Class meetings Tuesday-Thursday 11:30 AM-12:50 PM in B-227

Description
Foundations and practice of data analysis, modeling, and simulation of ecological and environmental systems. Fundamental course on applications of engineering to environmental problems. Credit hours: 3 hrs.

Prerequisites
For 4330 senior standing. For 5330 graduate standing.

Instructor
Miguel F. Acevedo, Regents Professor Electrical Engineering Department, Office B-260, Phone 940-891-6701, Email acevedo@unt.edu

Office hours
Tuesdays and Thursdays 9-10 AM, or by appointment.

Format
• Lectures and in-class computer labs. Software: most used R, depending on interests we will include some GRASS, and Python.
• Homework assignments. All assignments will be submitted online. Note: Assignments for 5330 are longer and/or more difficult than for 4330.
• Project to be developed during the semester. Individual basis (not by teams). Topic must be defined by 3rd week of classes. Project evaluation based on three reports: 1) Initial report (by 5th week): proposal with bibliography review, 2) midterm report (9th week): progress report with preliminary results, 3) final report (13th week): results, discussion, and conclusions. All reports will be submitted online.
• Online resources: Blackboard learn https://learn.unt.edu

Grade
• 30% graded assignments, 25% individual project, 40% two exams.
• Attendance 5%.

Schedules of exams and deadlines
• Midterm Oct 15
• Project reports due: See above.
• Designated final day: Exam 2 (Final) Tuesday December 8, 11:00 a.m. - 1:00 p.m.
  http://registrar.unt.edu/exams/final-exam-schedule/fall

Textbooks

**Class Evaluation by Students**
The Student Evaluation of Teaching Effectiveness (SETE) is a requirement for all organized classes at UNT and is available for your input at the end of the semester.

**Topics**
- Using R for data analysis and simulation
- Probability, random variables, distributions, moments, statistics
- Exploratory data analysis and inferential statistics
- Simple and multiple regression
- Linear models: exponential dynamics, population growth, chemical decay. ODE in Environmental Systems.
- Random processes and time-series analysis
- Non-linear models: logistic dynamics, Michaelis-Menten-Monod.
- Stability, environmental variability, populations under environmental stress, natural and human-induced disturbances.
- Analysis of spatial point patterns and geostatistics
- Multivariate analysis based on eigenvector methods

**Examples of projects**
- Develop an R and GRASS program to process and analyze NEXRAD data (weather radar data)
- Simulation of air quality models
- Analysis of water quality brackish groundwater resources in Texas
- Analysis of water quality data City of Denton
- Analysis of LiDAR data
- Simulation of watershed models (Clear creek example)
- Developing climate change scenarios from global climate models
- Simulation of forest ecosystem

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<th>Week</th>
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<td>Oct 13-15</td>
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**Policies**

**Grades:** All grades for the course will be final. No extra credit assignments or work will be considered after the final grade has been recorded.

**Accommodations:** The EE Department in cooperation with the Office of Disability Accommodation complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. Please present your written accommodation request before the 12th class day.

**Academic Dishonesty:** Students caught cheating, plagiarizing, or any other academic dishonesty will be subject to penalty according to the new Policy on Students Standards on Academic Integrity. See full policy at [http://www.unt.edu/policy/UNT_Policy/volume3/18_1_16.pdf](http://www.unt.edu/policy/UNT_Policy/volume3/18_1_16.pdf)

According to this policy the categories of academic dishonesty are:

A. Cheating. The use of unauthorized assistance in an academic exercise, including but not limited to:
   a. use of any unauthorized assistance to take exams, tests, quizzes or other assessments;
   b. dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems or carrying out other assignments;
   c. acquisition, without permission, of tests, notes or other academic materials belonging to a faculty or staff member of the University;
   d. dual submission of a paper or project, or re-submission of a paper or project to a different class without express permission from the instructor;
   e. any other act designed to give a student an unfair advantage on an academic assignment.

B. Plagiarism. Use of another’s thoughts or words without proper attribution in any academic exercise, regardless of the student’s intent, including but not limited to:
   a. the knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgement or citation.
   b. the knowing or negligent unacknowledged use of materials prepared by another person or by an agency engaged in selling term papers or other academic materials.

C. Forgery. Altering a score, grade or official academic university record or forging the signature of an instructor or other student.

D. Fabrication. Falsifying or inventing any information, data or research as part of an academic exercise.

E. Facilitating Academic Dishonesty. Helping or assisting another in the commission of academic dishonesty.

F. Sabotage. Acting to prevent others from completing their work or willfully disrupting the academic work of others.