HEIA-FR
HTA-FR

CALL FOR STUDENTS NOMINATIONS

SPRING 2024
Research Experience Abroad at Haute École Spécialisee de Suisse Occidentale

Research Internship Program in Engineering and Sciences at the School of Engineering and Architecture, Fribourg of the University of Applied Sciences of Western Switzerland.

With the aim of offering high-performing students at Tec de Monterrey 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 School of Engineering and Sciences of Tec de Monterrey and the iPrint Research Center of the School of Engineering and Architecture of the University of Applied Sciences of Western Switzerland, Campus Fribourg, invites undergraduate students to carry out research internships during the Spring semester (February-June) of 2024.

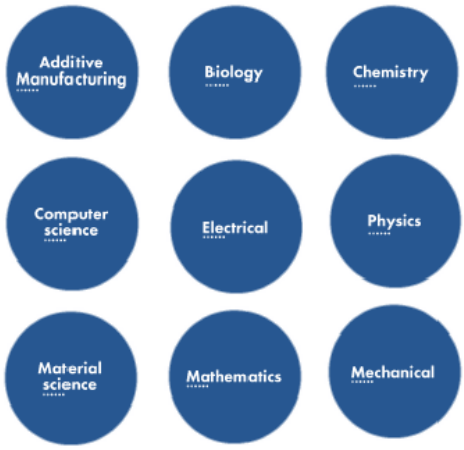
GENERAL REQUIREMENTS

All applicants must have and demonstrated:

- To apply to Spring 2024, you must be enrolled in the 5th semester by the time of submitting the application and have completed 72 credits by the time of applying.
- A minimum general average of 90
- Proof of English language proficiency from the minimum TOEFL 550 or equivalent
- Participation and experience in research projects
- Highly motivated, able to work independently, well organized and a good team player.
- Passionate about tackling grand challenges.

Starting dates and deadlines for receipt of applications for Spring 2024:

- *Opening date: August 15th*
- *Closing deadline: September 13th*

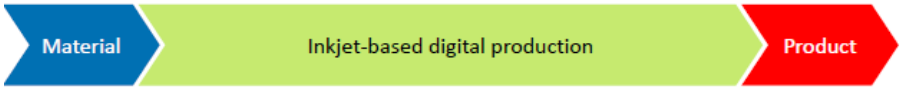


THE iPrint RESEARCH CENTER

- Multidisciplinary Institute and Competence center for Inkjet technology
- Established in 2013
- Is part of the School of Engineering and Architecture, Campus Fribourg of the University of Applied Sciences of Western Switzerland.
- 7 professors, 4 administrative staff, 30 scientific staff, 2 technicians
- 1’500 m2 space 24 labs with multiple home-built research printers

Education
Educate specialists in inkjet-related core competences with a highly interdisciplinary understanding

Innovative technologies
Develop new technologies enabling the revolution in tomorrow's digital production

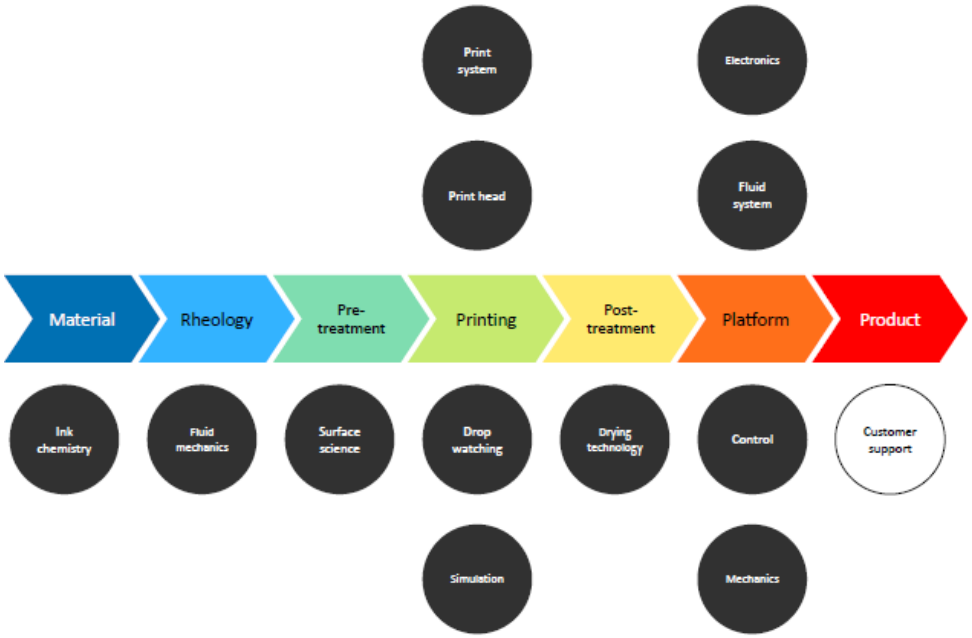


THE OBJECTIVES OF THE iPrint RESEARCH CENTER

Applied research
Develop and optimize inkjet-based digital printing processes

Technology transfer
Foster the technology transfer for digital printing processes

THE CORE COMPETENCES OF THE iPrint RESEARCH CENTER



PROFESSORS, LABS, PROJECTS, AND PROJECT DESCRIPTION

Project 1) Bioelectronics patches for ambulatory and remote care
No. spots: 1
Candidate Profile**:** Major in Electrical/Electronic Engineering or Physics (Those students who qualified for the project vacancy, despite the study program at TEC, are encouraged to apply if they can demonstrate skills and knowledge required at the project description)
iPrint Supervisor: Dr. Lorenzo Pirrami

PROJECT SUMMARY

Abstract:
Chronic nonhealing wounds in diabetic patients account for one of the most common complications of this disease leading to increased healthcare costs, decreased quality of life, infections, amputations, and even death. For instance, diabetic foot ulcers affect more than 1% of the world's population during their lifetime and represent a global burden on healthcare (Lou et al., 2020). In normal wound healing, tissues undergo three regeneration stages: inflammation, new tissue formation and remodelling. In each stage different cells are recruited, migrate, become activated and proliferate. As a result of factors such as diabetes, infection, ischaemia, metabolic conditions and immunosuppression, this carefully orchestrated process is impaired leading to high levels of proteases, elevated inflammatory markers, low growth factor activity, and reduced cellular proliferation within the wound bed. This results in significant patient discomfort and increased hospitalization rates (Jiang et al., 2022).

The purpose of this project is to develop a simple but effective bioelectronics patch for electrically stimulating and monitoring chronic wounds to improve their healing process. Compared to the literature, this concept focuses on the feasibility of optimizing the patch directly in an ambulatory environment where the medical staff will be able to rapidly assess the wound area through a robot arm and a short-range stereo camera followed by an automated image processing to detect the size, the perimeter, and the depth of the wound. As a result of this, an optimized matrix of electrodes will be printed on a flexible, stretchable, and conformal biocompatible substrate by the medical staff who will apply them to the patient rapidly after the wound assessment. During the internships, the student will focus on the wound assessment performing image acquisition and processing as well as optimizing and inkjet printing the matrix of electrodes.

Lou, D., Pang, Q., Pei, X., Dong, S., Li, S., Tan, W. qiang, & Ma, L. (2020). Flexible wound healing system for pro-regeneration, temperature monitoring and infection early warning. Biosensors and Bioelectronics, 162. https://doi.org/10.1016/j.bios.2020.112275

Jiang, Y., Trotsyuk, A. A., Niu, S., Henn, D., Chen, K., Shih, C.-C., Larson, M. R., Mermin-Bunnell, A. M., Mittal, S., Lai, J.-C., Saberi, A., Beard, E., Jing, S., Zhong, D., Steele, S. R., Sun, K., Jain, T., Zhao, E., Neimeth, C. R., … Bao, Z. (2022). Wireless closed-loop smart bandage for chronic wound management and accelerated tissue regeneration.
https://doi.org/10.1101/2022.01.16.476432

Project 2) New inkjet printhead design
No. spots: 1
Candidate Profile**:** Major in Mechanical/Electrical Engineering or Physics (Those students who qualified for the project vacancy, despite the study program at TEC, are encouraged to apply if they can demonstrate skills and knowledge required at the project description)
iPrint Supervisor: Dr. Gioele Balestra

PROJECT SUMMARY
Abstract:
Driven by the digital revolution and the demand for personalized products, inkjet printing has evolved from being mainly used for graphical applications to a digital fabrication toolkit. To further extend the application domains of inkjet printing, new printhead must be developed. In fact, today's printhead are limited in term of viscosity (max 20 mPa*s), particle size (max 3 µm) and jetting distance (few millimeters). The scope of this multidisciplinary project is to design, fabricate, assemble, and characterize a new inkjet printhead demonstrator to overcome such limitations. The student will familiarize with the mechanical design of microdevices, the different technologies necessary to fabricate and assemble them, the different piezo-electric actuation techniques available, and the methodology to characterize the performance of inkjet printheads. Numerical simulations for the mechanical design could also be performed. Depending on the student, electronic developments to drive the printhead could be undertaken as well. At the end of the project, the developed demonstrator will serve as a basis for the process developments in new digital printing domains.

Project 3) Advanced smart ink system for inkjet printing
No. spots: 1
Candidate Profile**:** Major in Mechanical/Electrical Engineering or Physics (Those students who qualified for the project vacancy, despite the study program at TEC, are encouraged to apply if they can demonstrate skills and knowledge required at the project description)
iPrint Supervisor: Dr. Gioele Balestra

PROJECT SUMMARY
Abstract:
Driven by the demand of new applications and markets, inkjet printing inks are more and more complex. Today's inks supply systems feeding the printhead with the inks to be printed are no-longer sufficient. Higher particle concentrations, heavier functional particles, higher polymer weights inks, more volatile solvents, etc. make the control of the ink even more crucial to guarantee a good jetting process from the printhead. The scope of this project is to add new innovative features to the ink supply systems to improve the printing performance thanks to an automatic feedback loop and control. Different elements as level sensor control, in-situ viscosity measurement and flowrate or pressure measurement could be developed and integrated into a new smart ink system. The information gained through such additional elements will be used for the automatic control and compensation to ensure the proper droplet

ejection at the nozzle. Additional features as degassing, particle sorting depending on the size, active/passive mixing, etc. could be added to the smart ink system as well to further improve the printing performance.

HOW TO APPLY

Follow 3 steps:

1. Update your profile at:

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

Tutorial: https://www.youtube.com/watch?v=orFahJzO6uM
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: SUI-5EVI-004A

Period: Febrero – Junio 2024 (Preselección)
Tutorial: https://www.youtube.com/watch?v=A2Hfzir6N5Q

Key points:

- The preselection programs are not part of the regular application calendar of the study abroad and international exchange programs. Therefore, if this is the research abroad program you are most interested in, **SUI-5EVI-004A** is the only code you must register for on your application. You do not need to include any other code or any other period.

- Shortly after the application is sent, you will receive an e-mail to notify you that you must accept a “pre-selection.” It is important to keep in mind that this is only an automated status of the platform to continue with the next step. It is NOT the official selection of students. The International Programs Office will inform the official selection by e-mail on October 23, 2023.

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: September 13, 2023

DOCUMENTS TO SUBMIT

Documentation to submit:

- A copy of your **Curriculum Vitae** (free format)
- A **motivation letter** (maximum of 1 page) in English.
- **Letter of recommendation** in English from one researcher at Tec de Monterrey probing the student skills for the project.
- **Transcript** (Fin English)
- **Proof of English language** proficiency from the minimum TOEFL 550 or equivalent (Current or expired)
- **Copy of valid passport**, it must be valid for at least 6 months after your return to México.

Some recommendations when writing motivation letters and CV:

- be very specific in both CV and motivation letters on how they can prove they have the skills and abilities required.
- include evidence of teamwork skills, leadership, and proactivity (i.e., participation in student groups, social activities, representative teams, entrepreneurial activities, outstanding work done as a team leading the respective team, etc.)

Document submission deadline: September 13, 2023

Applications will not be accepted after the deadline, without exception. Incomplete documents will not be considered to participate in the program.

Students can apply to different projects in the same call. However, remember to modify your motivation letter, CV, and recommendation letter.

Students might also be contacted and offered a different project, according to each profile and skills. We thank all students for their participation. We will only communicate with those who are preselected for an interview.

SELECTION PROCESS

An evaluation of each applicant is done by Tec de Monterrey under this calendar:

a) International Office of Monterrey Campus reviews documentation of all candidate's	August 15 to September 13

b) Notification of Preselected Candidates to office of Swiss International Academic Delegation	September 15
c) Swiss International Academic Delegation sends dossiers of student applications to research project directors at university	September 19
d) Interviews of student applicants by research project directors at university and notification of candidates that have been selected to Swiss International Academic Delegation	September 20 to October 18
e) Swiss International Academic Delegation notifies TEC of students that have been selected for research internship	October 20-23

After final interviews, we will announce the final resolution and students will have a couple of days to accept or reject the offer. Once accepted, students will have further instructions to move forward with the VISA application.

The committee's decision is always final.

TO THE SELECT STUDENTS

- The starting and finishing day will be agreed in individual cases by the student and the iPrint researcher.
- **Official Spring term is February - June**. Students need to complete at least 16 weeks of research internship. Students are welcome to arrive a few weeks before the internship starts.
- Be fully aware that, as a selected student, you are part of the image of the institution, so in addition to complying with the norms and standards of HEIA Fribourg, you 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.
- The work schedule will be defined for both the student and iPrint researcher before the student arrives in Switzerland. There will be a TEC Researcher closely involved in the project or internship.
- Students must sign a confidentiality agreement at the iPrint Research Center, depending on the nature of the project and agreed terms by the professors.
- Research internships are unpaid. Students need to demonstrate sufficient funds to apply for an internship or student visa. Notice that this is a full-time internship from Monday to Friday.
- This call does not include funding for accommodation, food, or any personal expenditures either from TEC or HEIA Fribourg.

- Visa process will take about 4 months. Students should cover their visa process cost. You can visit the site: https://www.fr.ch/vie-quotidienne/demarches-et-documents/etrangers for further information about immigration requirements.

REGISTRATION AND ACREDITATION OF COURSES

Students will be enrolled at Tecnológico de Monterrey in the academic period February-June 2024.

Students of academic plan pre-2019:
The number of units to be accredited will be determined by the Academic Coordinator before the student participates in the research abroad program. The number of units to be enrolled and accredited per semester is:

Minimum: 8 units
Maximum: 32 units

Students of academic plan Tec21:
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.

To students of both academic plans:
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 it is 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 PARTICIPATION 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 February-June 2024.

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

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.