CALL FOR STUDENTS NOMINATIONS.

Research Abroad Program at Purdue University, USA

With the aim of offering high-performing students at Tec de Monterrey a multicultural environment that contributes to their global perspective, academic and personal development in institutions of recognized international prestige, the Vice-Rector's Office for Internationalization in collaboration with EAAD, ECSG, EHE and EIC of Tec de Monterrey and the research laboratories of **Purdue University** invite pre-graduate students to carry out research abroad starting Fall 2023 term.

- This call is addressed to students of Tec 21 (semester 7th for EIC; Semesters 6 & 7th for the rest of schools) and students enrolled in academic plans prior to 2019
- Period of the Research Stay: Aug-Dec 2023
- Completed at least 5 semesters at Tec by the time of application
- The deadline for the submission of the documentation will be March 30, 2023.

Projects:

TEC MAJORS	Project Name	Description	Qualifications
IDS, ITC, IE	Smart Charging System for Electric Vehicles (EVs) and Load Management utilizing Fine-Grained Solar Power Predictions	The proposed new system has various uncertainties to overcome such as hourly PV generation, EV coming/departing time, customer various load demands, and required charging power, etc. These uncertainties significantly impact the parameters of the system using the current/ traditional algorithms. So, there is a critical need for an efficient solution to incorporate those uncertainties in the system to guarantee stable and precise functioning of the EV charging system' operations, and loads' behavior. Additionally, the system may act another way in physical applications because various pragmatic considerations have been shortened in the current algorithms. That is why it is mandatory to validate the algorithm in a physical environment. Moreover, PV integration into the power grid is constrained by the load performance (linear and nonlinear), and EV chargers. Thus, a fine-grained prediction of dynamic demand and supply is essential for more economical and cost-effective usage by enabling dumping, storing, and managing any excess power. However, uncertainties of real load behaviors pose vital challenges in behavior control of the energy storage under the smart operation. Another challenge for PV-EV-Battery smart charging is the synergies optimization among the PV power generation, customers' load demand, and EV energy demand to (a) improve the PV penetration to the power grid, (b) promote self-consumption, and (c) provide ancillary services to the grid. In this ever-complex load management system, utilization of artificial intelligence (AI) techniques have been emerged for predictive modeling, optimization, maximum power point tracking (MPPT), and power management for smart charging. Therefore, it is very important to implement new schemes to handle these tasks.	Experience in programming and simulation software with good writing skills.
Robotica, IMT	Construction Automation	We are investigating the future of construction by integrating internet of things (IoT), building information modeling (BIM), robotics, and cyber-physical systems (CPS) into our cutting-edge D. Dorsey Moss Construction Lab (take a peek at the lab facility here: https://www.youtube.com/watch?v=HJ5O2bo8Z74). Several federal and state sponsored research projects are underway at the Automation and Intelligent Construction (AutoIC) Lab, such as the following: https://www.nsf.gov/awardsearch/showAward?AWD_ID=2231160&HistoricalAwards=false https://www.nsf.gov/awardsearch/showAward?AWD_ID=1827733&HistoricalAwards=false https://www.nsf.gov/awardsearch/showAward?AWD_ID=2222838&HistoricalAwards=false https://www.nsf.gov/awardsearch/showAward?AWD_ID=2121967&HistoricalAwards=false https://rip.trb.org/view/1870407 https://rip.trb.org/view/1870408 We are glad to host students who have a passion in construction automation and sustainable built environment, and would like to work on research topics related to any of the above mentioned areas.	• Hands-on experience working with industry robots (e.g., Kuka, ABB, Fanuc, Yaskawa, etc.) or any sensor • Java, Python or C++ programming background • Strong oral and written communication skills • Strong self-motivation • Excellent collaborative

			and interpersonal skills Optional: • Hardware prototyping or manufacturing experience • Electronics experience
IMT, IM, IQ	Composites Additive Manufacturing	Work with Professor Pipes and Dr. Eduardo Barocio in the study of carbon fiber composite additive manufacturing utilizing CAMRI, a 3D Printer developed by Purdue at the centimeter scale and the Thermwood LSAM large-scale additive manufacturing system at the meter scale.	Engineering major in the fields of mechatronics, mechanical engineering, chemical engineering or materials engineering.
IIS	Gaussian Influence Diagrams (Industrial Engineering)	The normal (Gaussian) influence diagram has been shown to be a valid representation of the multivariate normal distribution that can be used as a Kalman-filtering model for estimating the state vector of a discrete-time linear dynamical system and for linear-quadratic-Gaussian decision making (Kenley 1986). This project aims to implement the linear-quadratic-Gaussian decision making influence diagram as an open source package in Matlab. A student researcher would be learning about the normal (Gaussian) influence diagram and adding code and testing an extension to an existing open source package in Matlab. Kenley, C. Robert. 1986. Influence diagram models with continuous variables. Doctoral Dissertation, Stanford University. http://web.ics.purdue.edu/%7Eckenley/pubs/Kenley1986.pdf	Student must have previous course work in linear algebra and probability, and experience in coding in Ma

TEC SCHOO	TEC MAJOR	Project Name	Description
EAAD, EIC	ARQ, LUB, IC	Public Perceptions of Construction Jobsites	Evaluate the perspectives of the general public in the surrounding areas of a construction job site related to what they think about construction as an industry. Additionally, the study will evaluate the impact of jobsite activities on the general public's daily routine and the impact that has on their perceptions of construction. Students will help with data collection and the formation of data analysis. This is conducted with Dr. Luciana Debs.
EAAD, EIC	ARQ, LUB, IC	Lessening Density Requirement and Adjusting Density Pay Factors for Asphalt Pavements in Poor Sublayer Conditions	The main objective of the study is to identify the correlation between the density of the new surface layer and the condition of existing sublayers of Hot Mixed Asphalt pavements. This study is supported by the Indiana Department of Transportation (INDOT). The student will be participating in data collection and statistical analysis of the density of asphalt pavement. This practical research will help the students understand the quality assurance and quality control (QAQC) of pavement construction.
EAAD, EIC	ARQ, LUB, IC	Public Perceptions of Construction Jobsites	Evaluate the perspectives of general public in the surrounding areas of a construction jobsite related to what they think about construction as an industry. Additionally, the study will evaluate the impact of jobsite activities on general public's daily routine and the impact that has in their perceptions of construction. Students will help with data collection and formatting data for analysis. This project is a collaborative project with Dr. Besiktepe.

TEC SCHOO	TEC MAJOR	Project Name	Description
ECSG	All	Primary Project: Sleep and Health in the Home	Early childhood is often a period in which patterns of obesity begin, and these patterns can last well into adulthood, which is associated with several negative health outcomes. This is especially significant for people who identify as African American and Latinx. The goal of this project is to work with families from these identified groups to understand the sociocultural systems that contribute to parenting decisions that may increase the likelihood of child obesity. This study will be in the data collection phase during the Fall 2023 and Spring 2024 semesters and will be conducted in both English and Spanish. Undergraduate assistants in this project will have the opportunity to help with sleep scoring, data collection, preparation of materials, and any other tasks that will assist with the lab. Undergraduates may also have the opportunity to work on other projects in the lab.
ECSG	All	Representing Migration In/Through Mexico	This project, "Representing Migration In/Through Mexico," will be the starting point for my new monograph, and will look at the representation in film, literature, and other cultural products of and by migrants, particularly Central Americans, and their journey through/to Mexico, with a final intended destination of the United States or Canada. This project will illuminate the experiences of undocumented migrants in both Mexico and the United States through analysis of literature, film, art, and other projects. It will provide a historical overview of the cultural representation of this history of migration, from the 19th-century to the present, but will focus in particular on the proliferation of such representations of Central American migrants and their experiences in Mexico as well as in the United States in the late 20th-century and the 21st-century. The so-called immigration crisis at the U.S.-Mexico border has consistently attracted headlines and heated political commentary in the United States and Mexico for the last two decades. Yet it is an experience that is poorly understood by the general public and one that is often portrayed as a “new” phenomenon, despite the fact that this is not the case. There has also been a surge in the production of literature, art, testimonios, and other cultural products produced by migrants traveling through/to Mexico in the last 10-15 years, yet no systematic study of this representation, and no systematic study that looks at such production in both English and Spanish, that analyzes works produced in both the United States and Mexico, and that examines how this representation has changed over the course off more than two centuries. This project will thus be a significant contribution to the fields of Mexican and U.S. literary studies, political science, immigration studies, Mexican and U.S. history, and Mexican and U.S. cultural studies. The student will assist me in identifying, reading, summarizing, and cataloguing sources (literary, cinematic, artistic, etc.) published or written in both Mexico and the U.S. that represent such experiences, from the 19th century to the present (depending on student’s interests and strengths, as well). In addition, and depending on the amount of time the student is at Purdue and the research interests/strengths of the student, the student may assist me in researching and/or writing the introduction to the book, which could be published separately as a stand-alone article and which would involve a cultural history of the representation of migration in, through, and to Mexico from the 19th-century to the present.
ECSG	All	Relationship between social media usage and vaccine hesitancy.	This research examines the vaccine information seeking behaviors and how it impact on the vaccine hesitancy and the vaccine uptake.

TEC SCHOO	TEC MAJOR	Project Name	Description
EHE	Comunicacion, Letras Hispanicas	Milton on the Hispanophone Stage and in Paratexts	The two-semester (Fall 2023 and Spring 2024) internship project, “Milton on the Hispanophone Stage and in Paratexts” focuses on two Spanish-to-English translation and research projects. During the Fall 2023 semester, the project would center on completing the transcription of the Ibero-Spanish play "El Paraíso de Milton, drama en tres actos y en verso" ("Milton’s Paradise, A Drama in Three Acts and in Verse"; 1878) by Francisco Pérez Echevarría and Arturo Gil de Santivañes. This project extends Professor Angelica Duran’s prior co-publications with undergraduate interns of Spanish-to-English translations. Purdue interns M Cadwallader (Spanish major) and Tim Bolton (Creative Writing major) went above and beyond and are thus credited as Duran’s co-translators of the Spanish-to-English verse translation of the 19th-century Ibero-Spanish play "Milton: Drama in One Act and in Verse" published in Milton Quarterly (2017). So too with Brenae Newhard (Comparative Literature and Spanish majors) with the Spanish-to-English translation of the 20th-century Mexican pastorela "Paradise Lost: Drama in 4 Acts Arranged by Ambrosio Nieto, Upon the Inspiration of the Immortal Milton" (2023), forthcoming in the same journal. Duran would plan to submit this transcription and translation to Milton Quarterly as well, with the intern possibly credited as co-translator depending on a high level of contribution. During the Fall 2023 semester, the intern would attend the 3 material and digital archive workshops that are part of all of Duran's Purdue courses so that, Spring 2024, the intern could conduct material and digital archival research on the Hispanophone translations of Milton’s late masterpieces: twenty-four translations of "Paradise Lost" (twenty from Spain, four from Hispanoamerica), two of "Paradise Regained," and one of "Samson Agonistes." The intern would use Purdue’s excellent digital resources and interlibrary loan network to add to the materials that Duran possesses in order to access as many of these Hispanophone Miltonic translations as possible. The intern would collect all their footnotes for entry into Anglophone digital editions of "Paradise Lost," "Paradise Regained," and "Samson Agonistes" that would possess all Hispanophone footnotes as possible and their English translations. These digital editions will be an invaluable resource for scholars who seek to advance Anglo-Hispanic literary research, as Duran knows from her recent books: "Milton in Translation" (Oxford UP, 2017), "Milton among Spaniards" (U of Delaware P, 2020), "Global Milton and Visual Art" (Rowman & Littlefield, 2021), and "Milton Across Borders and Media" (Oxford UP, 2023).
EHE	Innovacion Educativa	Teachers and Researchers Advancing Integrated Lessons in STEM (TRAILS)	TRAILS is an acronym for Teachers and Researchers Advancing Integrated Lessons in STEM. This is a National Science Foundation project that is bringing together high school Biology or Agriculture (life science), and Engineering/ Technology Education teachers through integrated STEM professional development experiences. The TRAILS 2.0 SEI (Scaling, Expanding, and Iterating Innovations) expands participation in STEM education and pursuits in STEM careers by a strategic partnership with Purdue University and the University of Hawai’i at Manoa, University of Maryland- Eastern Shore, Otero Junior College. Partnering faculty will provide access to necessary local knowledge to reach rural schools containing underserved high school student populations. TRAILS 2.0 overarching goal is to enhance underserved and underrepresented rural high school students’ interest and capacity to pursue STEM careers and prepare secondary teachers to provide technology-rich integrated STEM learning experiences. Providing technology and support to rural and underserved cohorts serves to level the playing field for students and teachers in rural populations, thus, bridging equity gaps known to exist in these areas. SEE: https://www.nsf.gov/awardsearch/showAward?AWD_ID=2148781&HistoricalAwards=false AND https://www.nsf.gov/awardsearch/showAward?AWD_ID=2148782&HistoricalAwards=false
EHE, EAAD	Innovacion Educativa, LAD	Increasing Task Performance: Color Field Animation & Speed	As technologies expand the landscape of animation and virtual environments, there is a growing need for designing ideal environments for understanding human task performance. Current technologies make it possible to measure performance, speed, and accuracy for a given task. Previous studies support connections between mood and performance, as well as color and mood, but little evidence links color with animation, speed and performance. For this study we have focused on creative thinking and error-checking tasks by applying color field animations with designs to target color, arousal, composition, and animation speed. By combining areas of expertise in computer graphics, engineering, and psychology, we propose the novel idea that design and color field animation can affect work and learning performance by increasing and decreasing visual searching. Distinct colors influence emotional concepts, for example, by evoking negative responses associated with red when green is present, but not when green is absent (Kawai, Claudia, et al., 2020). We also know hue plays a more significant role than chroma or lightness in influencing the perception of color emotion and color preference (Gong, Rui, et al., 2017). Communicating affect, experience, or emotion, is critical in creating engaging color and palette properties. Participants in this study were divided in two groups, viewing two different sets of color field animations and identical questions. By studying creative thinking and error-checking, measured quantitatively, we see how design factors in learning environments (color, hue, composition, complexity, animation speed) affect task performance (creative versus error-checking, response time, accuracy). This information is highly beneficial for future work environments, UX design, screen-based applications, hazard mitigation, and human machine interfaces.

TEC SCHOOL	TEC MAJORS	Project Name	Description
EIC	Robotica	Construction Automation	We are investigating the future of construction by integrating internet of things (IoT), building information modeling (BIM), robotics, and cyber-physical systems (CPS) into our cutting-edge D. Dorsey Moss Construction Lab (take a peek at the lab facility here: https://www.youtube.com/watch?v=HJ5O2bo8Z74). Several federal and state sponsored research projects are underway at the Automation and Intelligent Construction (AutoIC) Lab, such as the following: https://www.nsf.gov/awardsearch/showAward?AWD_ID=2231160&HistoricalAwards=false https://www.nsf.gov/awardsearch/showAward?AWD_ID=1827733&HistoricalAwards=false https://www.nsf.gov/awardsearch/showAward?AWD_ID=2222838&HistoricalAwards=false https://www.nsf.gov/awardsearch/showAward?AWD_ID=2121967&HistoricalAwards=false https://rip.trb.org/view/1870407 https://rip.trb.org/view/1870408 We are glad to host students who have a passion in construction automation and sustainable built environment, and would like to work on research topics related to any of the above mentioned areas.
EIC	IQ, IBT	Identification of novel bioactive molecules in Actinobacteria	Identification of novel bioactive molecules is critical to the development of new therapeutics. Molecules that can treat drug-resistant diseases or that can hit traditionally challenging targets such as protein-protein interactions are particularly sought after. Natural products (NPs) have historically been a bountiful source of bioactive molecules, with NPs and their derivatives making up 64% of FDA-approved small-molecule drugs. NPs from soil-dwelling bacteria such as Streptomyces are one of the most bountiful sources of bioactive NPs, including antimicrobials, anticancer agents, antiparasitics, immunosuppressants, as well as many others. Many of the drugs of last resort for antibiotic-resistant infections such as carbapenems, vancomycin, and daptomycin are NPs derived from Actinobacteria microorganisms. Additionally, Actinobacterial NPs are capable of hitting "undruggable" targets including protein-protein interactions (e.g. the immunosuppressant rapamycin) and transcription factors (the FUS-CHOP transcription factor inhibitor trabectedin). Based on genomics data, we and others believe hundreds of thousands of novel NPs likely to have interesting bioactivities remain to be discovered from. Unfortunately, many are not produced under standard laboratory conditions (i.e. growth as a monoculture on solid media). Novel strategies to access these "cryptic" NPs are critical to maximizing the NP potential from Actinobacteria and identifying novel biological probes and leads for drug discovery. Our research aims to identify novel but medically relevant bacterial NPs from a wide variety of origins by improving genome-mining strategies. We also develop novel culture strategies and employ chemical biology and synthetic chemistry to access these currently unobtainable NPs for their further identification and characterization through metabolomic studies.
EIC	Tecnologias Computacionales	Immersive Jigsaw Puzzle Co-solving with an Intelligent Virtual Human	This project aims to understand how humans perceive a virtual human's intelligence. To do so, the student will create an intelligent virtual human that can solve a jigsaw puzzle in collaboration with a human. The developed algorithm should be able to control the intelligence of the virtual human (whether the virtual human will be able to place a selected jigsaw puzzle piece in the correct position; 0% means non-intelligent at all [the virtual human always places the set puzzle piece in the wrong spots]; 100% means high intelligent [the virtual human always puts the selected puzzle piece in the right spots]. Later, to understand how study participants perceive the intelligence of the virtual human, we will ask participants to collaboratively solve the given puzzle with the virtual human in an immersive virtual reality environment while wearing a virtual reality headset and answer several questions concerning the perceived intelligence and anthropomorphism of the virtual human.
EIC	Tecnologias Computacionales	Project Dost	Dost is a next-generation AI-driven human-computer interaction software platform that creates realistic interactive avatars that can interpret facial expressions, voice intonations, and verbal cues in real-time and respond with appropriate visual and audible reactions. The effect is dynamic and life-like and can potentially address a number of large markets including mental health therapy. Many products have been marketed as virtual chatbots or assistants, but also have significant shortcomings. Dost is Hindi for "Friend," and as the name suggests, is intended to bring emotional and behavioral aspects of a friend into a virtual human. When humans communicate with each other, they use a combination of speech, interpersonal relationships, and non-verbal body expressions to complement, contradict, substitute, or regulate what is being said. These signals are essential for understanding each other, particularly when expressing changes in moods and affective states. Our Dost technology not only learns from text conversations but also looks at real human emotional states, via a behavior-learning AI that accounts for facial expressions, gestures, vocal patterns, and speech intonations. Dost uses state-of-the-art AI and graphics technology to generate realistically friendly characters speaking over six languages, representing different ethnicities. Dost even uses cultural cues learned using AI to interact with the individual. New researchers will work on developing the animation, graphics or the AI aspects (natural language based on GPT or gestures based generation).
EIC	Tecnologias Computacionales	Deep Learning in Computer Graphics	Using deep learning models for 3D geometry generation. The project involves formulating the generative task in terms of ML and casting it to a DL approach such as diffusion model, GAN, or similar. The overall objective is to provide a high level of control over the generation. The application domain will range from man-made models (CAD, facades, urban models) to nature (terrains, trees, clouds).
EIC	Tecnologias Computacionales	Augmented and Virtual Reality	We can work on any research project in augmented reality and virtual reality. Have a look at my webpage here: https://www.cs.purdue.edu/homes/popescu/ for recent papers / projects.
EIC	IQ, Electronica, Nanotecnologia	Solid-state batteries	Solid-state batteries are projected to replace Li-ion batteries to meet the future needs of transportation electrification. The development of solid-state electrolytes (SSE) affording chemical and voltage stability against high-capacity Li-metal anodes and high voltage cathodes is essential for the realization of high energy density, fast charging batteries. The Marinero group is developing composite SSE materials comprising polymer matrixes embedded with ionically conducting filler nanoparticles. They exhibit attractive attributes of processability, mechanical properties, safety and low-cost materials and fabrication. We have developed high ionic conductivity composite polymer electrolytes (CPE) embedded with low %wt. loads (5% - 10%) of ionically conducting nanoparticles. These CPEs are designed for Li-metal anodes batteries affording twice the energy density of current Li-ion batteries. The Monterrey Tec student working on this project will participate in the synthesis and structural characterization of CPEs and their evaluation in battery devices.

TEC SCHOOL	TEC MAJORS	Project Name	Description
EIC	Fisico Industrial	Rydberg-enabled quantum nonlinear optical devices	During the past decade, strong photon-photon interactions have been achieved by coupling single photons to strongly interacting Rydberg states. These interactions are key ingredients for photonic qubit operations and all-optical devices such as single-photon switches and transistors. However, the detrimental dissipation associated with those interactions have been hindering the development towards practically useful schemes for quantum information processing. Our group investigates hybrid approaches to draw benefits from different systems and overcome the photon loss problem. Central to our experimental setup are laser cooled and trapped ultracold atoms in ultrahigh vacuum. The student will help with continued development of the apparatus towards photon correlation measurements.
EIC	Tecnologias Computacionales	Virtual Reality and Artificial Intelligence based Safety Analytics	In this project, we are aiming to develop virtual reality modules to examine worker safety and injury risk in different workplace scenarios based on analysis of historical accident records.
		Smart Charging System for Electric Vehicles (EVs) and Load Management utilizing Fine-Grained Solar Power Predictions	The proposed new system has various uncertainties to overcome such as hourly PV generation, EV coming/departing time, customer various load demands, and required charging power, etc. These uncertainties significantly impact the parameters of the system using the current/ traditional algorithms. So, there is a critical need for an efficient solution to incorporate those uncertainties in the system to guarantee stable and precise functioning of the EV charging system' operations, and loads' behavior. Additionally, the system may act another way in physical applications because various pragmatic considerations have been shortened in the current algorithms. That is why it is mandatory to validate the algorithm in a physical environment. Moreover, PV integration into the power grid is constrained by the load performance (linear and nonlinear), and EV chargers. Thus, a fine-grained prediction of dynamic demand and supply is essential for more economical and cost-effective usage by enabling dumping, storing, and managing any excess power. However, uncertainties of real load behaviors pose vital challenges in behavior control of the energy storage under the smart operation. Another challenge for PV-EV-Battery smart charging is the synergies optimization among the PV power generation, customers' load demand, and EV energy demand to (a) improve the PV penetration to the power grid, (b) promote self-consumption, and (c) provide ancillary services to the grid. In this ever-complex load management system, utilization of artificial intelligence (AI) techniques have been emerged for predictive modeling, optimization, maximum power point tracking (MPPT), and power management for smart charging. Therefore, it is very important to implement new schemes to handle these tasks.
EIC	Tecnologias Computacionales	Mixed reality Human-Machine interface for robotics	The goal of this project is to explore and experiment methods for interacting with real machines in a virtual or mixed reality environment using MR headsets. The project will focus on creating a framework for the development of tools that will connect real electro-mechanical machines with a cloud based or edged-based virtual environment.
EIC	Tecnologias Computacionales	Optical communication for the Internet of Things	This project is about using light instead of radio waves for wireless communications. We use organic LEDs, and high-efficiency solar cells to create optical tags for identification and sensing. The tags also include a battery and a small flexible display. We also use computer vision and artificial intelligence to decode transmissions from the tags. We are applying this technology to monitor and track farm animals and objects in warehouses.
EIC	Tecnologias Computacionales	Cost-effective AI-Power Conversion Framework for Hydrogen Generation based on Waste-to-Energy Integrated System	Sustainable energy can be generated from different resources such as biomass, solar, geothermal, wind, ocean, biomass, and hydro energy via various electrochemical, thermochemical, and biochemical processes. However, the bio-waste-to-energy path is one of the highest potential and most economical and efficient solutions in the world. But it needs more investigation, and assessment from the perspective of cost-effective power conversion, and efficiency via modern technologies. Since the hydrogen electrolyzers are innately dc in their conversion phases, it makes sense to be integrated these gadgets via a dc structure. Employing power electronic conversion raises the efficiency but also the cost of the whole system. So, there is a need to optimize this operation and quantify the benefits and drawbacks of all possible options. Power electronics is one of the efficient technologies for the decarbonization of renewable energy systems conversion. To assist power electronics converters design, and implementation, analytic calculations, and numerous specific software are available facilitating the designers from the side of circuits simulation, electromagnetic FEM, thermal analysis, etc. Recently, the AI approaches can be a corresponding tool to the conventional software to expedite the computation time. So, it is vital to create an AI-based tool for the layout of power electronics elements with the required cost-effectiveness and overall system efficiency in real physical designs nature. The research targets the following: •Speed up the energy conversion towards green energy via the integration of renewable energy sources, storage mechanisms, control schemes, maximum power point tracking (MPPT) devices, and bio-waste-to-energy conversion technologies. •Create an artificial intelligence (AI) framework for the design of power electronics converters associated with the proposed hydrogen generation system from waste. •Various conversion designs and topologies will be qualitatively and quantitively analyzed for hydrogen electrolysis system interconnection. •Build an AI, and simulation platform to bring together the key circuit emulators, FEM software, and analytic converter models for system automation, and the design of power electronics converters.
EIC	IMA, IQ	Development of Pressure Tunable Adhesives for Pick and Place Applications	Pressure tunable adhesives are sticky materials that change their adhesive strength as a function of how much pressure is used to apply them. These materials can be used for sensitive fabrication processes like multi-layered microelectronic chips that need to be gently moved from place to place as they are built. We also envision their use as grippers in soft robotics. This research project will focus on the further development of PTAs and characterization of their pressure sensitivity. The researcher will be responsible for fabricating new PTAs, performing normal contact adhesion tests, and analyzing the images of the contact areas obtained during the adhesion tests. Polymer sample fabrication, micromechanical indentation measurements, and optical microscopy characterization will be the primary responsibilities of the researcher.
EIC	IMA	Surface Engineering Additively Manufactured Metals	Additive manufacturing of thin walled metal samples results in relatively rough topography and, often, in residual stress gradients. Developing methods to create controlled surface roughnesses and stresses through processes like shot peening on thin sections is needed if these parts and materials are to be replacements for small lot manufacturing of parts such as biomedical implants. The student on this project will carry out experiments to smooth rough AM Ti and other metal surfaces, measure stresses and hardness on the resulting parts, and develop an analytical model for guiding processing of complex shapes.

On the following link you will be able to find more information regarding the projects and the researchers:

https://globalpartners.purdue.edu/global-partnerships/mexico/purdue-tec-de-monterrey/

GUIDELINES

All students with a minimum general average of 90 at the time of the call and who present a copy of the academic transcript that endorses it and who satisfy the following points may participate as per the following guidelines:

1) 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.
2) Present a motivation letter with a maximum of 1 page, addressed to the leading research professor at HOSTING UNIVERSITY, as well as a copy of your CV (free format). Both documents must be submitted in English.
3) Proof of English language proficiency as follows: TOEFL iBT 80, TOEFL iBT Home Edition 80 or IELTS 6.5.
4) Letters of recommendation in English from 2 teachers.
5) Evidence of teamwork skills, leadership and proactivity (Certificates, memberships, diplomas, event pictures, which demonstrate participation in student groups, social activities, representative teams. All in digital format and in one single PDF)
6) Have a VALID national passport at the time of submitting your application to this call and with sufficient validity to remain in the United States if selected.

7) Students must have sufficient funds and appropriate Medical and Liability insurance as per hosting university guidelines to support themselves for the duration of the respective research stay.

HOW TO APPLY

1. The student must update his/her profile, the route to access is:

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

2. The student must send his/her application by March 30, 2023, including the program code**: EUA-R5EVI-201A**
The route to access is:

MiTec -> 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 result. It will be communicated by the International Programs office.

4. The student will have access to the Document Submission and must upload the required documents by March 30, 2023.

DOCUMENTS SUBMISSION

• Documents must be digitized in 1 single PDF file named with the prospective student ID # and last name of HOSTING UNIVERSITY Research Professor of the project to be applied for. Applications will not be received if the documents come in multiple files.

• Pre-grad Students

1) Present a motivation letter with a maximum of 1 page, addressed to the leading research professor at MSU, as well as a copy of your CV (free format). Proof of English language proficiency as follows: TOEFL: 80 or higher on the iBT TOEFL Exam or IELTS: 6.5 or higher
2) Letters of recommendation in English from 2 teachers.
3) 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.)
4) Have a valid national passport at the time of submitting your application to this call and with sufficient validity to remain in the United States if selected**.** Validity of minimum 6 months after coming back from USA.

Enter info and requested documentation in the following link: https://form.jotform.com/230165834188056

Without exception, applications will not be accepted after the date indicated, so it is suggested to complete the application as soon as possible. Candidates with incomplete documentation will be automatically disqualified. There is the possibility that they will not be selected for the laboratory to which they applied, but they could be selected for another, so if it is of interest to you, it is recommended to indicate a second, or even a third option.

The deadline for the submission of the documentation will be March 30, 2023.

SELECTION PROCESS.

The selection process is divided into two parts.

1) At 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) Selection of candidates according to the program

c) Sending the file directly to the research project leading professor at HOSTING UNIVERSITY

2) At partner university

a) Analysis of the candidates sent and, where appropriate, selection of them for an interview.

b) If selected for the interview, an appointment will be arranged with the HOSTING UNIVERSITY researchers via video link. It is important to take into account that the language of the communication appointment with the researchers is in English.

c) Report from HOSTING UNIVERSITY's leading researchers to the professor in charge of the Tec de Monterrey program on students selected to participate in the respective research projects.

Once the process is completed, the 2023 selected student will receive the response to the application by email by mid-April, 2023. The committee's decision is final at all times.

TO THE SELECTED STUDENTS.

• Be fully aware that, as selected student, you are the image of the institution, so that in addition to complying with the norms and standards of the respective research center or laboratory, you will be obliged, without exception, to comply at all times with the institutional values and the General Regulation of Students of the 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 at all times.

• 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 researcher together with the Tec student, as well as any change in dates.

• Students must have sufficient funds to support themselves in hosting university 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.

- Accepted students are expected to complete and pay for the corresponding visa process including any related fees that HOSTING UNIVERSITY dictates for reimbursement.

REGISTRATION AND ACCREDITATION OF COURSES.

The program has a duration of 18 weeks for which, depending on the length of the research stay, students will be enrolled at the Tec de Monterrey in the following academic periods:

• Aug-Dec 2023

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.

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

Once accepted, students must send the accreditation format for each period to the International Programs office at their correspondent Campus.

It is student's responsibility to validate with the Academic Coordinator the availability of the topics and / or subjects to be revalidated by a project in which they participate. Otherwise, the subjects could be left as off-plan subjects.

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 number of credits to be revalidated 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.

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 registered in each period.

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 addressed to International Programs Office at the correspondent campus.