



In Partial Fulfillment of the Requirements for the Degree of

**Doctor of Philosophy**  
**Mukunth Natarajan**

will defend his dissertation

**Food, a Global Product: An Enhanced FEW Nexus Approach**

**Abstract**

Sustainable food systems have been studied extensively in recent times and the Food-Energy-Water (FEW) nexus framework has been one of the most common frameworks used. The dissertation intends to examine and quantitatively model the food system interaction with the energy system and the water system. Traditional FEW nexus studies have focused on food production alone. While this approach is informative, it is insufficient since food is extensively traded. Various food miles studies have highlighted the extensive virtual energy and virtual water footprint of food. This highlights the need for transport, and storage needs to be considered as part of the FEW framework. The Life cycle assessment (LCA) framework is the best available option to estimate the net energy and water exchange between the food, energy, and water systems. As we know climate plays an important role in food production as well as food preservation. Crops are very sensitive to temperature changes and it directly impacts a crop's productivity. Changing temperatures directly impact crop productivity, and water demand. It is important to explore the feasibility of mitigation measures to keep in check increasing agricultural water demands. Conservation technologies may be able to provide the necessary energy and water savings. Even under varying climates it might be possible to meet demand for food through trade. The complex trade network might have the capacity to compensate for the produce lost due to climate change, and hence needs to be established. Re-visualizing the FEW nexus from the consumption perspective would better inform policy on exchange of constrained resources as well as carbon footprints. This puts the FEW nexus research space a step towards recreating the FEW nexus as a network of networks, that is, FEW-e (FEW exchange) nexus.

June 18, 2019  
1:00 PM  
College Avenue Commons (CAVC), 401

Faculty, students, and the public are invited.

Supervisory Committee:  
Dr. Mikhail Chester, Chair  
Dr. Benjamin Ruddell  
Dr. Andrew Fraser  
Dr. Jose Lobo