



The School of Engineering and Sciences

CALLS

Professionals holding a master's degree interested in attending the

PhD IN NANOTECHNOLOGY

The PhD program in Nanotechnology is intended for professionals of engineering and sciences. It is oriented to foster the chain of value of advanced materials and systems based in the fundamentals of Nanoscience to create scientific knowledge that allows to develop nanotechnology-based products and/or services and to identify nanotechnology-based entrepreneurial opportunities. This program is integrated with the MSc program in Nanotechnology, and both emphasize research lines in Material Science, Micro and Nanosystems, and Nanophotonics and Quantum Systems; which are strongly supported by the research activity carried out within research groups in Advanced Materials, Nanosensors and Devices, Optics and Lasers, and Advanced Manufacturing. The graduate program has national coverage, currently based in the campuses of Monterrey and the State of Mexico, and it is credited by the National Graduate Quality Program (PNPC) of CONACYT.

The research lines of the program are described below:

1. Materials Science

Materials science provides knowledge and tools to develop applications of nanostructured materials. Our nanotechnology professors have expertise with materials as diverse as nanocomposites, carbon nanomaterials (nanotubes, graphene, nanographite), nanoclays, conducting polymers and composites, metal and oxide nanoparticles, photocatalysts, biomaterials, and photoluminescent materials. The methods used in their research include CVD, electrodeposition and 3D printing, to develop nanomaterial applications in tissue engineering, surface enhanced Raman spectroscopy, sensors, batteries, renewable energy, environmental applications, optoelectronics, biomedical applications, and more. Other projects include manufacturing MEMS and NEMS with carbon, polymers, and other materials, by laser and electrohydrodynamic processing, photopolymerization and other novel techniques, with applications for sensors, actuators, microfluidics and electrochemical devices.

2. Micro and Nanosystems

The area of Sensors and Devices focuses in the application of nanostructured materials and the development of micro/nano-technology processes, to create novel micro/nano- sensors and devices. Research activities in this area are particularly related to fabrication and application of microfluidic devices and Labs-on-a Chip that are based on electrokinetical and/or centrifugal forces. We investigate novel microfluidic components, integration of multi-step experimental protocols in a single device (e.g. CD Microfluidics), and applications of microfluidics in clinical diagnostics and environmental engineering. This research line is also focused on energy-related devices like supercapacitors, microbatteries, fuel cells, and energy harvesters. Moreover, activities comprise the development of micro/nano-sensors with high sensitivity, high selectivity and very low limit of detection. Research subjects on sensors include impedance-based, electrochemical, and photonic sensors.

3. Nanophotonics and Quantum Systems

Nanophotonics studies the behavior of light on the nanometer scale, and its interaction with nanometer-scale objects, such as carbon nano-tubes, nano metal particles, nano crystals, semiconductor nano dots, photonic crystals, tissue and DNA. At these sizes, the characterization of the physical phenomena requires a quantum treatment. Normal optical components, like lenses and microscopes, generally cannot focus light to nanometer subwavelength scales, because of the diffraction limit. Nevertheless, it is possible to squeeze light into a nanometer scale using other techniques like, for example, surface plasmons, localized surface plasmons around nanoscale metal objects, and the nanoscale apertures and nanoscale sharp tips used in near-field scanning optical microscopy (NSOM) and photo-assisted scanning tunneling microscopy. The projects in this research line pursue a very wide variety of goals, in fields like physics, linear and non-linear optics, microelectronics, microscopy, biochemistry, plasmonics, spintronics, quantum systems, among others.

Admission requirements

To apply, candidates must present the following documents and meet the following requirements:

- **Admission request.** The electronic application link is: <https://solicitud.itesm.mx/admision> (it is important to generate a password and username to access and fill the admission application).
- **Curriculum Vitae.** Updated CV including all relevant achievements such as awards, thesis, publications, and participation in conferences, among others.
- **Previous studies.** A master's degree with a minimum average of 90 or its equivalent, and the corresponding study certificate and school kardex.

- **Admission test.** A minimum score of 600 points in the Admission Test (PAEP). The PAEP can be taken at any campus or headquarters of Tecnológico de Monterrey. The candidate must request the PAEP dates in the campus or headquarters where he/she wishes to present the exam. It is also recommended to follow the PAEP test preparation workshop. Foreign students being out of Mexico are encouraged to present the GRE® General Test (<http://www.ets.org/gre/>).
- **Recommendation letters.** At least three recommendation letters from academics must be provided (professors, thesis advisors, etc.). Letters must describe thoroughly the academic performance and attitudinal qualities of the applicant and the potential to conduct research. The recommendation letters must be sent directly by the referee to the Program Chairs to the following addresses: smart@itesm.mx and vergarabp@itesm.mx, and with the subject: MNT, Recommendation letter, Candidate's name.
- **Motivations essay.** An essay in which the applicant emphasizes his/her background and abilities, and justifies his/her reasons and goals to pursue a PhD program, specifying the chosen research line, as well as a description of his/her area of knowledge and the research topic that he/she wishes to perform. In the essay, the candidate must specify his/her agreement to be part of the program as full-time graduate student attending either the Monterrey campus or the State of Mexico campus
- **English.** Applicants to the PhD program must demonstrate English proficiency since their admission to the program. TOEFL score above 550 or equivalent is requested.
- **Interview.** Candidates to the PhD program must have an interview with a faculty member designated by the admissions committee. The interview only takes place once the candidate has submitted its complete dossier.

All documents must be submitted in digital format in order to start the admission process. Nevertheless this process will only be considered completed once the original printed documents are shown on-site upon first enrollment. Recommendation letters are not requested to be presented in printed format.

Admission process

Candidates can be admitted to start either in January or August. Admission to the program is not automatic. Applicants must send the requested documentation to the program chairs before the deadline indicated in the call. An admissions committee will evaluate the file and decide, according to the merits of each applicant and to the lines of research of the program, which candidates are accepted. The admissions committee will communicate its decision to the candidates who will have a maximum period of one year, after having received notification of admission by the committee, to complete their files in the admissions office and be enrolled in the program.

Candidates are suggested to visit the program's website (<http://www.tec.mx/mnt>) to get more information. They can also be directly assisted by the program chairs, both in person or remotely, to understand the program format and be guided in meeting the admission requirements.

Financial Support

The students of the program are under exclusive contract and they receive total tuition scholarship from Tecnológico de Monterrey, and the maintenance scholarship from CONACYT given that the MNT program is credited by the National Quality Graduate Program (PNPC) of Conacyt.

Validity of the Call for admission in JANUARY 2018.

Closing of the call – Friday, November 10, 2017.

Notification of results – Monday, December 4, 2017.

Beginning of classes – Monday, January 8, 2018.

Information:

Monterrey Campus

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