

## Concrete Mixture Design

CGN 4905 Section 29314

**Class Periods and Location:** M Period 7 (1:55-2:45 pm) MCCA 2196

W Period 7-8 (1:55-3:50) MAT 0051

**Academic Term:** Fall 2024

### **Instructor:**

Kyle Riding

[kyle.riding@essie.ufl.edu](mailto:kyle.riding@essie.ufl.edu)

352-294-1628

Office Hours: M Period 8 (3:00-3:50 pm) MCCA 2196

W Period 9 (4:05-4:55) MAT 0051

### **Course Description**

3 credit hours

### **Course Pre-Requisites / Co-Requisites**

CGN 3501C or instructor permission

### **Course Objectives**

1. Students will learn the cement and supplementary cementitious material production processes
2. Students will learn the cement chemical reactions
3. Students will learn and apply mixture design procedures for different class of concrete
4. Students will learn common concrete quality control test methods
5. Students will study common causes of concrete deterioration
6. Students will use software to design concrete systems for a target service life

### **Materials and Supply Fees**

No material and supply fees. All students must have steel toed boots. Long pants and steel toed boots are required to be worn on days with labs.

### **Professional Component (ABET):**

This course contributes to meeting the engineering design profession component of the ABET-accredited civil engineering degree.

### **Relation to Program Outcomes (ABET):**

The table below is an example. Please consult with your department's ABET coordinator when filling this out.

Outcome	Coverage*
1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	medium
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.	high
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	medium
4. An ability to communicate effectively with a range of audiences	medium
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must	low

consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.	low
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty	medium

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

***Required Textbooks and Software***

None

***Recommended Materials***

- Design and Control of Concrete Mixtures, 16th Edition  
Portland Cement Association (PCA)  
2016, 16th edition  
ISBN number 978-0893122775
- ACI Manual of Concrete Practice - students can get free access to this online resource through a free student e-membership to the American Concrete Institute. Information will be provided the first day of class.

**Topics (assignments posted on course CANVAS site)**

Monday Date	Subject/Activity	Wednesday Date	Subject/ Activity
26-Aug	Class Introduction and policies	28-Aug	Lab Safety Training
2-Sep	Holiday	4-Sep	2a Portland Cement Production 2b Cement and SCM Types 2c Cement reactions
9-Sep	2d Aggregates	11-Sep	3a Concrete porosity 3b Concrete strength and maturity
16-Sep	2e Chemical Admixtures	18-Sep	4a Concrete Mixing 4b Mixture Design 4c Mix Optimization
23-Sep	2f SCMs: fly ash, slag cement, silica fume	25-Sep	Lab 1 - Mix Concrete and Fresh Properties
30-Sep	4d High Performance Concrete, UHPC, UHPC Mix Design	2-Oct	Lab 2 - Testing Hardened Concrete Strength, Double Punch for UHPC
7-Oct	Exam 1	9-Oct	Lab 3: Making and Testing SCC
14-Oct	5a Placing and Curing	16-Oct	Lab 4: Making and Testing Fresh UHPC
21-Oct	5b Concrete pumping	23-Oct	5c Pervious Concrete 6a Dimensional Stability (Shrinkage)
28-Oct	5d Hot weather concreting	30-Oct	Lab: term projects
4-Nov	Exam 2	6-Nov	Lab: term projects
11-Nov	Holiday	13-Nov	Lab: term projects
18-Nov	6b Corrosion mechanisms 6c Service life modeling	20-Nov	6d Sulfate Attack 6e Freeze-thaw
25-Nov	Holiday	27-Nov	Holiday
2-Dec	6f ASR 6g Chemical Attack	4-Dec	5f Internal curing 7a Sustainability

Exam 3 will be during the regularly scheduled final exam time for this course.

**Attendance Policy, Class Expectations, 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.

**Evaluation of Grades**

UF policies for grading will be followed. <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx> 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. The exams 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).

Assignment	Percentage of Final Grade
Homework, quizzes and lab reports	25%
Term Project	15%
Exam 1	20%
Exam 2	20%
Exam 3	20%
	100%

### **Grading Policy**

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

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

### **Students Requiring Accommodations**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### **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.ua.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.ua.ufl.edu/public-results/>.

### **In-Class Recording**

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or guest lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### ***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.

### ***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](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### ***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>

### ***Campus Resources:***

#### *Health and Wellness*

*Concrete Mixture Design, CGN 4905*  
*Kyle Riding, Fall 2024*

**U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

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

**Sexual Discrimination, Harassment, Assault, or Violence**

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto:title-ix@ufl.edu)

**Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus:** [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.