NSF Research Traineeship (NRT) Program Fellowship Call

The new CONDESA program at UC Merced invites PhD students to apply to be in the first cohort of fellows, which is expected to fund 5 students. Selections will be made by the end of October, with fellowship funding beginning in Spring 2022. See next page for details on program concept, research areas, and elements.

Eligibility

PhD students who started in their programs in AY 20-21 are eligible for this cohort and must be a US citizen, national, or permanent resident.

Preference will be given to students from the core CONDESA graduate programs (physics, mechanical engineering, chemistry and biochemistry, environmental systems) but students from other programs will also be considered.

Application Materials

Submit a CV, an unofficial transcript from UC Merced, and contact information for up to 3 references.

Include a 1-page statement, describing how your research interests and/or current work fit into one of the 3 research thrusts for CONDESA (see next page), and how this funding and the CONDESA program will benefit your research and future career plans.

How to Apply

Apply by *1 October 2021* for full consideration. Later applications will be reviewed if space remains. Please send your application materials as a single PDF titled 'LastnameFirstname_condesa.pdf' by email to ucmcondesa@ucmerced.edu.

Any questions may be directed to Sayantani Ghosh, sghosh@ucmerced.edu.

NRT CONDESA (Convergence of Nano-engineered Devices for Environmental and Sustainability Applications is a 5-year integrated research and education program that will train a new generation of nano-engineers in the design and development of nano-engineered sensors targeted for distributed deployment in environmental media (soil, water, and air). Our faculty from four diverse graduate groups, Physics, Chemistry and Biochemistry, Mechanical Engineering, and Environmental Systems, along with research scientists from Lawrence Livermore National Lab, will mentor graduate trainees on thesis projects based on convergent themes drawn from the following research thrusts:

Thrust 1. Detection of Contaminants in Geoenvironments via Nano-enabled Sensors. This thrust will focus on nano-enabled sensors for high precision and robust detection of contaminants (including, but not limited to, heavy metals, microplastics, pharmaceuticals, and pathogens) in different geoenvironments, (soil, surface and groundwaters). Low-cost, *in situ* nano-enabled sensors developed here will allow comprehensive and customized detection of contaminants and will capture variations in concentration in time and space overlooked by conventional approaches.

Thrust 2. Nano-enabled Sensing for Greenhouse Gases and Carbon Cycling in Soil. The design, fabrication, and testing of nano-enabled sensors for the detection of greenhouse gases and carbon cycling in soil will be the goals of this research thrust, with the aim of *in situ* tracking of changes in concentrations of relevant species, with higher spatial and temporal resolution than what is achievable using conventional approaches. Developments in this research direction will yield tools that will help us better understand critical phenomena such as climate change.

Thrust 3. Advanced Quantum Sensing for Geoenvironments. This thrust will focus on determining the feasibility of quantum sensing achieved through solid state nanoscale devices for specific environmental sensing applications. The projects undertaken will revolutionize the monitoring of emerging phenomena such as hot spots in soil, and thus present excellent opportunities for trainees to perform cutting-edge fundamental science with environmental relevance.

In addition, the trainees will have the opportunity to graduate with the **Nano-engineered Environmental Monitoring (NEEM) emphasis** upon completing the required coursework and professional development workshops, and will take part in the Science and Engineering of Environmental Signatures (SEES) bootcamp.

Trainees will need to complete **core courses** required by the students' home graduate programs, and *one* elective from among the following list: **(1) ES 208:** Surface and Colloid Chemistry of Earth Materials **(2) ES 222**: Dynamics of Organic Matter in Soils and Sediments **(3) ES 270:** Contaminant Fate and Transport **(4) CHEM 250:** Chemistry of Surfaces and Interfaces **(5) ENGR 270/270L:** Introduction to Electron Microscopy (with lab component) **(6) PHYS 241:** Condensed Matter Physics, or **(7) PHYS 209:** Soft Matter Physics. Trainees will also take the following two electives: **(A) PHYS/ME/ES/CCB 233:** Nano Fabrication for Interdisciplinary Materials Sciences; and **(B) PHYS/ME/ES/CCB 292**: Nano-Sensing for Environmental Applications. These two new graduate courses will be cross-listed between all four participating graduate programs.

The professional development workshops over the 5-year duration of the award will cover:
(a) **Team Science:** goal setting, visioning, communication, and team management
(b) **Ethics**: responsible conduct of research
(c) **Leadership**: outreach, peer mentoring and leading translational teams
(d) **Career planning**: Science communication, time management and networking