DEPARTMENT OF MATHEMATICS Content of PhD in Mathematics					
COURSE CODE	**COURSE NAME AND CONTENTS**	**T**	**A**	**C**	**ECTS**
MAT801	**Finite Elements I**	**3**	**0**	**0**	**8**
Purpose and Content	The aim of this course is to learn the concepts and techniques in finite fields theory and to provide the knowledge required by the student to be able to apply these concepts in cryptography and coding theory. Prime fields, Prime sub-body of a finite field, Prime sub-fields as a vector space, Multiplicative group of a finite field, Polynomials on a finite field, Automorphisms of finite fields, Wedderburn's Theorem, existence of, Prime polynomials on a prime field, Introduction to Galois Theory.				
MAT816	**Special Topics in Differential Equations**	**3**	**0**	**0**	**8**
Purpose and Content	The aim of this course is to give basic concepts of the theory of partial differentail equations and the solution methods and solutions of some types of partial differential equations. Curves and Surfaces in 3- dimensional space, Classification of partial differential equations, Pfaffian systems and their solutions, Origins of First order partial differential equations, Cauchy problem for first-order partial differential equations, First order linear partial differential equations, Surfaces orthogonal, First-order nonlinear partial differential equations, Compatible systems, Charpit's method, First-order special type partial differential equations and partial differential equations transformed special type equations, Applications of first order partial differential equations, Higher order partial differential equations, Second order linear partial differential equations with constant coefficients.				
MAT817	**Sobolev Type Differential Equations**	**3**	**0**	**0**	**8**
Purpose and Content	The aim of this course is to define Sobolev Spaces, showing the relationship between these and solving Cauchy and boundary value problems of some partial differential equations in these spaces. C(Q) and Ck(Q) spaces , Lp spaces, K finite function spaces, Schwarz spaces (S), W0k and Hk spaces				
MAT818	**Nonlinear Partial Differential Equations**	**3**	**0**	**0**	**8**
Purpose and Content	To have knowledge about the solution methods of nonlinear partial differential equations. Application of methods such as Adomian method, Tanh method, variational iteration method and differential transformation to nonlinear partial differential equations.				
MAT819	**Advanced Scientific Computing Methods I**	**3**	**0**	**0**	**8**
Purpose and Content	To create a numerical solution for two and three dimensional partial differential equations. Finite Difference Method and Finite Elements Method for Hyperbolic Problems, Elliptic Problems and Parabolic Problems.				

MAT824	**Integral Equations**	**3**	**0**	**0**	**8**
Purpose and Content	The aim of this course is to gain knowledge about integral equations and solution methods. In this course, it is aimed to make inferences about integral equations, solutions of integral equations, and systems of integral equations.				
MAT830	**Graph Theory and Algorithms**	**3**	**0**	**0**	**8**
Purpose and Content	To learn the basic definitions and concepts in graphs and to write the solution algorithms of the related problems. Graph connectivity, Accessibility and access in graph, Dominotion number and types in graphs, Coloring in graphs. Problems and solution algorithms based on these concepts, Algorithm analysis.				
MAT831	**Mathematical Programming and Applications**	**3**	**0**	**0**	**8**
Purpose and Content	The aim of this course is to provide the students who want to work in the field of algebra and number theory, the basics of programming languages and to enable students to make calculations on computer algebraic structures with a high number of elements in a short time. MAGMA programming language, constructing structures and elements, evaluating and printing expressions, identifiers, assignment process, applications on numbers, algebraic structures, conditional expressions, combined structures, representative and arbitrary element selection, cartesian products, transformations and homomorphisms, functions, repetitive expressions, rings and fields, finite fields, various applications on number fields, vector spaces and matrix spaces, error correction codes.				
MAT841	**Vector Optimization I**	**3**	**0**	**0**	**8**
Purpose and Content	Recognizing vector spaces, constructing orders on vector spaces and obtaining solutions of vector valued optimization problems according to these orders. To learn the methods used to solve vector optimization problems. Recognize vector optimization, convex sets, vector optimization concepts. Relating the problems encountered in daily life with vector optimization.				
MAT896	**PhD Qualification**	**0**	**1**	**0**	**26**
Purpose and Content	The purpose of the PhD qualification exam is to determine whether the student has basic knowledge enough to do doctoral studies, whether he / she has reached sufficient scientific maturity, and whether he is ready to conduct research at the doctoral level. Doctorate proficiency exam is made from basic courses at undergraduate and graduate level and special topics related to doctoral study.				
MAT897	**PhD Seminar**	**0**	**2**	**0**	**6**
Purpose and Content	To have comprehensive information about the subject, to gain oral presentation and discussion skills, to determine the objectives and scope of the thesis work. To conduct comprehensive research on a topic determined by the faculty member and student				

MAT8098D	**Course Specialised Field**	**4**	**0**	**0**	**4**
Purpose and Content	Course Specialised Field is a theoretical course that the faculty member proposes by a faculty member to share their knowledge, experience and expertise in their scientific field with graduate students under their supervision. This course aims to educate students on scientific ethics and instil a strong work discipline.				
MAT8098T	**Thesis Specialised Field**	**4**	**0**	**0**	**4**
Purpose and Content	Thesis Specialised Field is a theoretical course that faculty member proposes to the graduate students he/she supervises in order to share the methods of conducting research in the current literature, following and evaluating the literature and to establish and carry out the scientific foundations of the student's thesis / exhibition / project work.				
MAT899	**PhD Thesis Research**	**0**	**1**	**0**	**26**
Purpose and Content	The main purpose of this course is to report all the studies carried out in line with the principles such as conducting independent research, examining scientific events with a broad and deep perspective, making comments, developing a new scientific method, and moreover, applying this method to a field. The content of this course consists of assistance and guidance for all kinds of studies (for example, periodic review of the literature and reporting of the results, preparation of conference presentation, preparation of the article, preparation of the project, etc.).				
LUEE801	**Scientific Research Techniques and Scientific Ethics**	**3**	**0**	**0**	**8**
Purpose and Content	The purpose of this course is to learn the definition of science and scientific research methods/techniques, to learn scientific methodology, research techniques and data collection methods, to learn ethical issues in scientific studies. Learning the types of scientific publications (thesis, papers, articles, reports, etc.), gaining the ability to follow current scientific developments in the field, and learning the ethical principles that must be followed in scientific research and publication. In this course, the definition of scientific knowledge and its differences from other types of knowledge are presented. It is aimed to make inferences about the philosophy of science and philosophy of knowledge (epistemology) by learning and trying to provide a conceptual basis.				