Civil & Environmental Engineering

PROFILE

Chair: Kim Roddis
202-994-4901
www.cee.seas.gwu.edu
Full-time faculty: 13
Undergraduate students: 67
Graduate students: 56
Annual research expenditures: $3.9 million

FACULTY

Sameh S. Badie, **ASSOCIATE PROFESSOR**
Kennerly H. Digges, **RESEARCH PROFESSOR**
Azim Eskandarian, **PROFESSOR**
Samer Hamdar, **ASSISTANT PROFESSOR**
Muhammad I. Haque, **PROFESSOR**
Cing-Dao (Steve) Kan, **ASSOCIATE RESEARCH PROFESSOR**
Khalid Mahmood, **PROFESSOR**
Majid T. Manzari, **PROFESSOR**
Dhafer Marzougui, **ASSISTANT RESEARCH PROFESSOR**
Baoxia Mi, **ASSISTANT PROFESSOR**
Rumana Riffat, **ASSOCIATE PROFESSOR**
Kim Roddis, **PROFESSOR**
Pedro Silva, **ASSOCIATE PROFESSOR**

RESEARCH AREAS

ENVIRONMENTAL ENGINEERING
Mi, Riffat

STRUCTURAL/GEOTECHNICAL/EARTHQUAKE ENGINEERING
Badie, Manzari, Roddis, Silva

TRANSPORTATION SAFETY ENGINEERING
Digges, Eskandarian, Hamdar, Kan, Marzougui

"Working Out" the Solutions

Professor Pedro Silva of the Department of Civil and Environmental Engineering has always been physically active—swimming, running, or bicycling. He bikes 18 miles to and from work each day, and he says his bike riding commute is essential because it is during this time that he solves complicated equations, debugs computer code, develops innovative ideas for proposals, and handles other intellectual tasks—all in his head.

Silva uses this time on his bike to think creatively and dream. He believes that creativity is key to his work. Responding to a question about his research challenges and limitations, Silva says, "The limitations are only within myself. I will be the limiting factor of the research. But what's different about my approach is how I look at it from a holistic point of view. I'm not just interested in that small component of research but in how it affects almost everything else outside."

His research focuses on designing better impact-resistant or load-bearing structures, but, as he says, he always looks at the bigger picture and tries to design materials that do more than simply perform a structural function. He seeks to design structures that use less material, save energy, are more aesthetic, or reduce harm to the environment. In short, he sees his structures in the greater context of helping give people better, safer ways to live.

Take, for example, his current project to help design reinforced panels for homes. Silva explains, "The materials in my current proposal have two skins that are sandwiched in a foam, and the density of the foam can be designed for you to be able to achieve the structural performance. The foam and skins meet their structural requirements, but you can also insert collecting systems into them that draw the heat—for example, metal tubes that collect water that then gets heated. So the materials can be used both as a structural component of the home and to collect energy for the home. The application of these is infinite. It might not be for the construction of homes but for the construction of highways, so the reinforcement of the asphalt also can serve a dual purpose of collecting energy. Currently, we're wasting a massive amount of energy from heat that escapes from asphalt in the summer, but if we can envision a highway system built with these types of materials, if we can draw massive amounts of energy out of asphalt, we're talking about a revolution."

While Silva is a visionary person, it is clear that his aims are very practical. In addition to his reinforced panel design project, he currently has grants from the National Science Foundation to study the optimum design of bridges and to participate in a multi-university earthquake engineering simulation. And some of his research has been put into American Concrete Institute codes of practice (the standard for concrete construction in the U.S.), taking it all the way from vision to reality.

LESS IS MORE: Professor Pedro Silva looks to do more than design safe structures. He wants structures that use less material and save energy.