for immobilization of biomolecules in static (e.g., biosensors) and dynamic (e.g., microfluidics) biodevices. Study intelligent-like behaviour and algorithms used by microorganisms in their survival and search strategies, probed in microfabricated structures.
Noémie-Dorval	Dorval Lab	1	IQ, IBT, INA	The Dorval Lab works at the intersection of materials science, chemical engineering, synthetic biology, and nanotechnology. Biological materials have exquisite properties that enable them to naturally participate in various chemical and physical phenomena, assemble into complex shapes, and bind molecules or particles. The lab's research focuses on exploiting, enhancing and complementing these properties to fabricate next-generation multifunctional materials and devices. Specifically, the research group combines genetic engineering to program biomaterials with novel functions; bioconjugate, organic and inorganic chemical syntheses to form composites and

Reyes-Lamothe	Reyes-Lamothe Lab	2	IBT, IQ	The Reyes Lab aims to understand the function of molecular machines as they work inside the cell. The research group uses quantitative approaches in live cells, particularly through fluorescence microscopy, to infer the spatial organization macromolecules, the stoichiometry of molecular machines and the kinetics of cellular processes. The Lab's current focus is on the understanding of the molecular machines of DNA replication and uses "simple" unicellular organisms, E. coli and S. cerevisiae, as model organisms for bacteria and eukaryotes.
Boris Vaisband	Think Team Lab	1	IRS, ITC, IE, IMT, IE	THInK Team focuses on enabling heterogeneous systems integration. The research group deeps dive into different integration platforms and generate design methodologies to increase system performance, reduce energy footprint, and enable novel applications. Projects include research focus on: heterogeneous systems integration; implantable microsystems, analog/ digital/mixed-mode integrated circuits, wireless neural interfacing, and efficient-power converter design.
Livia Garzia	Garzia Lab	1	IQ, IBT	The Garzia lab investigates the molecular basis of metastasis and therapy resistance in pediatric solid cancers such as sarcomas and brain cancers. The lab uses genomics on patient samples followed by in vivo functional genomics models and its goal is to prevent or cure metastasis in these cancer types. The research work aims to unravel the genetic bases of cancer recurrence and metastasis in pediatric cancers such as bone sarcomas and brain tumors. The lab's work is focused on understanding how gene function is altered during the process of metastasis initiation, maintenance, and progression.
Hamed S. Najafabadi	Computational and Statistical Genomics Lab	1	IBT, IQ, IMD	Najafabadi lab encompasses the development of computational and statistical frameworks to decode these regulatory instructions, understand the evolutionary mechanisms that have shaped them, and decipher their role in normal cell function and in human diseases. By developing novel methods based on machine learning and statistical inference, his lab aims to characterize the regulatory factors that govern transcription, RNA splicing, and mRNA stability, and their contribution to neurodegenerative disorders and cancer.
Matthew Harrigton	Harrington Lab	1	IQ, IBT, INA	Harrington Lab work is focused on understanding biochemical structure-property relationships in the function and formation of biological materials and applying extracted design principles for the development and sustainable production of bio-inspired materials. Researchers at this lab utilize advanced material characterization techniques combined with traditional biochemical analysis to investigate why these materials have such excellent properties and how they are self-assembled. The research group then apply these distilled principles to create novel polymeric materials via advanced materials processing methods.
Kartiek Agarwal	Kartiek Agarwal	1	IFI, IM	The research in Prof. Argawal's group falls along the following general themes: a) Quantum protocols: One of the emerging goals in science today is the development of quantum simulators and quantum computers. The challenges on this front include, for instance: i) how can we stabilize quantum memories, and correct for errors from decoherence and dissipation? ii) how can we prepare quantum states of matter in specific eigenstates and with certain entanglement features? iii) what are feasible channels to implementing universal quantum gates? b) Quantum thermalization, many-body localization and non-equilibrium phases of quantum matter. c) Novel spectroscopic probes
Julia Burnier	Julia Burnier	1	IBT, IQ, IMD, INA	Burnier Lab's research focuses on understanding the dynamic molecular changes that occur during tumour progression and metastasis through liquid biopsy. Burnier Lab tracks tumour evolution through a liquid biopsy, a minimally invasive approach to monitor disease progression, recurrence and treatment response using a blood sample. The goal is to develop novel accurate and sensitive biomarkers and identify new targeted therapeutic strategies.
Eric D. Kolaczyk	Kolaczyk Lab	1	IDM, ITC	Kolaczyk Lab work is focused at the point of convergence where statistical and machine learning theory and methods support human endeavors enabled by computing and engineered systems, frequently from a network-based perspective of systems science. Current projects: Network modeling under noisy and/or dynamic conditions; Machine learning and artificial intelligence for chemistry and materials science; Statistical modeling and inference under differential privacy
Eric McCalla	McCalla Lab	1	IQ, INA	McCalla Lab's research is focused on the design of new functional materials through a combination of high-throughput synthesis along with more traditional solid-state chemistry approaches. Of immediate interest are novel materials for a wide variety of battery technologies including electrodes materials for Li- and Na-ion batteries as well as solid electrolytes for all-solid-batteries.
Gonzalo Cosa	Cosa Lab	1	IQ, INA	The research centers on designing, synthesizing and using fluorescent molecular probes and on developing fluorescence microscopy methods that combined provide unprecedented detail of chemical and biologically relevant processes with unsurpassed spatial-temporal resolution and sensitivity. The hallmark of Cosa Lab program lies in visualizing and monitoring the motions of molecules one at a time, by tracing fluorescence emission at the single-molecule level, unraveling properties otherwise hidden in bulk ensembles. Researchers at Cosa Lab create unique "movies" – sequences of molecular recognition and assembly processes as they lead to increasingly complex nano- and meso-scale structures.

| Lilian Childress | McGill Quantum Optics & Sensing Lab | 1 | IFI, IM, INA | Lilian Childress'research group applies notions from quantum optics and atomic physics to condensed matter systems, notably defect centres in diamond. The lab´s work is focused on two primary directions: (1) creating a spin-photon interface by integrating diamond defects into fiber-based micro-cavities and (2) investigating dynamics of spin-transfer-driven nanomagnets using defect-based probes. Other recent interests include optimal qubit readout, charge state dynamics of defect centres, opto-mechanics with superfluid helium, and micro-cavity-enhanced sensing. |