ECTS COURSE INFORMATION FORM

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

Course Code	CE 202			
Course Title in English	Construction Materials			
Course Title in Turkish	Yapı Malzemeleri			
Language of Instruction	English			
Type of Course	Flipped Classroom/ Lecture/ Laboratory Work			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	50	50	-	-
Semester Offered	Spring			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab: 2 hours	Other:-
Estimated Student Workload	150 hours			
Number of Credits	6 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 develop basic understanding of key material properties, requirements, and related behavior characteristics of typical construction materials.			
Course Description	This course will familiarize the student with atomic and crystal structure, stress-strain relationship, mechanical properties of materials, failure theories, cementitious materials, fresh and hardened properties of cementitious materials based on properties of constituent materials. Properties of certain construction materials will be determined through specified laboratory experiments and the resulting data will be analyzed.			
Course Description in Turkish	Bu derste malzemelerin atomik ve kristal yapısı, gerilme-şekil değiştirme ilişkileri, malzemelerin mekanik özelikleri, kırılma teorileri, çimentolu malzeme karışımları ve bunların taze ve sertleşmiş özelikleri incelenmektedir. Yapı malzemelerinin özelikleri laboratuvar deneyleri ile tayin edilecek ve sonuçlar incelenecektir.			
Course Learning Outcomes and Competencies	Upon successful completion of this course, the learner is expected to: 1. evaluate basic mechanical properties of metals, and analyze the stress-strain relationships considering atomic bonding, atomic arrangements in crystal structures, and effects of crystal defects; 2. discuss the mechanics of the various failure modes (fracture, fatigue, and creep) and present a case study in collaboration with team members; 3. measure physical properties of constituent materials for concrete mixtures, prepare mixtures, and evaluate fresh and hardened properties using various test methods as a member of a team; 4. prepare written lab reports that clearly communicate experimental results, analysis, and relationship to the material properties by addressing uncertainties.			

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Student Outcomes	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	H	1	Exam, Lab report, FCP
(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			
(3) an ability to communicate effectively with a range of audiences	S	2	Presentation, Lab report
(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			
(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	3	Presentation, Lab report, FCP
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	H	4	Lab report
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies			

Prepared by and Date	Asst. Prof. Tahsin Alper Yıkıcı / December 2019	
Semester	Spring 2019-2020	
Name of Instructor	Asst. Prof. Tahsin Alper Yıkıcı	
Course Contents	Week	Topic
	1.	Introduction, Material selection process
	2.	Atomic structure and interatomic bonding, The structure of crystalline solids
	3.	Imperfections in Solids, Diffusion
	4.	Mechanical properties of metals, Mechanical properties lab
	5.	Strengthening mechanisms, Failure of engineering materials
	6.	Dislocations, Failure case study
	7.	Concrete microstructure, Precision of testing
	8.	Properties of Portland cement, Cement lab
	9.	Cementitious materials, Admixtures
	10.	Properties of aggregates, Aggregate lab
	11.	Fresh properties of concrete, Cementitious material lab
	12.	Concrete mixture design, Variability of strength
	13.	Hardened properties of cementitious materials, Mechanical properties lab
	14.	Time dependent concrete properties, Green concrete
	15.	Final Exam/Project/Presentation period
	16.	Final Exam/Project/Presentation period
Required/Recommended Readings	Required: None Recommended: Peter Damone and John Illston, Construction Materials: Their Nature and Behavior, Fourth Edition, CRC Press, 2010	
Teaching Methods	Lectures/contact hours using 'flipped classroom' as an active learning technique	
Homework and Projects	Failure case study analysis and presentation	
Laboratory Work	Weekly laboratory study as scheduled, Laboratory reports	
Computer Use	Microsoft Office Applications	
Other Activities	Field trip	

Assessment Methods	Flipped Classroom Practice/Exercise: 10% Case Study Presentation: 10% Quiz (x2):5% Midterm (x2):20% Laboratory reports: 30%
Course Administration	**Instructor's office**: 5th Floor **Office hours:** open-door policy **E-mail address:** yikicia@mef.edu.tr **Rules for attendance:** YÖK Regulations (80%) **Missing Laboratory Session:** There will be no makeup sessions for the laboratory. **Missing a midterm/ quiz**: Provided that proper documents of excuse are presented, each missed midterm/quiz 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 (http://www.mef.edu.tr/tr/yonetmelikler)

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	14	1	3		56	A*(B+C+D)
Laboratory/Exercise	14	1	3	1	70	A*(B+C+D)
Quiz	2	2	1		6	
Midterm(s)	2	7	2		18	A*(B+C+D)
Total Workload					150	
Total Workload/25					6	
ECTS					**6**	