AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Operator Algebras								
Course Code	MTK611		Couse Level	Third Cycle (Doctorate Degree)					
ECTS Credit	7.5	Workload	188 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The purpose of this course is to introduce the notions and basic results of linear operators in Banach and Hilbert spaces, and to give important theorems for operators, representations and positive linear functionals in C*-algebras.								
Course Content	Linear operators of Banach spaces, the spectrum of an element of Banach algebras, the Gelfand representation of commutative Banach algebras, C*-algebras, positive elements of C*-algebras, Hilbert spaces, operators of Hilbert spaces, ideals in C*-algebras, approximate identities of C*-algebras, positive linear functionals of C*-algebras, representations of C*-algebras, the Gelfand-Naimark Representation, irreducible representations of C*-algebras, Kadison transitivity theorem.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	70

Recommended or Required Reading	
1	C*-algebras and Operator Theory, G.J. Murphy, Academic Press Inc., San Diego, 1990.
2	Theory of Operator Algebras I, M. Takesaki, Encyclopaedia Subseries on Operator algebras and non-commutative geometry, Springer, 2001.
3	Fundamentals of the Theory of Operator Algebras, Volume I, R.V. Kadison, J.R. Ringrose, Academic Press, Inc., London, 1983.

Week	Weekly Detailed Course Contents	
1	Theoretical	Normed spaces, linear functionals on normed spaces
2	Theoretical	Banach spaces, linear operators on Banach spaces
3	Theoretical	Banach algebras, the spectrum of an element of Banach algebras
4	Theoretical	The Gelfand representation of commutative Banach algebras
5	Theoretical	C*-algebras
6	Theoretical	Positive elements of C*-algebras
7	Theoretical	Hilbert spaces
8	Theoretical	Operators on Hilbert spaces
9	Intermediate Exam	Midterm Exam
10	Theoretical	Ideals in C*-algebras
11	Theoretical	Approximate identities of C*-algebras
12	Theoretical	Positive linear functionals on C*-algebras
13	Theoretical	Representations of C*-algebras, The Gelfand-Naimark Representation
14	Theoretical	Irreducible representations of C*-algebras
15	Theoretical	Kadison transitivity theorem
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	3	3	84
Midterm Examination	1	40	2	42

Final Examination	1	60	2	62
			Total Workload (Hours)	188
			[Total Workload (Hours) / 25*] = **ECTS**	7.5
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	Ability to learn the basic properties of operators in Banach spaces.
2	Ability to learn the basic properties of operators in Hilbert spaces.
3	Ability to explain the Gelfand representation of commutative Banach algebras.
4	Ability to understand the theorems of positive linear functionals of C*-algebras.
5	Ability to explain representations of C*-algebras.

Programme Outcomes *(Mathematics Doctorate)*	
1	To be able to develop the current and advanced knowledge of mathematics domain to expertise level by an original idea or research, based on the level of its knowledge at the graduate level, and to be able to reach original definitions that will bring innovation to Mathematics.
2	To be able to comprehend the interdisciplinary interaction associated with Mathematics.
3	To be able to use and evaluate the new knowledge in the field of Mathematics with a systematic approach.
4	To be able to develop an idea, a method, a design or an application that will bring innovation to Mathematics, to use well known ideas, methods, designs or applications on a different research area, or to search, comprehend, design, adapt and apply an original subject matter.
5	To be able to criticize, analyze, synthesize and evaluate new and complex ideas.
6	To be able have high-level skills in research methods related to studies on Mathematics.
7	To be able to expand the frontiers knowledge in the field of Mathematics via generating or interpreting an original study, or publishing at least a scientific paper in national/international refereed journals.
8	To be capable of leadership in the positions that require the analyses of problems related to the field of Mathematics.
9	To be able to defend his/her original ideas among the experts in the discussion of math related issues, and to be able to communicate effectively to show his/her competence in the field of Mathematics.
10	To be able to contribute to the solution of the social, scientific, cultural and ethical problems related to the Mathematics, and to be able to support the development of social, scientific, cultural and ethical values.
11	To be able to have both oral and written communication using a foreign language.

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5
P1	4	4	5	4	4
P2	4	5	5	4	5
P3	4	4	5	5	5
P4	3	4	5	5	4
P5	3	4	5	4	4
P6	4	4	5	5	4
P7		3	3		3
P9	3	3	3	3	3
P11	3	3	3	3	3