	Course name: MATH 423 Functional Analysis	Department: Mathematics		Semester
				7
	Methods of Education			Credit (ECTS)
Lecture	Recitation/ (Etud)	Lab	Exams	Homework/ Quiz	Other	Total	6
42	0	0	40	0	98	180	

Language	English
Compulsory/Elective	Elective
Prerequisites	None

	Weeks	Subjects
Course Contents	1	▪ Metric Spaces ▪ Open set Closed Set, Neighborhood
	2	▪ Cauchy Sequence, Completeness ▪ Completion of Metric Spaces
	3	▪ Normed Spaces ▪ Properties of Normed Spaces ▪ Finite Dimensional Normed Spaces
	4	▪ Linear Operators ▪ Continuous Linear Operators ▪ Dual Spaces
	5	▪ Banach Spaces ▪ Linear Functionals
	6	▪ Inner Product Spaces. Hilbert Spaces ▪ Properties of Inner Product Spaces ▪ Orthogonal Complements and Direct Sum
	7	▪ Orthonormal Sets and Sequences ▪ Legendre, Hermite and Laguerre Polynomials
	8	▪ Hilbert-Adjoint Operator ▪ Self-Adjoint, Unitary and Normal Operators
	9	▪ Fundamental Theorem for Normed and Banach Spaces
	10	▪ Zorn's Lemma ▪ Hahn-Banach Theorem
	11	▪ Category Theorem ▪ Uniform Boundedness Theorem ▪ Strong and Weak Convergence

12	▪ Numerical Integration and Weak Convergence ▪ Open Mapping Theorem	
13	▪ Closed Linear Operators ▪ Closed Graph Theorem	
14	▪ Banach Fixed Theorem ▪ Applications of Banach's Theorem	

Course Objectives	**1.**To familiarize students with the basic concepts, principles and methods of functional analysis. **2.**To provide the knowledge of applications of functional analysis.
Learning Outcomes and Competences	Student, who passed the course satisfactorily can: • know the basics knowledge of functional analysis • understand applications of functional analysis with the other disciplines of mathematics.
Textbook and /or References	1. Introductory Functional Analysis with Applications by E. Kreyzig (Author) Publisher: John Wiley & Sons (1989) 2. Fonksiyonel Analiz, Yüksel Soykan, Nobel Yayınevi, 2016.

Assessment Criteria		If any, mark as (X)	Percentage (%)
	Midterm Exams	X	40
	Quizzes		
	Homework		
	Projects		
	Term Paper		
	Laboratory work		
	Other		
	Final Exam	X	60

Instructors	