CIVE 203 - Engineering Systems and Decision Analysis
SPRING 2012

Course Instructor:
Mazdak Arabi
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Office Hours: WF 11:00-12:00

Course GTAs:
Jonathan McIntosh, jonnymac@rams.colostate.edu, Office Hours: M 11:00-12:00
Clare Steninger, csteninger@gmail.com, Office Hours: W 12:30-1:30

Course Website: RamCT (ramct.colostate.edu)

Course Times and Locations:
Lecture: T&Th 11:00–11:50 am  Natural Resources 113
Lab 01 Monday 1:00-2:40 pm  Engr. C205
Lab 02 Tuesday 8:00-9:40 am  Engr. C205
Lab 03 Monday 3:00-4:40 pm  Engr. C205
Lab 04 Thursday 8:00-9:40 am  Engr. C205

Exams and Grading:
The course will include two multiple choice quarterly, a midterm and a comprehensive final examination. Grading will be based on the following components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Laboratory exercises</td>
<td>15%</td>
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<tr>
<td>Homework (other than lab)</td>
<td>25%</td>
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<tr>
<td>Final Project</td>
<td>10%</td>
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<tr>
<td>Quarterly Examinations (2)</td>
<td>10%</td>
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<tr>
<td>Midterm Examination</td>
<td>15%</td>
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<tr>
<td>Final Examination</td>
<td>25%</td>
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- The laboratories are an essential part of the course as is the lecture material. Students must have a passing grade (>=60%) on the laboratory projects/exercises and on the midterm and final examinations to receive a passing grade for the course.
- This course will use the +/- Grading system.
- Midterm exams are given during the lecture period.
- Final is given during the scheduled final exam period.
- Final exam is comprehensive and covers the entire course.
- Make-up exams are given only for extreme cases.
- One 8.5 by 11 in crib sheet is allowed for each exam.
Homework:
- Assigned weekly on RamCT, some submitted on paper, some submitted as MATLAB files or ArcGIS documents on RamCT.
- Show your work and clearly identify your answers.
- **Must be your own work** (every cell, every line of code, and every word of text must be written individually).
- Providing your homework solution to someone is not allowed, but discussion with others is allowed.
- Due on Tuesdays before class, **late homework is not accepted**.
- Solutions are posted on RamCT after due date.
- In the case where assignments are submitted on-line via RamCT, it is the responsibility of the student to be sure that all attachments to the submission are provided. Students will not receive credit for any submission that is missing the required attachments.

Project:
- A project will be assigned on RamCT.
- **Must be your own work** (every cell, every line of code, and every word of text must be written individually).
- Providing your project solution to someone is not allowed, but discussion with others is allowed.
- Submit all project files including the final report on RamCT by deadline.
  Late projects can be emailed to instructor for partial credit:
  - < 24 hrs late (maximum of 2/3 credit)
  - 24-48 hrs late (maximum of 1/3 credit)
  - > 48 hrs late (no credit)

Course Description: CIVE 203: Engineering Systems and Decision Analysis - 3(2-2-0)
In dealing with real world problems, engineers are ought to make decisions about design, implementation, and operation of a system of interest. The decision making process requires an understanding of import system variables and processes, and the interactions between system components. In this context, uncertainties are unavoidable. The role of probability and statistics is quite pervasive in engineering; it ranges from the description of basic information to the development of models for design and decision making. This course covers basic statistical and probability concepts and methods that are useful for making decisions under uncertain conditions. The course materials are organized as follows:
  I. Sampling and exploratory data analysis
  II. Random variables: distributions, functions, and moments
  III. Hypothesis testing and confidence intervals
  IV. Building empirical models
The laboratory exercises aim to enhance students' capacity to implement statistical and probability methods. To this end, two powerful software packages, MATLAB and ArcGIS are used.

Prerequisite: CIVE 202, Numerical Modeling & Risk Analysis.
**Course Format:** Two lectures and one 2-hour laboratory per week, with the laboratory used for a mix of laboratory, computer use and team projects.

**Course Objectives:** At the end of the course, the successful student should be able to:
1. Demonstrate their improved understanding of the concepts of mathematical modeling and statistical data analysis as applied to civil engineering systems.
2. Estimate parameters for various statistical distributions, determine which distribution best describes a set of data and to generate random samples from those distributions.
3. Demonstrate the proper application of confidence limits and hypothesis testing to examples from civil engineering systems.
4. Demonstrate the proper application of simple linear or multiple regression for building empirical models of engineering and scientific data.
5. Demonstrate the use of geographic information systems (GIS) for spatial data collection, organization, and analysis.
6. Enhance their oral and written communication and presentation skills.

**Prerequisite Knowledge and Skills:** The student starting CIVE 203 is expected to have an understanding of basic concepts of simulation and modeling, basic statistical concepts and measures, and a basic understanding of mathematical programming and code development (e.g., VBA).

**Textbook:**

**Recommended Textbooks:**

**Other Material:**
1. MATLAB Statistics Toolbox, MathWorks Inc.
2. MATLAB Curve Fitting Toolbox, MathWorks Inc.

**General Class Policies:**
You are expected to:
- Attend regularly: It is recommended that you attend each class because important information will be covered in class that will help you with the laboratory assignments,
homework, and exams. Remember that not everything is in the lecture handouts. Also, if changes in exam procedure, exam date, exam coverage, assignments, etc. are announced in class you are responsible for knowing this information.

- Access RamCT regularly: The RamCT course site will be updated regularly with PowerPoint handouts and other materials presented in class. The class schedule and due dates for assignments will be regularly posted and updated. It is your responsibility to be aware of this information. Anything that is posted on RamCT and covered in class is likely to be subject to questions on the midterm and final.

- Respect the lecture time: Coming late to class or leaving early from class causes a disturbance to others. Please try not to enter or leave the room while the class is in progress, except in the case it is absolutely necessary. If you must leave the classroom please do so as quietly as possible.

- Turn off or silence your cell phones before the start of class.

- Respect assignment deadlines: Assignments will typically be submitted via RamCT and the system will not accept submissions after the deadline. Unless you have discussed an emergency situation with your instructor late assignments will not be accepted. It is highly encouraged that you submit your assignment prior to the deadline to avoid any last minute problems.

- Be honest: CSU Policies and Guiding Principles will be strictly enforced. For details, please visit: http://www.catalog.colostate.edu/index.asp?url=catalog_04-06/policies.

All CSU students are responsible for knowing and adhering to the academic integrity policies of this institution. Violations of this policy may include: cheating, plagiarism, aiding academic dishonesty, fabrication, lying, bribery, and threatening behavior. Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion).

Specifically in CIVE 203, homework assignments (unless otherwise noted on the assignment) will be individual assignments. While you may certainly discuss the approach to solving the assignments with your classmates, all submissions and associated software coding must be individually done and unique (every line of code and every word of text must be written individually). Likewise projects must be unique and not use any coding developed by other students in this or previous offerings of this course.