COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P+L Hour*	*Credits*	*ECTS*
PRESTRESSED AND REINFORCED CONCRETE STRUCTURES	CE 529	-	3+0+0	3	10

Prerequisites	

Language of Instruction	English
Course Level	Master's Degree (Second Cycle Programmes)
Course Type	Departmental Elective
Course Coordinator	-
Instructors	Assist. Prof. Dr. Almıla Uzel
Assistants	-
Goals	Analysis, design and behaviour modelling of reinforced concrete and prestressed concrete structures are introduced. Analysis and design of reinforced concrete and prestressed concrete members beyond sectional models are discussed.
Content	Methods for predicting the load-deformation response of reinforced and prestressed concrete elements and structures are reviewed; design of structural components such as post-tensioned slabs and transfer girders, bridges and other civil engineering structures are studied; the use of computer based analytical procedures is illustrated in terms of case studies.

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Knowledge on characteristics of prestressed and reinforced concrete materials.	1,2,5	1, 2	A, B
2) Knowledge on the structural behavior of prestressed and reinforced concrete under flexural, axial and shear effects.	1,2,5	1, 2	A, B
3) Knowledge on the nonlinear characteristics of reinforced concrete members.	1,2,5	1, 2	A, B

Teaching Methods:	1: Lecture, 2: Question-Answer
Assessment Methods:	A: Written Exam, B: Homework

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Introduction, Concept of Prestress.	Lecture Notes and Textbook
2	Response of Axially Loaded Prestressed Concrete Elements	Lecture Notes and Textbook
3	Post-Cracking Behaviour of Concrete	Lecture Notes and Textbook
4	Flexural Response of Prestressed Concrete Elements	Lecture Notes and Textbook
5	Response of Members in Flexure and Axial Load	Lecture Notes and Textbook
6	Long-term response of Prestressed Concrete Elements	Lecture Notes and Textbook
7	Shear Design of Prestressed and Reinforced Concrete Structures	Lecture Notes and Textbook
8	Compression Field Theory and Modified Compression Field Theory (MCFT).	Lecture Notes and Textbook
9	Mechanisms affecting shear behavior of members and implementation of these mechanisms into MCFT.	Lecture Notes and Textbook
10	Midterm Exam	Lecture Notes and Textbook
11	Shear design of Prestressed and Reinforced Concrete Beams using MCFT procedures. Simplified Modified Compression Field Theory (SMCFT), shear provisions of Canadian Code (CSA A23.3-14) and AASHTO codes.	Lecture Notes and Textbook
12	Design of Prestressed Bridge Girders	Lecture Notes and Textbook
13	Design for Torsion	Lecture Notes and Textbook
14	Design of Disturbed Regions, B- and D- regions, Strut and Tie models, strength of struts, ties and nodal zones, deep beams, corbels	Lecture Notes and Textbook
15	Statically Indeterminate Structures	Lecture Notes and Textbook

RECOMMENDED SOURCES	
Lecture Notes	Notes prepared by the instructor
Textbook	**Reinforced Concrete Mechanics and Design:** Authors: J.K. Wight, J.G. MacGregor, Prentice Hall, 2008.
	Prestressed Concrete Structures: Authors: M.P. Collins, D. Mitchell, Response Publications, 1997.

MATERIAL SHARING	
Documents	Lecture notes delivered to the students
Assignments	Homeworks are returned to students after they are graded
Exams	Exams questions are solved if demanded

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	1	50
Quizzes	-	-
Assignment	5	20
Term Project	1	30
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		1	2	3	4	5	
1	Attains knowledge through wide and in-depth investigations his/her field and surveys, evaluates, interprets, and applies the knowledge thus acquired.				**x**		
2	Has a critical and comprehensive knowledge of contemporary engineering techniques and methods of application.				**x**		
3	By using unfamiliar, ambiguous, or incompletely defined data, completes and utilizes the required knowledge by scientific methods; is able to fuse and make use of knowledge from different disciplines.						
4	Has the awareness of new and emerging technologies in his/her branch of engineering profession, studies and learns these when needed.						
5	Defines and formulates problems in his/her branch of engineering, develops methods of solution, and applies innovative methods of solution.				**x**		
6	Devises new and/or original ideas and methods; designs complex systems and processes and proposes innovative/alternative solutions for their design.						
7	Has the ability to design and conduct theoretical, experimental, and model-						

	based investigations; is able to use judgment to solve complex problems that may be faced in this process.					
8	Functions effectively as a member or as a leader in teams that may be interdisciplinary, devises approaches of solving complex situations, can work independently and can assume responsibility.					
9	Has the oral and written communication skills in one foreign language at the B2 general level of European Language Portfolio.					
10	Can present the progress and the results of his investigations clearly and systematically in national or international contexts both orally and in writing.					
11	Knows social, environmental, health, safety, and legal dimensions of engineering applications as well as project management and business practices; and is aware of the limitations and the responsibilities these impose on engineering practices.					
12	Commits to social, scientific, and professional ethics during data acquisition, interpretation, and publication as well as in all professional activities					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	2	28
Midterm examination	1	3	20
Homework	5	24	120
Final examination	1	2	30
Total Work Load			240
Total Work Load / 25 (h)			10
ECTS Credit of the Course			10