ChE 379/384T -- Dynamics in Ecology and the Environment   Spring 2018

Instructor: Professor Mark A. Stadtherr (markst@utexas.edu)

Textbook: There is no textbook to buy. Students will be provided with electronic, interactive study materials.

Prerequisites: Students should be familiar with basic concepts in the areas of differential equations, linear algebra and matrices. Many of these topics are reviewed in the provided study materials and others will be reviewed in class as needed.

Course Description and Goals:

Engineering students today are frequently taught to be environmentally conscious in designing new products or processing systems. However, their attention is less often focused on the Earth's own natural systems, and on how these systems interact with manmade systems. Thus the focus of this course is on the Earth's natural processes, populations, and systems. The Earth's systems are dynamic, changing with time in response to a variety of disturbances. A primary goal in this course will be to develop a basic understanding of some of these dynamic processes, and to show how one can use mathematical models to aid in this understanding and to estimate the impact of manmade disturbances. A broader goal is to develop an awareness, on a scientific level, of current environmental and ecological problems, and to enable the student to better seek answers to these problems.

Topics (anticipated):

I. Dynamics of Populations, Communities and Ecosystems

1. Population dynamics – single species
2. Interacting populations – competitors
3. Predator-prey models
4. Food chains
5. Large communities
6. Spatiotemporal systems

II. Dynamics of the Earth's Natural and Altered Environments

1. Biogeochemical cycles (C, N, S, P)
2. Tracking pollutants in the environment
3. The Earth's temperature
4. Ozone in the troposphere and the stratosphere