CGN 6905: Concrete Structural Rehabilitation
Spring 2020

Instructor

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Class Time and Place

M | Period 4-5, 10:40 am-12:35 pm, RNK 0225
F | Period 4-5, 10:40 am-12:35 pm, MAT 0220

Office Hours

MW 1:00-2:15 pm, 460C Weil Hall

Course Description

CGN 6905 Special Problems in Civil Engineering
3 Credits
Studies in areas not covered by other graduate courses.

Prerequisites

CGN 3501C
CES 4702 Analysis and Design in Reinforced Concrete

Course Objectives

This course will cover the basic mechanisms that cause degradation of concrete pavements and bridges, methods for diagnosing concrete degradation mechanisms, and proper repair methods. This is a graduate level class.

Objectives:

- Learn mechanisms that cause deterioration of concrete structures and pavements, including structural and materials related causes
- Diagnose deterioration cause for most common types of concrete distress
- Apply concrete repair principles to concrete degradation mechanisms and select appropriate repair method
- Design appropriate concrete strengthening / protection system

Textbooks

Required (Can be obtained at a discount from ICRI –see forms):

Emmons, Peter H. Handbook Concrete Repair and Maintenance Illustrated. R.S. Means Company, Inc., Kingston, MA., 1993.

American Concrete Institute, Concrete Repair Manual, 4th Edition. American Concrete Institute, Farmington Hills, Michigan, 2013.

Reference/Recommended:

ACI 562-13 Code Requirements for Evaluation, Repair, and Rehabilitation of Concrete Buildings (ACI 562-13) and Commentary

Rasheed, H.A., Strengthening Design of Reinforced Concrete with FRP, CRC Press, 245 pp. (Available as an ebook from the UF library)

Poursaee, A., Corrosion of Steel in Concrete Structures, Woodhead Publishing Series in Civil and Structural Engineering: Number 61, 2016, 295 pp. (Available as an ebook from UF library)

Online Course Recording

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Homework & Exams

Late homework will not be accepted without **prior** arrangements with the instructor. Students are encouraged to work on homework in groups, but homework must be done individually. The standard for homework is that you must be able to explain what was done in the homework problem turned in and why. There will be 2 midterm exams and 1 final exam. The midterm exam will focus mainly on the material covered after the previous exam, however, because each class builds on previous material, students should be prepared to answer questions about any previously covered topic. Students are responsible for keeping returned homework, quizzes, and exams to be able to correct problems with recording of scores. In all cases involving grades, the student should wait at least 2 days after the problem is discovered (for a cooling off period) before talking to the instructor. All grades on exams, quizzes and homework becomes final 2 weeks after being returned to the class (a student not picking up an exam or homework does not constitute an extension to this deadline).

Grading

Homework:	15%	Exam 2:	20	Exam 3:	20%
Exam 1:	20%	Project:	10%	Quizzes:	15%

Grading Scale:

	Grade Greater Than or Equal To (%):	Grade Less Than (%):
A	93.4	100.0
A-	90.0	93.4
B+	86.7	90.0

	Grade Greater Than or Equal To (%):	Grade Less Than (%):
B+	83.4	86.7
B-	80.0	83.4
C+	76.7	80.0
C+	73.4	76.7
C-	70.0	73.4
D+	66.7	70.0
D	63.4	66.7
D-	60.0	63.4
F	0.0	60.0

More information on grades and grading policies is here:

https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Class Attendance and Make-Up Policy

Class attendance is expected. While attendance is not recorded as a part of the course grade, students are responsible for any information communicated during class. Exam attendance is mandatory. Missed exams can only be made up when it is an excused absence. Excused absences must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation. Student must contact the instructor as soon as the student knows that he/she will have an excused absence to arrange for makeup. Cell phones must not be used during class.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Class Demeanor

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones and restrict eating to outside of the classroom. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all. Students are expected to bring a laptop to class to participate in activities.

Materials and Supplies Fees

There are no additional fees for this course.

Class Communication & Email Policy

Email will be regarded as an official means of communication between the instructor and students. It is the responsibility of the student to ensure that the instructor has the student's correct email address, and that it is checked by the student frequently.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

• Your academic advisor or Graduate Program Coordinator

- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Course Schedule:

Course Material is organized into modules. Each module contains information on videos to watch, material to read, quizzes to take, homework to complete, and activities that will be done with the class. Dates for each module are given on the module posted on the UF eLearning site for this class. Modules required for this course include:

1. Class Introduction, Syllabus, Administration
2. Failure Causes: Corrosion Mechanisms
3. Failure Causes: Disintegration Mechanisms
4. Failure Causes: Moisture & Thermal Effects
5. Failure Causes: Load Effects
6. Failure Causes: Construction Defects
7. Evaluation: Process
8. Evaluation: Non Destructive Testing
9. Evaluation: Strength
10. Surface Repair: Strategy and Design
11. Surface Repair: Material Removal and Surface Preparation
12. Surface Repair: Material Placement and Bonding
13. Electrochemical Repair: Cathodic Protection
14. Pavements
15. Structural Strengthening
16. Fire Repair
17. FRP: Introduction
18. FRP: Flexural Design
19. FRP: Shear Strengthening Design
20. FRP: Column Strengthening