

**COURSE INFORMATION FORM**

Faculty	Faculty of Engineering	
Program	B.Sc. in Civil Engineering	Elective
	B.Sc. in Electrical-Electronics Engineering	Elective
	B.Sc. in Industrial Engineering	Elective
	B.Sc. in Computer Engineering	Elective
	B.Sc. in Mechanical Engineering	Elective
Semester		

Course Code	CE 462			
Course Title in English	Advanced Concrete Technology			
Course Title in Turkish	İleri Beton Teknolojileri			
Language of Instruction	English			
Type of Course	Flipped Classroom/Lecture			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	-	50	50	-
Semester Offered	Fall			
Contact Hours per Week	Lecture: 3	Recitation: -	Lab: -	Other: -
Estimated Student Workload	132 hours per semester.			
Number of Credits	5 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	None			
Expected Prior Knowledge	None			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To familiarize students with concrete properties and recent advances in concrete technology.			
Course Description	This course will familiarize the student with microstructure and mechanical properties of concrete, development of strength, dimensional stability, durability of concrete, hydraulic cements, aggregates, chemical admixtures, concrete proportioning early age properties of concrete, non-destructive test methods, progress in concrete technology, advances in concrete mechanics and future challenges in concrete technology.			
Course Description in Turkish	Bu derste beton iç yapısı ve mekanik özellikleri, mukavemet gelişimi, boyutsal stabilite, betonun dayanıklılığı, hidrolik çimentolar, agrega özellikleri, kimyasal katkıları, beton karışım tasarımı, erken yaş beton özellikleri, hasarsız deney yöntemleri, beton teknolojisindeki son gelişmeler, zamana bağlı beton özellikleri ve beton sektöründeki zorluklar ve fırsatlar üzerine çalışmalar yapılacaktır.			
Course Learning Outcomes and Competences	Upon successful completion of this course, the learner is expected to: 1. Discuss important properties of engineering materials in comparison with concrete. 2. Explain the differences between "bad" concrete and "good" concrete and examine the reasons that made concrete the most widely used structural material in the world. 3. Describe the hydration reactions in Portland cement with their influence on development of concrete properties 4. Apply standard test procedures to determine concrete properties, analyze and interpret experiment results, and use "critical thinking and knowledge" of the fundamentals of concrete material properties to identify problems and suggest solutions. 5. Design an innovative concrete mixture and determine important properties.			
Relation to Program Outcomes and Competences:	N=None S=Supportive H=Highly Related			

Relationship of the Course with the Student Outcomes and Competencies	Level	Assessed by
	N/S/H (Related Learning Outcomes and Activities)	Flipped Classroom Practice, Exam, Lab,
(a) an ability to apply knowledge of mathematics, science, and engineering	H	Flipped Classroom Practice, Project, Exam
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	N	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	Flipped Classroom Practice, Project, Exam
(d) an ability to function on multidisciplinary teams	N	
(e) an ability to identify, formulate, and solve engineering problems	H	Flipped Classroom Practice, Project, Exam
(f) an understanding of professional and ethical responsibility	S	Flipped Classroom Practice
(g) an ability to communicate effectively	S	Project
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	S	Project
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Flipped Classroom Practice
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	H	Flipped Classroom Practice, Project, Exam
Prepared by and Date	Asst. Prof. Tahsin Alper Yikici / January 2016	
Name of Instructor	Asst. Prof. Tahsin Alper Yikici	
Course Contents	Week	Topic
	1.	Introduction to properties of concrete
	2.	Microstructure and properties of hardened concrete
	3.	Concrete strength
	4.	Dimensional stability
	5.	Durability of concrete
	6.	Hydraulic cements
	7.	Aggregates
	8.	Admixtures
	9.	Proportioning concrete mixtures
	10.	Concrete at early ages
	11.	Non-destructive test methods
	12.	Progress in concrete technology
	13.	Advances in concrete mechanics
	14.	Future challenges
	15.	Final examination period
	16.	Final examination period
Required/Recommended Readings	Mehta, P. K., Monteiro, P. J., Concrete: Microstructure, Properties, and Materials, Fourth Edition. McGraw-Hill Education, 2014. Properties of Concrete, Adam M. Neville Concrete 2 nd Edition, Sidney Mindness, J. Francis Young and David Darwin.	
Teaching Methods	Lectures/contact hours using 'flipped classroom' as an active learning technique	
Homework and Projects	-	
Laboratory Work	-	
Computer Use	Microsoft Office Applications	

Other Activities	-
Assessment Methods	Midterm 30% Project 20% Flipped Classroom Practice/Exercise 10% Final 40%
Course Administration	<p>Instructor's office: Office hours: E-mail address: Rules for attendance: Flipped Classroom Practice/Exercise contributes to 10% of the final grade. Missing a midterm: Provided that proper documents of excuse are presented, each missed midterm by the student will be given the grade of the final exam. No make-up will be given. Missing a final: Faculty regulations. A reminder of proper classroom behavior, code of student conduct: YÖK Regulations Statement on plagiarism: YÖK Regulations</p>

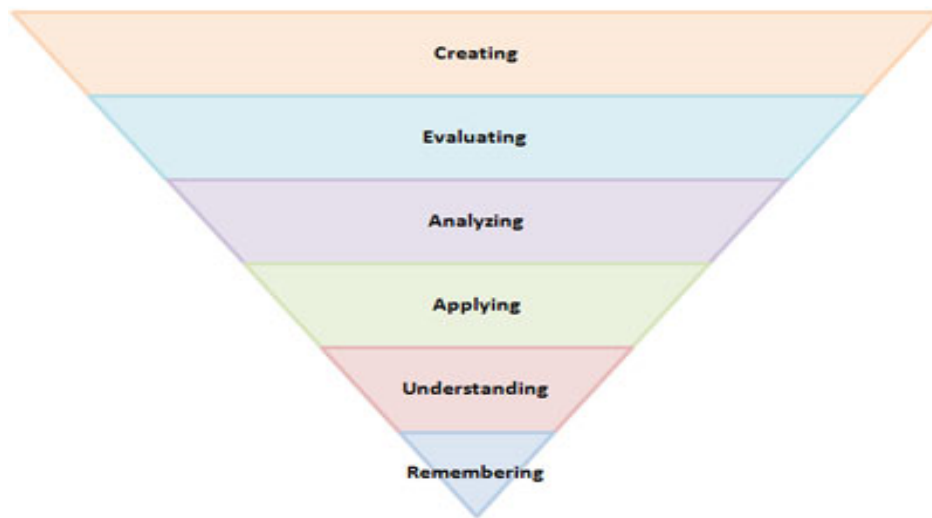
ECTS Student Workload Estimation	Activity	y/Weeks	Hours			Calculation	Explanation
		No/Weeks per Semes	Preparing for the Activity	Spent in the Activity	Completing the Activity		
	Lecture	14	1	3		56	A*(B+C+D)
	Project	1	12	12	2	26	A*(B+C+D)
	Midterm	2	14	2		32	A*(B+C+D)
	Final Examination	1	16	2		18	A*(B+C+D)
	Total Workload					132	
	Total Workload/25					5.28	
	ECTS					5	

PROGRAM CRITERIA

1. Proficiency in a minimum of four recognized major areas of civil engineering; ability to conduct laboratory experiments and to critically analyze and interpret data in at least two of the recognized major civil engineering areas; ability to perform civil engineering design
2. Proficiency in mathematics through differential equations, probability and statistics, calculus-based physics, and general chemistry
3. Understanding of professional practice issues, such as procurement of work, bidding versus quality-based selection processes, how design professionals and construction professionals interact to complete a project; awareness of the importance of competency and continuing education

Key verbs for cognitive domain in writing learning outcomes and competences:

Bloom's Taxonomy



Revised edition by Lorin Anderson (a student of Bloom)

Key Verbs:

Remembering: defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states.

Understanding: comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives an example, infers, interprets, paraphrases, predicts, rewrites, summarizes, translates.

Applying: applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.

Analyzing: analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates.

Evaluating: appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports.

Creating: categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes.

Key verbs for affective domain in writing learning outcomes and competences:

Receiving Phenomena: asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits, erects, replies, uses.

Responding to Phenomena: answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes.

Valuing: completes, demonstrates, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works.

Organizing: adheres, alters, arranges, combines, compares, completes, defends, explains, formulates, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes.

Internalizing values: acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, verifies.