COURSE IDENTIFICATION FORM

Course Code and Name: IM5056 CALCULATION OF BUILDING SYSTEMS WITH MATRIX METHODS				**Department of :** CIVIL ENGINEERING / MASTER PROGRAMME			
Semester	**Theoretic Hour**	**Practice Hour**	**Total Hour**	**Credits**	**ECTS**	**Education Language**	**Type: Compulsory Elective**
Atumn/Spring	3	0	3	3	5	Turkish	Optional
Prerequisite (s)							
Instructor						**Mail :** **Web :**	
Course Assistant						**Mail :** **Web :**	
Groups / Classes							

Course Aim	To teach the solution of planar and/or spatial carrier systems with the help of matrix methods and to introduce the finite element method for rods.
Course Goals	• To teach the solution of planar and/or spatial rod systems under fixed external effects with matrix methods and the calculation of section effects • To teach the solution for moving loads, influence lines, and the creation of general finite element formulations.
Course Learning Outs and Proficiencies	• Students will be able to create element matrices and obtain the system matrix. • Students will be able to create the stiffness matrix directly. • Students will be able to create the formulation of the finite element model for bar systems.
Course Basic and Auxiliary Contexts	• Doran, B., Yapı Sistemlerinin Matris Yöntemlerle Hesabı, YTÜ Basım Yayın Merkezi, 2012. • Livesley, R.K., Matrix Methods of Structural Analysis, 2 nd Edition, Pergamon,1975. • Çakıroğlu, A., Özer, E., Malzeme ve Geometri Bakımından Lineer OlmayanSistemler, Cilt 1, Matbaa Teknisyenleri Basımevi, 1980. • McGuire, W., Gallagher, R.H., and Ziemian, R.D., Matrix Structural Analysis,2 nd Edition, John Wiley, 2000. • Cook, R.D., Malkus, D.S., and Plesha, M.E., Concepts and Applications of Finite Element Methods, 4 th Edition, John Wiley, 2002. • Megson, T.H.G., Structural and stress analysis, Second edition,

	Elsevier Butterworth-Heinemann 2005.
Methods of Give a Lecture	Face to Face

		If Available, to Sign (x)	General Average Percentage (%) Rate
Assessment Criteria	**Midterm Exam**	**X**	**50**
	1. Quiz		
	2. Quiz		
	3. Quiz		
	4. Quiz		
	Oral Examination		
	Practice Examination (Laboratory, Project etc.)		
	Final Exam	**X**	**50**

Semester Course Plan

Week	Subjects
1	General principles in the calculation of rod systems with matrices
2	Matrix displacement method and matrix force method
3	Matrix displacement method: matrix relations in element, element stiffness matrix
4	Matrix relations in total system
5	Node/element loads and support movements
6	Direct generation of stiffness matrix, influence lines
7	Solution examples
8	Midterm exam
9	Formulation for shape functions and element matrices
10	Axial force element
11	Bending and frame elements-Bernouilli and Timoshenko rod theory
12	Formulation technique-variational methods
13	General finite element formulation, solution examples
14	Numerical examples