ADVANCED TOPICS ON CONCRETE MECHANICS

Class Hours: Mon Thu: 2:00 - 3:50 pm Location: JEC 4309

Instructor:
Gianluca Cusatis
Office: JEC 4048
Phone: 276 - 3956
e-mail: cusatg@rpi.edu

Instructor Office Hours: Tue Fri: 2:00 – 4:00 pm
You are also welcome to make an appointment for a different time.

Teaching Assistants: n/a

Textbooks:
Fracture Processes of Concrete, J. G. M. van Mier, CRC Press
Inelastic Analysis of Structures, M. Jirásek and Z. P. Bažant, Wiley.
Fracture and Size Effect, Z. P. Bažant and J. Planas, CRC Press.

Catalog Description: Mechanics of concrete failure under uniaxial and multiaxial stress states. Strain-softening behavior and damage localization in tension and compression. Nonlinear strain-hardening behavior under triaxial compression. Tensile fracture and size-effect. Constitutive modeling of concrete mechanical behavior. Cohesive crack model. Plasticity models, damage models, microplane models, and discrete models.

Course Objective: The objective of this course is to introduce graduate and senior undergraduate students to advanced topics on the mechanics of concrete behavior. Students will do this by building on the knowledge gained through all mechanics related courses of the undergraduate curriculum (statics, mechanics of materials, concrete design, etc.). Upon successful completion of the course, students will have an advanced understanding of concrete behavior as well as knowledge of specific modeling theories that can be used for the numerical simulation of concrete structures. Having successfully completed this course, students will have the necessary skills to conduct concrete research as well as to solve advanced concrete design problems.

Course Outcomes: After successfully completing this course students will be able to:

1. Perform experimental tests in compression;
2. Perform experimental tests in tension (direct and indirect);
3. Analyze and report experimental results;
4. Use advanced constitutive models for concrete;
5. Analyze and report numerical results.

Prerequisites: Mechanics of materials

Exam and HW dates: See attached schedule

Homework Policy: Homework is due no later than 5:00pm on the due date. Late homework will be accepted up to 2 days after the due date but with a 50% penalty. Collaboration with your classmates is encouraged. Solving homework problems within study

groups is encouraged. However, it is also suggested that each student attempt the homework problems on their own prior to meeting with their study group so as to understand their personal deficiencies. In this way, group study will be most effective for each student. Each student must hand in each individual problem. Copying is not acceptable. If copying is suspected, you will be asked to demonstrate your solution to the instructor. Homework assignments are worth a total of 100 points.

Grading Policy: Grades between 0 and 100 are assigned based upon the level of mastery of the subject by the student. Grades will not be curved.

Final HW Grade = Total homework points earned

Final Grade = 0.40 (HW) + 0.60 (Final Report/Presentation)

A = 96-100; A- = 91-95; B+ = 86-90; B = 81-85; B- = 76-80; C+ = 71-75; C = 66-70; C-= 61-65; D+= 56-60; D = 51-55; F < 50.

Academic Integrity: Student-teacher relationships are built on trust. Acts, which violate this trust, undermine the educational process. The *Rensselaer Handbook of Student Right and Responsbilities* defines various forms of Academic Dishonesty and everyone should be familiarized with these. In this class, all HW and AR assignments that are turned in must represent the student's own work. Submission of any assignment that is in violation of this policy will result in a penalty of ten (10) points on the final grade.