

<b>Faculty</b>	<b>Faculty of Engineering</b>	
<b>Program</b>	<b>B.Sc. in Civil Engineering</b>	<b>Elective</b>
	<b>B.Sc. in Computer Engineering</b>	<b>Elective</b>
	<b>B.Sc. in Electrical-Electronics Engineering</b>	<b>Elective</b>
	<b>B.Sc. in Industrial Engineering</b>	<b>Elective</b>
	<b>B.Sc. in Mechanical Engineering</b>	<b>Elective</b>

<b>Course Code</b>	CE 462			
<b>Course Title in English</b>	Advanced Concrete Technology			
<b>Course Title in Turkish</b>	İleri Beton Teknolojileri			
<b>Language of Instruction</b>	English			
<b>Type of Course</b>	Flipped Classroom/Lecture/Laboratory			
<b>Level of Course</b>	Undergraduate			
<b>Course Category (by % of Content)</b>	Basic Science	Basic Engineering	Engineering Design	General Education
	-	50	50	-
<b>Semester Offered</b>	Fall - Spring			
<b>Contact Hours per Week</b>	Lecture: 2 hours	Recitation: -	Lab: 2	Other: -
<b>Estimated Student Workload</b>	133 hours			
<b>Number of Credits</b>	5 ECTS			
<b>Grading Mode</b>	Standard Letter Grade			
<b>Pre-requisites</b>	CE 202 Construction Materials			
<b>Expected Prior Knowledge</b>	Prior knowledge in selecting suitable constituent materials for concrete mixtures and evaluating fresh and hardened cementitious material properties using various test methods, is expected.			
<b>Co-requisites</b>	None			
<b>Registration Restrictions</b>	Undergraduate & Graduate Students			
<b>Overall Educational Objective</b>	To become familiar with special concrete mixtures and recent advances in concrete technology.			
<b>Course Description</b>	This course will provide the student detailed information about microstructure and mechanical properties of concrete and properties of constituent materials, development of strength, dimensional stability, temperature problems in concreting, durability of concrete, non-destructive test methods, compliance with specifications, progress in concrete technology, advances and future challenges in concrete technology.			
<b>Course Description in Turkish</b>	Bu derste beton iç yapısı ve mekanik özellikleri, beton karışım malzemeleri ve özellikleri, mukavemet gelişimi, boyutsal stabilite, sıcaklık etkileri, betonun dayanıklılığı, hasarsız deney yöntemleri, beton teknolojisindeki son gelişmeler üzerine çalışmalar yapılacaktır. yöntemleri, ve beton sektörünün geleceği ve fırsatlar üzerine çalışmalar yapılacaktır.			
<b>Course Learning Outcomes and Competencies</b>	Upon successful completion of this course, the learner is expected to: <ol style="list-style-type: none"> <li>1. design and mix an innovative concrete mixture and determine physical &amp; mechanical properties using destructive and non-destructive test methods;</li> <li>2. apply standard test procedures or develop new test methods to determine concrete properties, analyse and interpret experiment results addressing uncertainties;</li> <li>3. investigate environmental impacts of production of concrete and its constituents (such as cement, aggregates, admixtures, and supplementary cementitious materials);</li> <li>4. prepare written technical report that clearly refines objective, experimental results, analysis and relationship to the innovative mixture design;</li> <li>5. present test results of the experimental study using poster presentation.</li> </ol>			

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
<b>Student Outcomes</b>	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics			
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	H	1	Exam, Project
(3) an ability to communicate effectively with a range of audiences	S	5	Poster Presentation
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	S	3	Exam, Project
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	H	4	Poster Presentation, Project
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	H	2	Poster Presentation, Project
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies			
<b>Prepared by and Date</b>	Asst. Prof. Tahsin Alper Yıkıcı / January 2020		
<b>Semester</b>	Spring 2019-2020		
<b>Name of Instructor</b>	Asst. Prof. Tahsin Alper Yıkıcı		
<b>Course Contents</b>	Week	Topic	
	1.	Properties of concrete and constituent materials	
	2.	Fresh concrete properties, Test methods for concrete at early ages	
	3.	Strength of concrete, Development of strength	
	4.	Durability of concrete	
	5.	Test methods for hardened concrete properties	
	6.	Dimensional stability, Creep and Shrinkage	
	7.	Advanced cementitious composites	
	8.	Sustainable mix design, Service life concept	
	9.	Non-destructive test methods	
	10.	Precision of testing	
	11.	Compliance with specifications	
	12.	Recent advances in concrete technology, Draft project submission	
	13.	Future challenges	
	14.	Poster presentations	
	15.	Final Exam/Project/Presentation period	
	16.	Final Exam/Project/Presentation period	
<b>Required/Recommended Readings</b>	Concrete Technology, 2 <sup>nd</sup> Edition, Neville, A.M. and Brooks, J.J. (Required) Concrete, 2 <sup>nd</sup> Edition, Mindness S, Young J.F. and Darwin D. Concrete: Microstructure, Properties & Materials, Fourth Edition. Mehta, P. K., Monteiro, P. J. Properties of Concrete, Neville, A.M		
<b>Teaching Methods</b>	Lectures/Contact hours/Lab using 'flipped classroom' as an active learning technique		
<b>Homework and Projects</b>	Term Project		

<b>Laboratory Work</b>	Weekly lab work
<b>Computer Use</b>	Microsoft Office Applications
<b>Other Activities</b>	-
<b>Assessment Methods</b>	Homework (x1): 10% Midterm Exam (x2): 30% Term Project: 40% Classroom Presentation: 20%
<b>Course Administration</b>	<b>Instructor's office:</b> 506 <b>Office hours:</b> open-door policy <b>E-mail address:</b> yikicia@mef.edu.tr <b>Rules for attendance:</b> YÖK Regulations (80%) <b>HW &amp; Term Project Submission:</b> Provided that proper documents of excuse are presented an extension of no more than one-week will be given; otherwise late submissions will not be accepted. <b>A reminder of proper classroom behavior, code of student conduct:</b> Read the Classroom Etiquette on Blackboard. <b>Statement on plagiarism:</b> YÖK Regulations

ECTS Student Workload Estimation	Activity	No/Weeks	Hours			Calculation	Explanation
		No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
	Lecture/Flipped Classroom	14	1	2	0	42	A*(B+C+D)
	Laboratory Work	14	1	2	0	42	A*(B+C+D)
	HW's	1	0	4	0	4	A*(B+C+D)
	Midterm	2	6	2	0	16	A*(B+C+D)
	Term Project	1	2	18	1	21	A*(B+C+D)
	Poster Presentation	1	6	2	0	8	A*(B+C+D)
	Total Workload					133	
	Total Workload/25					5,32	
	ECTS					<b>5</b>	