

Spring 2022, Wednesday 3:00-5:30 pm

## NEXUS OF FOOD, ENERGY AND WATER

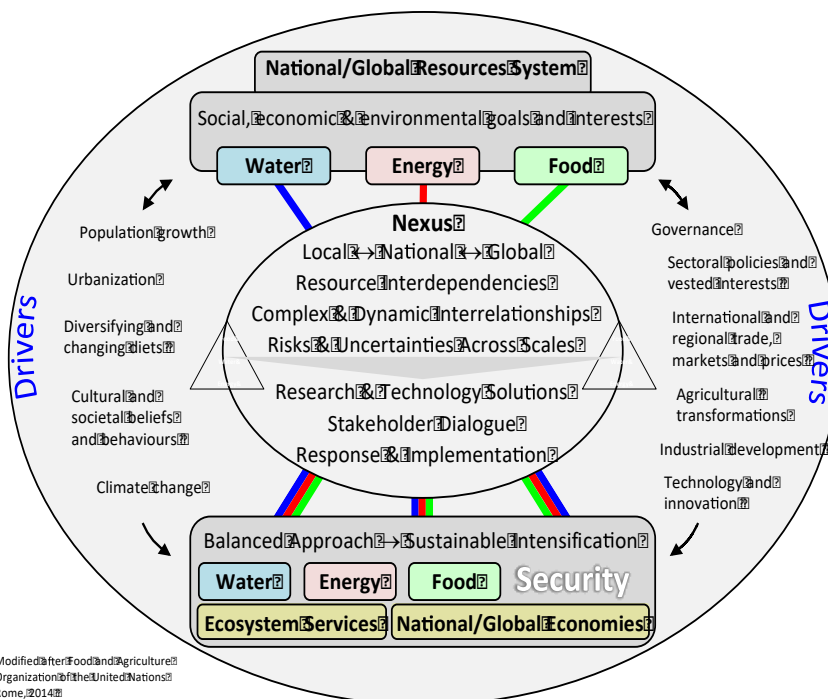
ESS 561 (3 Credits)

Instructor: Jie (Joe) Zhuang ([jzhuang@utk.edu](mailto:jzhuang@utk.edu))

Humanity is poised on the precipice of global crises entailing growing needs for food, energy, and water (FEW) resources in the face of increasing climate change stress and dynamic demographic, and socioeconomic transitions. FEW systems are characterized by complex interrelationships, problems, and challenges. The relationships underlying FEW systems cut across all sectors of society and occur at scales ranging from garden plots and household use of resources, to national production and consumption, and to international trade and supply chains. The nexus of FEW deals with problems and challenges of timely production, quality and quantity of goods, and effects of politics, natural disasters, and even pandemics on supply and demand of FEW resources.

This graduate course will introduce the concepts, framework, and challenges of FEW-system nexus and promote student's abilities to think strategically, systematically, and critically using a transdisciplinary approach. The format will be in-person lectures. The instructor and invited guest lecturers will provide an overview of FEW research and teach literature-based discovery methods. Students will apply the methods to search and analyze scientific literature and data sets for identifying knowledge and technology gaps of FEW-system nexus. Students will present the results of their investigations and analyses to the class and lead group discussions. At last, high-quality work will be edited and recommended for publishing in journals.

The course will be restricted to seniors with a GPA of at least 3.0 and graduate students in all discipline areas. To enroll, please contact Jie (Joe) Zhuang at [jzhuang@utk.edu](mailto:jzhuang@utk.edu).



A conceptual FEW-system network model. The challenge will be to develop a balanced approach that allows sustainable resource exploitation at local, regional and global scales while meeting societal needs. Note that local solutions may not scale. Positive and negative feedback loops and interdependencies must be identified and communicated to various stakeholders and politicians.