CIVE.5050 Concrete Materials (3-0-3)

Syllabus

Fall 2017

Instructor:

Tzuyang Yu (Falmouth 107-C, ext.4-2288, Tzuyang_Yu@UML.EDU)

Thursday 1:00 p.m.∼3:30 p.m. (or by appointment)

Teaching Assistant:

N/A

Time and Venue:

Thursday 6:30 p.m.∼9:20 p.m., KI 306

Webpage: http://faculty.uml.edu/tzuyang_yu/Teaching/Teaching.aspx

Prerequisite: CIVE.3110 *Engineering Materials Laboratory*

Course Description

This course is designed for introducing fundamental and advanced topics in the properties of concrete materials. Fundamental topics including the formation, structure, mechanical behavior, durability, fracture, and deterioration of concrete are covered. Theoretical treatments on the deformation, fracture, and deterioration of concrete are addressed. Advanced topics including the electromagnetic properties of concrete, high performance concrete (HPC), high-strength concrete (HSC), fiber-reinforced concrete, other special concretes, and the green construction of concrete are introduced. There is also a service-learning project component in this course, aiming at helping students to develop hands-on experience with concrete in practical situations.

Grading Policy

There are two homework assignments (20% each), one mid-term exam (30% each), one project report (20% each), and one project presentation (10% each). All assignments must be turned in on time. The late policy is stated as follows: (1) 25% reduction for "less than one day" late; and (2) 100% reduction for "more than one day" late.

Textbook and References

Textbook:

S. Mindess, J.F. Young, and D. Darwin (2003), *Concrete*, 2^{nd} ed., Prentice Hall, Upper Saddle River, NJ.

References:

L. Solymar and D. Walsh (2004), *Electrical Properties of Materials*, 7^{th} ed., Oxford University Press, New York, NY.

P.K. Mehta and P.J.M. Monteiro (1993), *Concrete – Structure, Properties, and Materials*, 2^{nd} ed., Prentice Hall, Upper Saddle River, NJ.

M. Ashby, H. Shercliff and D. Cebon (2007), *Materials – Engineering, Science, Processing, and Design*, 1^{st} ed., Elsevier, Oxford, UK.

(Further guidance on the recommended texts will be provided.)

Schedule

(Note: Symbol () indicates the date an assignment is issued, while symbol [] indicates the date an assignment is due.)

Week	**Date**	**Topics**
1	09/07	Introduction to structural concrete / (HW#1)
2	09/14	Cement, water, aggregates, and admixtures
3	09/21	Cement hydration; Formation and proportioning
4	09/28	Macroscopic and microscopic structures / [HW#1], (HW#2)
5	10/05	Composition of concrete; Mechanical properties
6	10/12	Deformation, fracture, deterioration and time-dependent behaviors
7	10/19	Normal concrete; Durability / [HW#2]
8	10/26	**Mid-term Exam**
9	11/02	*Project Activities*
10	11/09	Electrical, magnetic, and thermal properties
11	11/16	Chemical and electrochemical properties
12	11/23	**Thanksgiving Recess**
13	11/30	High strength concrete and other special concretes / [Project report]
14	12/07	Concrete in construction / **Project Presentation**