



**FACULTY OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT
FALL 2015-16
COURSE OUTLINE**

COURSE CODE	: CE 544
COURSE TITLE	: Advanced Concrete Technology
LOCAL CREDIT	: 3 (3,0)
ECTS CREDIT	7
LECTURER	: Assist Prof. Dr. Pınar Akpınar
COURSE HOUR	: Monday- 14:00-17:00
OFFICE HOUR	: Tuesday-10:00-12:00, Wednesday-10:00-12:00
TYPE OF COURSE	: Master Course
PREREQUISITES	: None

CATALOGUE DESCRIPTION : This course is designed for providing an understanding on cement chemistry, hydration reaction of Portland cement, influence of other cementitious materials to the progress of hydration reaction and the ultimate concrete properties, chemical and physical interaction of aggregates and admixtures with the hydrated cement paste and their effects on the performance of fresh and hardened concrete. Concrete durability problems: mechanisms, expected physical and chemical changes occurring on the concrete microstructure during the progress of durability problems and precautions to be taken. Manufacture of special concretes and their properties.

LEARNING OUTCOMES : By the end of this course, graduate students should be able to;

- Develop a thorough understanding on the hydration of PC, influence of other cementitious materials and admixtures and additives on the progress of hydration reaction and on the hydration products being produced in the concrete microstructure,
- Develop an understanding on the relationship between the microstructure formation and strength and durability issues, the physical and chemical changes occurring on the concrete microstructure during the progress of a concrete durability problem.
- Develop research skills on an assigned topic at master's level of education..

LEARNING / TEACHING METHOD : The modes of delivery include formal lectures, theoretical discussions and guided investigation practices designed for the needs of each individual term projects are used as learning tools.

METHOD OF ASSESSMENT

Midterm : 20%

Term Project : 40 % (Progress & Report & Presentation)

Final : 40 %

TEXTBOOK(S):

1. CE544-Lecture Notes-NEU.
2. Concrete Technology, Neville A. M., & Brooks J. J., Prentice Hall, 2008.
3. Properties of Concrete, Neville A. M., Prentice Hall, 2005.
4. Concrete- Microstructure, Properties and Materials, Mehta P. K., Monteiro P. J. M., McGraw- Hill, 2006.
5. Beton, Erdoğan T., METU Press, 2003.

TENTATIVE SCHEDULE

Lecture Date	Lecture content to be covered
05/10/15	Lecture-1. Concrete constituents, their principal roles in concrete performance & Lecture- 2. Cement – Manufacture, contents, properties
12/10/15	Lecture-3. Cement Hydration Reactions, Concrete microstructure formation, hydration products and their influence to final concrete qualities. Assigning individual term projects to each student.
19/10/15	Lecture-4. Setting, hardening and heat of hydration relationships and their significance. Progress check for term projects.
26/10/15	Lecture -5 Cement Types. & Lecture-6. Other Cementitious Materials and their effects on hydration process and ultimate concrete behavior. Progress check for term projects.
2/11/15	No lectures- studying week
9/11/15	Midterm Exam
16/11/15	Lecture-7. Admixtures- chemical and physical effects on concrete behaviour both in fresh and hardened state. Progress check for term projects.
23/11/15	Lecture-8. Aggregate Selection- physical and chemical properties affecting the performance of fresh and hardened concrete. Progress check for term projects.
30/11/15	Definition of Durability in Concrete and Introduction to Durability Problems in Concrete.
7/12/15	Submission of term projects & Project Presentations
14/12/15	Project Presentations
21/12/15	Project Presentations
28/12/15	Final Exam

Learning Outcomes		
When this course has been completed the students should be able to:		Assessment
1	Develop a thorough understanding on the hydration of PC, influence of other cementitious materials and admixtures and additives on the progress of hydration reaction and on the hydration products being produced in the concrete microstructure,	1 &3
2	Develop an understanding on the relationship between the microstructure formation and strength and durability issues, the physical and chemical changes occurring on the concrete microstructure during the progress of a concrete durability problem.	1&3
3	Develop research skills on an assigned topic at master's level of education..	3&4
AssessmentMethods:1. WrittenExam2.Assignment3. Project/Report 4.Presentation 5. Lab.Work		
Course'sContributionto Program		
		CL
1	Ability to use advanced level of fundamental science knowledge as an effective tool for the analysis and/or the design of specified civil engineering problems/projects.	3
2	Ability to use advanced level engineering theories on the analysis and/or the design of specified civil engineering problems/projects.	1
3	Ability to correlate advanced level civil engineering concepts and theories within each other, as well as with the basic level engineering background received in BSc. degree education.	5
4	Ability to design an efficient research methodology and to carry out advanced level of research on a specific civil engineering topic.	5
5	Ability to carry out team-work activities with other specialized civil engineers or participating in team-work activities of multi-disciplinary nature for the solution of the targeted problem.	2
6	Ability to produce innovative and efficient solutions to specific civil engineering problems.	5
7	Ability to write advanced level of technical reports as well as graduate studies thesis and/or to carry out presentations on the studied engineering projects.	5
8	Ability to update background information with continuous efforts in following recent developments in different branches of civil engineering.	5
CL:Contribution Level(1:VeryLow, 2: Low, 3:Moderate,4:High,5:VeryHigh)		