Coupled Geomechanical Processes and Energy Technologies - Research Experience at Ecole des Ponts Paris Tech - ENPC, France (‘CGPET - ENPC’)

Description. The proposed International Research Experience for Students (IRES): Coupled Geomechanical Processes and Energy Technologies - Research Experience at Ecole des Ponts Paris Tech - ENPC, France (‘CGPET - ENPC’) aims to expose Georgia Institute of Technology (GT) undergraduate and graduate students to geomechanical research applied to energy technologies, immerse them in the academic culture of a leading European institution (ENPC), and inspire them in the pursuit of a scientific career to improve the sustainability and security of energy sources and production. Undergraduate and graduate students from Georgia Tech School of Civil and Environmental Engineering (GT-CEE) will spend nine weeks at ENPC Navier Laboratory completing a two-month research internship: five students in year 1, six in year 2 and seven in year 3. Student activities at ENPC will contribute to research planned and supervised by dual ENPC and GT-CEE faculty mentors. Every year, a GT-CEE mentor will spend the last week of IRES participants’ internship at ENPC, to work with his/her ENPC collaborator and supervise GT-CEE students’ final research presentations; similarly the ENPC mentor will spend the week following the internship period at Georgia Tech.

Research topics. ENPC Navier Laboratory gathers world’s experts in theoretical poromechanics and thermodynamics, and has unique experimental, imaging and computational facilities especially adapted for geomechanics. The ‘CGPET- ENPC’ program will start with five teams of dual mentors, who will work on the following topics: (1) Clay nanoporomechanics for carbon dioxide sequestration, (2) Characterization of particulate pore structures for geological storage, (3) Micro-mechanical modeling of fatigue in salt rock for Compressed Air Energy Storage (CAES), (4) Reactive fluid injection and withdrawal in rock, for oil and gas recovery and geothermal energy systems, and (5) Freeze/thaw cycles and sulfate attacks for improved cement-based buffers.

Professional development: Students selected to participate in the CGPET – ENPC program will have an international experience as part of a cohort through cultural and professional activities organized before, during and after the internship at ENPC. During the Spring preceding their internship, students will start working on their research project with their GT-CEE mentor, take French classes, and will have bi-weekly group meetings to prepare their professional trip, under the supervision of the PI. Participants will take ownership of a project and join a research group at ENPC, which will provide them with an individual experience in a French “Grande Ecole”. After their internships, IRES participants will organize a mini-symposium at Georgia Tech in the presence of one of the ENPC mentors, post their findings on a dedicated wikispace and serve as mentors for the following cohort of IRES students. The integration of activities for faculty and undergraduate and graduate students from ENPC and GT-CEE is expected to sustain long-term collaborations between groups focusing on experimental, theoretical and numerical research in energy geomechanics.