

# MATH 8850 - VIGRE Research Group

## Structure and Dynamics of Ecological Networks

**Organizers:** Caner Kazanci and Malcolm Adams

**Course website:** <http://www.math.uga.edu/~caner/09vigre>

**Office Hours:** Anytime by appointment.

**Projects:** Groups of 2-3 students will form at the beginning of the semester, and each group will work on a project. The project work will consist of frequent group meetings, biweekly group presentations, and two reports (mid and final). Here's tentative list of projects we will work on:

**Decomposition of general ecological networks** Ecological networks are often represented as weighted digraphs, and can be fairly complicated. Decomposing a complicated ecosystem into sub networks for easier analysis is often tempting. However, essential ecosystem behavior may be lost by breaking connections. For simpler models, we can identify flow sub-networks (fluxes) without breaking connections. We will investigate the uniqueness and existence properties of this decomposition; and try to create an algorithm that can decompose any ecological network into its sub flow networks.

**Decomposition of cycling index** In relation to the decomposition problem above, we investigate if system-wide network properties of the full model can be represented by a function of the same property of the decomposed sub-networks.

**Decomposition from an algebraic graph theory point of view** We study the same decomposition problem using algebraic graph theory of weighted digraphs and cycling basis.

**Utility Analysis** We investigate various questions about utility analysis.

**Grading:** The course grade will be based on performance (bi-weekly group presentations) and involvement. Reading material will be posted on the course website. Please check the course website frequently to access lectures, presentations, papers and additional course material.

**Attendance:** Attendance is essential and is required. If you have to miss any classes for any reason, you have to contact me at least a day before the meeting. If you have to leave the class early for any reason, you need to take permission before the class starts.

**Use of electronic equipment:** Cell phones must be set to silent or off. No laptops are allowed. The only two exceptions are: (i) You're presenting that day. (ii) You have a documented disability and you need to take notes using a computer. This restriction also applies to netbooks, tablet PC's, Android devices, iPhone's, or whatever Apple & Google are coming up with in near future.

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.