CONTENTS OF THE LECTURES

AITB1001	ATATÜRK'S PRINCIPLES AND HISTORY OF TURKISH REVOLUTION - I	2+0+0	ECTS:2
Contents of the Lecture			
Historical concepts, descriptions, descriptions of resources and methods, French Revolution and Industrial Revolution, Collapse of the Ottoman Empire (XIX. Century), Tanzimat and Islahat Firmans, I. and II. Constitutional Monarchy, Tripoli and Balkan Wars, I. World War, Mondros Truce, Wilson Principles, Paris Conference, Atatürk, Samsun, and Anatolia, Amasya Notice, National Congress, Opening of the Mebusan Assembly, Foundation of Turkish National Assembly (TBMM) and Internal rebellions, 1921 Organic Law, Foundation of the Army, I. Inönü, Sakarya, Kütahya, Eskişehir Wars and the Last Attack, pacts during the Turkish War of Independence, Lozan Pact, Abrogate of Saltanate.			

MAT1005	ANALYSIS - I	4+2+0	ECTS:9
Contents of the Lecture			
Functions (polynomials, rational, trigonometric, hyperbolic, exponential, logarithmic and inverse trigonometric functions) graphs of basic functions, shifting and scaling graphs, limit, continuity, differentiation and applications (Intermediate Value Theorem, L'hopital's rule, Mean Value Theorem, Optimization problems, sketching the graph of a function), integration techniques.			

FIZ1003	PHYSICS - I	4+0+0	ECTS:6
Contents of the Lecture			
Vectors. Motion in one dimension. Motion in two dimensions. The laws of motion. Circular motion and other application of Newton's laws. Work and energy. Potential energy and conservation of energy. Linear momentum and collisions. Rotation of a rigid body about a fixed axis. Rolling motion. Angular momentum and torque. Static equilibrium and elasticity. Oscillatory motion. The law of universal gravitation. Temperature. Thermal expansion and ideal gases. Heat and laws of thermodynamics. The kinetic theory of gases.			

MAT1013	BASIC MATHEMATICS	4+2+0	ECTS:8
Contents of the Lecture			
Propositions, conjunctions, Truth tables, Logical Equality, İmplication, Proof Methods, Quantifiers, Sets, Cartesian Product, Relation, Inverse relation, Functions, Bijections, Compound Function, Equipollent Sets, Denumerability, Equivalence relations, Equivalence Class and decompositions, Quotient Set, Order Relation, Total order, Well Ordering, Mathematical Induction and recursion theorem of function.			

TB1001	TURKISH LANGUAGE - I	2+0+0	ECTS:2
Contents of the Lecture			
Language and languages; (Language-Nation Relations, Language-Culture) Languages in the world and the place of Turkish language among other languages; (Language families in terms of their sources) Historical Development of Turkish written language: (Old Turkish- Middle Turkish-Divanü Lügati't-Türk, Atabet'ül Hakayık, Harezm Turkish) . Old Turkey Turkish (Old Anatolian Turkish) ; The era new Turkish, Modern Turkish era, West (West eastern Turkish) Turkey's Turkish, East (North-eastern Turkish) Karatay Turkish Phonetics; (Sound and the formation of sound the harmony of vowel sounds) , Fundamental sound Features in Turkish; (Features sound of Turkish, Spelling structure of Turkish, Sentence Emphasis) . Morphology; (Words in terms of form, prefixes, suffixes, roots). Enumeration and words in respect to their functions; (Noun, pronouns, and adjectives) Verbs; (Shape and Tense supplements). Prepositions-Gerunds; (Derived from nouns-verbs). Meaning Science: Meaning in word, The frame of word meaning. Sentence Knowledge: (Kinds of Sentences). The analysis of sentences.			

YBD1001	ENGLISH LANGUAGE - I	3+0+0	ECTS:3
Contents of the Lecture			
Present Simple / Present Progressive. Articles / Nouns, Some-Any-No-Every / Much-Many-A lot of-A few-A little / How much?-How many? Object Pronouns / Possessive Adjectives / Possessive Pronouns / Possessive Case. Adjectives / Adverbs / Comparisons – Revision. Past Simple / Past Progressive, Prepositions of Time / Prepositions of Place / Prepositions of Movement. Relative Clauses / Relative Pronouns (who, which, that, whose). Relative Clauses / Relative Pronouns (who, which, that, whose). Reflexive ? Emphatic Pronouns / Which? / One - Ones – Revision. Present Perfect Simple. Present Perfect Simple vs. Past Simple / The verb used to.			

AITB1000	ATATÜRK'S PRINCIPLES AND HISTORY OF TURKISH REVOLUTION - II	2+0+0	ECTS:2
Contents of the Lecture			
Revolutions in the political field, political parties and attempts to transition to multi-party political life, revolutions in the field of law, regulation of social life, innovations in the economic field, Turkish foreign policy in the period of 1923-1938, Turkish foreign policy after Atatürk, Principles of the Turkish Revolution: (Republican, Populism, Secularism, Revolutionism, Statism, Nationalism). Integrative Principles.			

FIZ1000	PHYSICS - II	4+0+0	ECTS:6
Contents of the Lecture			
Electric fields. Gauss law, electric potential, capacitance and dielectrics, current and resistance, direct current circuits, magnetic fields, sources of the magnetic field, Faradays law, inductance, alternating current circuits.			

MAT1000	BASIC ALGEBRAIC STRUCTURES	4+0+0	ECTS:5
Contents of the Lecture			
Binary operations, Algebraic structures, Groups, Constructions of numbers, Natural numbers, Integers, Rational numbers, Symmetric groups, The group Zn.			

MAT1002	ANALYTICAL GEOMETRY	4+0+0	ECTS:5
Contents of the Lecture			
Cartesian coordinates in plane and space; Vectors in plane and space; Straight lines in the plane; Straight lines and planes in 3-dimensional space; Relations between point-line, point-plane, line-plane and plane-plane; Rotations and translations in plane; Basic notions about conics; General quadric equations in the plane and their canonic forms and graphics; Polar, cylindrical and spherical coordinates; Special surfaces in space: Cylinders, Rotational surfaces, Quadric surfaces.			

MAT1006	ANALYSIS - II	4+2+0	ECTS:8
Contents of the Lecture			
Riemann sums, definite integrals and their properties, fundamental theorem of integral calculus. Variable transformation in definite integrals and areas between curves Applications of definite integrals: Calculation of volume (disk, flake and shell method), Arc length, areas of rotating surfaces. Generalized Integral (1st and 2nd Type) Sequences and Infinite Series (Convergence and Divergence concept, geometric series, divergence test, integral test, comparison, ratio and root test). Alternate series, absolute and conditional convergence, power series, Taylor and Maclaurin series. Multivariable functions, the concept of limits and continuity and partial derivatives. Chain rule, directional derivatives and gradients. Extreme values, absolute maximum and absolute minimum, Lagrange multipliers (Single conditional). Double integrals and their applications (Area). Variable transformation in multiple integrals, polar coordinates and double integral in polar coordinates and its applications (Mass and density, center of mass).			

TDB1000	TURKISH LANGUAGE - II	2+0+0	ECTS:2
Contents of the Lecture			
Punctuation and Composition (Punctuation Marks, Other Marks) marks of abbreviations, Spelling Rules (The spelling of capital letters, The writing of quotations. numbers, The Composition the purpose of composition, method in composition writing, planning, introduction, development and result in composition, the features of telling (purity in telling, simplicity in telling, clarity and sincerity in telling mistakes in telling (the use of synonymous words in the sentence). The use of synonymous words in the sentence, The misuse of phrases, Explanation, story, description, criticism, portray, speaking, proving. The kinds of verbal telling (daily and unprepared speaking- prepared speaking, debate, panel) The kinds of written telling (letter, telegraph, celebration, invitation, literary letter Job letters, formal letter, petition, report, decision, announcement, advertisement). Talking, criticism, memoir, travel, writing, interview, survey Autobiography biography novel- story, fable- theater tragedy, drama- scenario, poetry and its kinds.			

YDB1004	ENGLISH LANGUAGE - II	2+0+0	ECTS:2
Contents of the Lecture			
Present Perfect Tense, Adjectives, Adjectives & Adverbs, Passives, Conditionals, Relative Clause, Relative Clause, Noun Clause, Reported Speech, Gerunds And Infinitives.			

MAT2001	PROBABILITY AND STATISTICS - I	4+0+0	ECTS:6
Contents of the Lecture			
Random variable concept, probability space, probability distributions with one variable, multivariate probability distributions, mathematical expectation value, characteristics functions, producer functions, expectation value with condition, some inequalities, some discrete and concrete probability distributions.			

MAT2005	LINEAR ALGEBRA - I	4+0+0	ECTS:6
Contents of the Lecture			
Vectors spaces, subspaces, linear independence, span, bases, dimension, linear transformations, matrix algebra, inverse of an nxn matrix, systems of linear equations, Gaussian elimination.			

MAT2011	DIFFERENTIAL EQUATIONS	4+0+0	ECTS:6
Contents of the Lecture			
First order differential equations and applications. Existance and uniqueness of the solutions. First order linear differential equations. Bernoulli differential equation. Seperable differential equations. Exact differential equations . Integrating factor for non-exact differential equations. Introduction to higher order linear differential equations. Second order linear differential equations. Linear independence and Wronskian. Reduction of order. Homogeneous constant coefficient second order linear equations. Cauchy-Euler equation, Nonhomogeneous equations. Undetermined coefficients and variation of parameters. Laplace transformation and solution of initial value problems by Laplace transformation. Systems of differential equations.			

MAT2023	ANALYSIS - III	4+2+0	ECTS:8
Contents of the Lecture			
Functions of several real variables, Topology of Rn, Limit, Continuity, Compactness, Sequences of functions, Series of functions. Series in Rn, Linear operators and matrices. Derivative, Chain rule. Mean value theorems. Partial derivatives. Implicit and inverse function theorems. Maximum and minimum, Lagrange multiplier’s rule.			

MAT2025	PROFESSIONAL ENGLISH	2+0+0	ECTS:4
Contents of the Lecture			
Names of lessons, Mathematical terms.			

USEC0003	PROFESSIONAL ETHICS	2+0+0	ECTS:4
Contents of the Lecture			
Morality and ethics, ethical theories, professional ethics, engineering ethics, scientific and publication ethics, professional corruption, discussion.			

MAT2006	PROBABILITY AND STATISTICS - II	4+0+0	ECTS:6
Contents of the Lecture			
Sampling theory and sample selection, arrangement of data and analyzing, the central limit theory, distribution theory, variation, sampling distributions and estimation, interval estimation (for the mean of the population), interval estimation (for the variance of the population), problems and introduction to hypothesis, hypothesis test about mean of the population, hypothesis test about variance of the population, importance of the Chi-square tests, problem solutions, confidence interval for the parameters and hypothesis tests.			

MAT2008	MATHEMATICAL COMPUTATION	4+0+0	ECTS:6
Contents of the Lecture			
Main notions and definitions (hardware, software, data processing). Symbolic computations with MAXIMA (scalars, vectors, matrices, functions and their graphs, limit, differentiation, integration, series, linear algebra applications, differential equations). Computer programming (algorithms: pseudocode, flowcharts and coding), Programing with OCTAVE (scalars, vectors, matrices, functions and plotting, iterative and conditional structures, construction of function programs, applications)			

MAT2010	LINEAR ALGEBRA	4+0+0	ECTS:6
Contents of the Lecture			
Determinants, eigenvectors and eigenvalues, the characteristic polynomials, quadratic forms, the space of inner products, Euclidean and unitary spaces, orthogonal and unitary matrices.			

MAT2014	ANALYSIS - IV	4+2+0	ECTS:8
Contents of the Lecture			
Multiple integrals. Application of double and triple integrals. Change of variables for double and triple integrals. Integral and uniform convergence. Vectoral analysis. Gradient, Rotation, Divergence. Integrals along paths. Surfaces and surface integrals. Green theorem, Divergence theorem, Stokes theorem.			

MAT2002	CURRENT ECONOMY	2+0+0	ECTS:4
Contents of the Lecture			
Principal concepts about current economy and analyzing the Turkish economy by economical indicators.			

MAT3005	COMPLEX ANALYSIS	4+0+0	ECTS:7
Contents of the Lecture			
Complex numbers. Functions of complex variable. Elementary functions. Complex sequences and series. Analytic functions. Complex integration. Cauchy integral theorems. Residues and its applications.			

MAT3007	ABSTRACT ALGEBRA	4+2+0	ECTS:6
Contents of the Lecture			
Groups, Subgroups and Normal subgroups, Cyclic groups, Lagrange's Theorem, Group Homomorphisms, Group isomorphic Theorems, Rings, Factor Rings, Ring Homomorphisms, Ring Isomorphism Theorems, Prime and Maximal Ideals, Completeness Regions, Fields, Fraction Objects, Euclidian Regions, Principal Ideal Region, One kind of fragmentation regions.			

MAT3011	DIFFERENTIAL GEOMETRY	4+2+0	ECTS:5
Contents of the Lecture			
Euclidean Space; Tangent Vectors and Vector Fields in 3-dimensional Space, Directional Derivatives; Curves in 3-dimensional Space; 1-Forms; Differential Forms; Mappings Between Euclidean spaces; Dot Product; Curves; The Frenet Formulas; Arbitrary-Speed Curves; Covariant Derivatives; Frame Fields; Connection Forms; Surfaces3-dimensional Space; Patch Computations; Differentiable Functions and Tangent Vectors; The Shape Operator; Normal Curvature; Gaussian Curvature; Computational Techniques; Special Curves in a Surface; Surfaces of Revolution.			

MAT3003	RIEMANN INTEGRALS DEPENDENT ON PARAMETERS	4+0+0	ECTS:6
Contents of the Lecture			
Limit, contunuity, derivation and integral of Riemann inregrals depending of parameter; Limit, contunuity, derivation and integral of generalized Riemann integrals depending of parameter; Gamma and Beta functions.			

MAT3009	INTRODUCTION TO LATTICE THEORY	4+0+0	ECTS:6
Contents of the Lecture			
Partial ordered set, lattice isomorphism, graded partial ordered set, Distributive lattices, Modular lattices, semi modular lattices, complemented modular lattices, Boolean lattices, Boolean algebras			

MAT3029	NUMERICAL ANALYSIS	4+0+0	ECTS:6
Contents of the Lecture			
The need for numerical analysis, the stages of numerical analysis, coding with MATLAB/OCTAVE (conditional structures, loops and function programs, review). Finding an interval containing a zero of a function, the principles of numerical analysis using a paradigm problem of approximating a real zero of a function. Computer number system. Representation of real numbers in computers and related errors. Approximation of a function around a point using Taylor polynomials and resulting errors. Estimating an unknown value in a data set using polynomials and resultant errors (algebraic formulation, Lagrange, Newton and spline interpolations). Approximating a function over an interval using elementary functions and related error.			

MAT3025	HISTORY OF MATHEMATICS	2+0+0	ECTS:4
Contents of the Lecture			
History of number, mathematics in Egypt, Mesopotamia, Greek, European, Islam and modern mathematics.			

USEC0007	PROTECTION OF PERSONAL DATA	2+0+0	ECTS:4
Contents of the Lecture			
Personal data law. Personal data and data controller concept. General principles in the processing of personal data. Terms of processing personal data. Obligations of the data controller. Relevant person and their rights. Right of application and complaint. Data Controllers Registry (Verbis). Offenses and misdemeanors within the scope of protection of personal data. Precedent and decisions of the Personal Data Protection Board.			

MAT3010	PARTIAL DIFFERENTIAL EQUATIONS	4+0+0	ECTS:7
Contents of the Lecture			
Basic concepts, First order linear partial differential equations and solutions with the method of characteristics, Cauchy problems for first-order equations (existence and uniqueness). Method of characteristics for second-order linear differential equations in two variables. D'Alembert solution of the wave equation. Separation of variables. Fourier series, Boundary value problems, eigenvalues and eigenfuctions, Heat, Potential and Wave equations. Nonhomogeneous problems. Eigenfunction Expansion Method. Fourier and Laplace transforms and their applications for unbounded domain problems.			

MAT3014	GENERAL TOPOLOGY	4+0+0	ECTS:7
Contents of the Lecture			
The course focuses on the basic notions of topological spaces, open and closed sets, basis and sub basis for a topology, interior/closure/exterior of a set and neighborhood of a point, sub space topology, continuous functions between topological spaces, homeomorphisms, metric functions, topology induced by a metric, continuity between metric spaces, product and quotient spaces, countability, separation axioms, connectedness and compactness.			

MAT3002	NUMERICAL ANALYSIS - II	4+0+0	ECTS:6
Contents of the Lecture			
Fixed point iteration method, Selection of a proper iteration function and the method of Newton-Raphson, Several variants of Newton-Raphson method, Newton methods and its variants for nonlinear algebraic systems, Linear algebraic systems and their solutions, Direct methods: Gauss elimination with no pivoting or partial pivoting, LU decomposition and solution by LU decomposition, Gram-Schmidt method of ortogonalization, QR decomposition with Gram-Schmidt method, solution by QR method, Least Square Method vs QR method, Iterative methods: Gauss-Jacobi, Gauss-Seidel and convergence of iterative methods. Numerical methods of integration (left and right rectangle, mid-point, trapezoidal, Simpson) and their composite forms, local and global errors, applications in MATLAB/Octave environment, Iterative methods (Romberg).			

MAT3026	DIFFERENCE EQUATIONS	4+0+0	ECTS:6
Contents of the Lecture			
First order linear difference equations. Second order linear difference equations; constant coefficient homogeneous difference equations, constant coefficient non-homogeneous difference equations, variable coefficient homogeneous difference equations, variable coefficient non-homogeneous difference equations. Applications of difference equations. Higher order linear difference equations. Systems of first order difference equations.			

MAT3024	INTRODUCTION TO MOTION GEOMETRY	4+0+0	ECTS:6
Contents of the Lecture			
Groups, Rings, Dual numbers, Ring of dual numbers, D-Modul, The matrix representation of a dual number, 1st absolute value of a dual number, Conjugate dual numbers, Group action on a set, System of equivalent vectors and G-orbit, G-invariant function, 2nd absolute value of a dual number, The group D1, The group GD1, Relation between the groups D1 and GD1, The problem of D1-equivalence, The problem of GD1-equivalence, The group D2, The group GD2, Relation between The groups D2 and GD2, The group D3, The group GD3, Relation between the groups D3 and GD3.			

MAT3000	SPECIAL FUNCTIONS CLASSES	4+0+0	ECTS:6
Contents of the Lecture			
Metric and linear normed spaces; continuous and continuously differentiable functions; absolutely continuous functions; monotone functions and functions of bounded variation ; classes of Lipschitz and Hölder functions; Riemann- Stieltjes integral.			

MAT3008	NUMBER THEORY	4+0+0	ECTS:6
Contents of the Lecture			
Linear Congruences, High Degree Congruence, Prime Modules, Power Resudies, Quadradic Resudies, The Legendre Symbol, The Quadratic Resiprocity Theorem, The Jacobi Symbol, Multiplicative Functions, Diophantine Equation.			

MAT3032	ACADEMIC TRANSLATION	2+0+0	ECTS:4
Contents of the Lecture			
Terms of mathematics, Mathematical texts and some examples, History of school of Mathematics			

USEC0002	HISTORY OF SCIENCE	2+0+0	ECTS:4
Contents of the Lecture			
The emergence, the development and the interactions between civilization of science in ancient Egypt, Mesopotamia, China, India, Ancient Greece, Ancient Rome, medieval European and Islamic world, modern period. Examples from the major thinkers who contribute to science from each civilization. The stages of science in the historical process, the reasons for regression, displacement and change.			

MAT3030	WEB AND GRAPHIC DESIGN	2+0+0	ECTS:4
Contents of the Lecture			
Internet and WEB Definitions, Html Basic Structure and Labels, Text, Image and Media Tags, Link (Hyperlink) Creation, Listing Labels, Table Operations, Frames, Forms and Form objects, Style Template (CSS) Basics, Style Template (CSS) Properties and Using, Style Template (CSS) Menu Operations and Web Design, Designing Web Objects with Open Source Graphics Programs.			

MAT4001	SEMINAR - I	0+2+0	ECTS:6
Contents of the Lecture			
Seminar content is determined by the advisor based on the department's undergraduate program.			

MAT4005	REAL ANALYSIS	4+0+0	ECTS:6
Contents of the Lecture			
Preliminaries; Sigma Algebras; Measurable Functions; Measurable Spaces; Measure and Outher Measure; Lebesgue Measure; Measurable Spaces ; İntegral ; Monotone Convergence Theorem and Consequences; Integrable Functions; Lebesgue Dominated Convergence Theorem.			

MAT4015	FIELD EXTENSIONS AND GALOIS THEORY	4+0+0	ECTS:6
Contents of the Lecture			
Introduction, (basic concepts of Rings, Polynominal rings and Vector spaces) Algebraic extensions of fields, Normal and Separable extensions, Introduction to Galois Theory.			

MAT4023	A FIRST COURSE IN INTEGRAL EQUATIONS	4+0+0	ECTS:6
Contents of the Lecture			
The general terms about integral equations: The short history of integral equations, definition and classification; Solution of an integral equation; Converting Volterra Equation to an ordinary differential equation; Converting initial value problem to Volterra equation; Converting boundary value problem to Fredholm integral equation; Taylor series, Infinite geometric series, Solving Fredholm integral equation with using the Adomian decomposition method, the variational iteration method, the direct computation method, the successive approximations method, the method of successive substitutions; Homogeneous Fredholm integral equations; Fredholm integral equations of the first kind: The method of regularization; Solving Volterra integral equation with using he Adomian decomposition method, the variational iteration method, the series solution method, the successive approximations method, the method of successive substitutions; Volterra integral equations of the first kind: The series solution method, Conversion of first kind to second kind; Singular integral equations.			

MAT4025	INTRODUCTION TO ALGEBRAIC TOPOLOGY	4+0+0	ECTS:6
Contents of the Lecture			
Continuous maps, product and quotient spaces, identification spaces, homotopy, fundamental group covering spaces, categories and functors.			

MAT4013	TRANSFORMATIONS AND GEOMETRIES	4+0+0	ECTS:6
Contents of the Lecture			
Euclidean geometry, transformations from the plane to itself, transformation grups, geometric invariants, translations, rotations, reflections, similarity geometry, similarity transformations, similarity group, Affine geometry, affine transformations, affine group, decomposition of a general affine transformation, projective transformations, Projektive group, projektive geometry			

MAT4021	NUMERICAL SOLUTIONS OF DIFFERENTIAL EQUATIONS	4+0+0	ECTS:6
Contents of the Lecture			
Mathematical models as initial value and/or boundary value problems; the need for numerical methods, Initial value problems; single step methods (derivation, convergence analysis and implementation) (Euler, Trapezoidal, Runge-Kutta) , Multistep methods(explicit and implicit methods). Boundary-value problems: finite difference, shooting method; Difference methods and stability analysis for parabolic, ellliptic and hyperbolic equations. Implementations with MATLAB GUI			

MAT4007	APPLIED MATHEMATICS	4+0+0	ECTS:6
Contents of the Lecture			
Derivation of heat and wave equations, Gamma and Beta functions, self-adjoint operators, power series and the method of Frobenius, Legendre differential equation and its solution, Legendre polynomials, their properties and applications, Bessel differential equation, Bessel polynomials and their properties, Green functions, variational calculus, integral transformations and integral equations, solution of partial differential equations by Laplace transform, perturbation method.			

MAT4017	INTRODUCTION TO HYPERBOLIC GEOMETRY	4+0+0	ECTS:6
Contents of the Lecture			
Introduction to hyperbolic metric and hyperbolic field concepts. Review the basic concepts and relationships of hyperbolic trigonometry.			

MAT4000	GRADUATION STUDY	2+2+0	ECTS:6
Contents of the Lecture			
Carrying out academic research in comply with ethical issues, technical document preparation and presentation, document preparation and presentation on any topics suggested by the advisor.			

MAT4010	SEMINAR - II	0+2+0	ECTS:6
Contents of the Lecture			
Any undergraduate-level topic chosen by the advisor.			

MAT4004	DISCRETE GROUPS	4+0+0	ECTS:6
Contents of the Lecture			
The Basic Spaces; A Model for the Hyperbolic Plane, Riemann Sphere, The Boundary at Infinity of the upper half-plane, The General Möbiüs Group, The Group of Möbiüs Transformations and Transitivity Properties of its, The Cross Ratio, Classification of Möbiüs Transformations, A Matrix Representation, Reflections, The Conformality of Elements of Möb, Preserving the upper half-plane, Topological groups, topological transformation groups, coverings, PSL (2, R) group and discrete subgroups of its, Hyperbolic Length and Distance in the upper half-plane, hyperbolic polygons, hyperbolic area, Gauss-Bonnet formula, Fuchsian groups and algebraic properties, fundamental domains.			

MAT4014	INTRODUCTION TO FUNCTIONAL ANALYSIS	4+0+0	ECTS:6
Contents of the Lecture			
Metric spaces, Normed linear spaces, Inner product spaces, Orthogonal expansions, Linear transformations, Linear functionals, Spectrum of an operator.			

MAT4012	INDUSTRIAL MATHEMATICS	4+0+0	ECTS:6
Contents of the Lecture			
Industrial mathematics and mathematical problems of industry, Leontief input-output model, Typical optimization problems, geometric approach, algebraic approach: Simplex method, Dual problem, Two phase simplex method, Discrete Fourier transform and applications, Convolution and image applications, Mathematics of Tomography, Mathematics of GPS.			

MAT4020	DYNAMICAL SYSTEMS	4+0+0	ECTS:6
Contents of the Lecture			
Basic mathematical models, 1D dynamical systems, stability of the 1D systems, graphical methods, potential method, bifurcations, flow around a circle, linear and non-linear system of equations, limit cycles.			

MAT4016	MODULE THEORY	4+0+0	ECTS:6
Contents of the Lecture			
Modules, submodules, factor modules, module homomorphisms, free modules, finite generation modules, cyclic modules, irreducible modules, non-separable modules, semisimple modules, Artinian and Noetherian modules.			

MAT4024	MANIFOLDS AND HYPERSURFACES	4+0+0	ECTS:6
Contents of the Lecture			
Affine space, Euclidean space, topological manifolds, differentiable manifolds, curves on manifolds, tangent vectors and tangent space, Riemannian manifolds and covariant derivative, hypersurfaces, normal vector field in hypersurfaces, orientation, geodesics and parallelism, shape operator, Gauss transformation, calculation of the matrix of Weingarten transformation, fundamental forms and algebraic invariants of the shape operator.			