FACULTY OF COMPUTER AND INFORMATION TECHNOLOGIES

Bilgisayar ve Bilişim Bilimleri Fakültesi, 02.08.2024 tarih ve 32620 sayılı Resmi Gazetede yayımlanan 8785 sayılı Cumhurbaşkanı kararı ile kurulmuştur.

Dean   : Prof.Dr. Sevil ŞENTÜRK
Vice-Dean   :
Secretary to the Faculty : Evren ÇEMREK

STAFF

Faculty Members:
Bahadır CİNOĞLU, Özgür GÜLTEKİN

Research Assistants:
Betülnaz HAYRAN, Zehra Nur ÖZTÜRK

INFORMATION SECURITY TECHNOLOGY PR. (ENGLISH)

Department Head   : Assistant Prof. Dr. Lecturer Bahadır CİNOĞLU
Deputy Department Head :

PROGRAM

I.Semester

Code	Course	Hrs	ECTS
BBB101 (Eng)	Introduction to Programming	2+2	5.0
BGT101 (Eng)	Introduction to Information Security and Cyber Security	2+2	5.0
FİZ105 (Eng)	Physics I	4+0	6.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5
MAT1013 (Eng)	Calculus I	4+2	7.5
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0
	Seçmeli Ders	--	3.0

			30.0

II.Semester

Code	Course	Hrs	ECTS
BGT102 (Eng)	Operating Systems and Virtualization	3+0	5.0
BİL801 (Eng)	Object Oriented Programming	4+0	4.0
BST104 (Eng)	Data Structures and Algorithms	3+0	5.0
MAT1014 (Eng)	Calculus II	4+2	7.5
MAT2021 (Eng)	Linear Algebra	3+1	4.5
TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
	Seçmeli Dersler	--	2.0

			30.0

III.Semester

Code	Course	Hrs	ECTS
BBB2001 (Eng)	Computer Networks	3+0	5.0
BBB2003 (Eng)	Database Management Systems	3+0	4.0
BGT2001 (Eng)	Cryptology	3+1	5.0
İSG401	Occupational Health and Safety I	2+0	2.0
MAT239 (Eng)	Discrete Mathematics	3+0	5.0
TÜR125	Turkish Language I	2+0	2.0
	Mesleki Seçmeli Dersler	--	5.0

IV.Semester

Code	Course	Hrs	ECTS
BBB2002 (Eng)	Introduction to Artifical Intelligence	3+0	4.0
BGT2002 (Eng)	Secure Network Design	2+2	5.0
BGT2004 (Eng)	Fundamentals of Hardware	2+1	4.0
İSG402	Occupational Health and Safety II	2+0	2.0
İST2046 (Eng)	Statistics	4+0	5.0
TÜR126	Turkish Language II	2+0	2.0
	Mesleki Seçmeli Dersler	--	4.0

	Seçmeli Dersler	--	2.0		*Seçmeli Dersler*	--	4.0
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			30.0				30.0

Elective Courses

İNG325 (Eng)	Academic English III	3+0	3.0
İNG326 (Eng)	Academic English IV	3+0	3.0

Area Elective Courses

BGT2501 (Eng)	Entrepreneurship and Innovation	3+0	4.0
BGT2502 (Eng)	Data Security	3+0	4.0

INFORMATION SYSTEMS AND TECHNOLOGIES (ENGLISH)

Department Head   : Assistant Prof. Dr. Özgür GÜLTEKİN
Deputy Department Head   :

PROGRAM

	I.Semester				**II.Semester**		
BBB101 (Eng)	Introduction to Programming	2+2	5.0	BİL801 (Eng)	Object Oriented Programming	4+0	4.0
BST101 (Eng)	Information Systems and Technologies	3+0	3.0	BST102 (Eng)	Management Information Systems	3+0	4.0
FİZ105 (Eng)	Physics I	4+0	6.0	BST104 (Eng)	Data Structures and Algorithms	3+0	5.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	MAT1014 (Eng)	Calculus II	4+2	7.5
MAT1013 (Eng)	Calculus I	4+2	7.5	MAT2021 (Eng)	Linear Algebra	3+1	4.5
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0	TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
	Seçmeli Dersler	--	5.0		*Seçmeli Dersler*	--	3.0
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			30.0				30.0

	III.Semester				**IV.Semester**		
BBB2001 (Eng)	Computer Networks	3+0	5.0	BBB2002 (Eng)	Introduction to Artifical Intelligence	3+0	4.0
BBB2003 (Eng)	Database Management Systems	3+0	4.0	BGT102 (Eng)	Operating Systems and Virtualization	3+0	5.0
BST2001 (Eng)	Web Design and Programming I	3+0	4.0	BST2002 (Eng)	Web Design and Programming II	3+0	4.0
İKT151 (Eng)	Economics	3+0	3.0	BST2004 (Eng)	Visual Programming	3+0	4.0
İSG401	Occupational Health and Safety I	2+0	2.0	İSG402	Occupational Health and Safety II	2+0	2.0
MAT239 (Eng)	Discrete Mathematics	3+0	5.0	İST2046 (Eng)	Statistics	4+0	5.0
TÜR125	Turkish Language I	2+0	2.0	TÜR126	Turkish Language II	2+0	2.0
	Mesleki Seçmeli Dersler	--	5.0		*Seçmeli Dersler*	--	4.0
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			30.0				30.0

Elective Courses

| İNG325 (Eng) | Academic English III | 3+0 | 3.0 |
| İNG326 (Eng) | Academic English IV | 3+0 | 3.0 |

Area Elective Courses

| BGT2501 (Eng) | Entrepreneurship and Innovation | 3+0 | 4.0 |

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING PR. (ENGLISH)

Department Head : Assistant Prof. Dr. Özgür GÜLTEKİN
Deputy Department Head :

PROGRAM

	I.Semester				II.Semester		
BBB101 (Eng)	Introduction to Programming	2+2	5.0	BİL801 (Eng)	Object Oriented Programming	4+0	4.0
FİZ105 (Eng)	Physics I	4+0	6.0	BST104 (Eng)	Data Structures and Algorithms	3+0	5.0
FİZ107 (Eng)	Physics Laboratory I	0+2	1.5	MAT1014 (Eng)	Calculus II	4+2	7.5
MAT1013 (Eng)	Calculus I	4+2	7.5	MAT2021 (Eng)	Linear Algebra	3+1	4.5
TAR165	Atatürk's Principles and History of Turkish Revolution I	2+0	2.0	TAR166	Atatürk's Principles and History of Turkish Revolution II	2+0	2.0
YZM1001 (Eng)	Introduction to Artificial Intelligence and Machine Learning	4+0	6.0	YZM1002 (Eng)	Python Programming	2+1	4.0
	Seçmeli Dersler	--	2.0		*Seçmeli Dersler*	--	3.0
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			30.0				30.0

Elective Courses

| İNG325 (Eng) | Academic English III | 3+0 | 3.0 |
| İNG326 (Eng) | Academic English IV | 3+0 | 3.0 |

COURSE CONTENTS

BBB101 (Eng)   Introduction to Programming   **2+2   5.0**

Stages of Computer Problem Solving, Algorithm Development and Flow Diagrams; Algorithm Creation Examples, Introduction to C Programming Language; Data Types, Variables and Constants; Operators; Basic Input/Output Functions; Comparison Statements; Loops, Changing the Loop Flow with break and continue Statements, Nested Loops, Infinite Loops; For and While Loop Applications; Functions; Arrays, One Dimensional Arrays, Applications; Two Dimensional Arrays, Applications; Pointer Concept; File Management in C, Opening a File, Processing a File, Closing a File, Saving Information to a File, Reading Information from a File, Applications; Applications.

BBB2001 (Eng)   Computer Networks   **3+0   5.0**

Introduction and Overview of Networks: What is a computer network?,Overview of OSI and TCP/IP architectures, The rationale and significance of the layered approach; Physical Layer and Transmission Media: Bit transmission, analog and digital signals, Copper cables, fiber optics, wireless media, Modulation, bandwidth, encoding techniques; Fundamentals of the Data Link Layer: Framing, MAC addressing, Error detection and correction (CRC, parity), Flow control, ARQ protocols; Media Access Control (MAC) and Ethernet: ALOHA, CSMA/CD, CSMA/CA, Ethernet and IEEE 802.3, Differences between switch, hub, and bridge; IP Protocol and Addressing: IPv4 address structure, subnetting, Introduction to IPv6, NAT, ARP, ICMP; Routing and Routing Protocols: Static and dynamic routing, Introduction to OSPF, RIP, and BGP, Router structure and operation; Transport Layer Fundamentals - TCP and UDP: Connection-oriented vs connectionless services, TCP handshake (three-way handshake), UDP examples and use cases; Reliability, Flow and Congestion Control: TCP timing and retransmission, Windowing mechanism, Congestion control algorithms (Estimation, AIMD); Application Layer Basics and Protocols: HTTP, HTTPS, FTP, SMTP, DNS, DNS resolution and hierarchy, IP address allocation via DHCP,

Client-Server and Peer-to-Peer Architectures: Web server, proxy, P2P system architectures (BitTorrent, eMule), Content Delivery Networks (CDNs); Wireless Networks (Wi-Fi) and Mobile Communication: IEEE 802.11 architecture, Introduction to mobile networks: GSM, LTE, 5G, Wireless access points and security (WPA2, WPA3); Fundamentals of Network Security: Common attacks: MITM, sniffing, spoofing, Encryption and secure data transmission, VPN, firewall, IDS/IPS; Software-Defined Networking (SDN) and Virtualization: The concept of SDN, OpenFlow, control plane vs data plane separation, Network Function Virtualization (NFV); Network Management and Current Trends: SNMP and network monitoring tools, Using Wireshark, IoT networks and cloud-based communication infrastructures.

BBB2002 (Eng) Introduction to Artifical Intelligence 3+0 4.0

Introduction to Artificial Intelligence; Smart Agents; Problem Solving by Searching; Informed Search Algorithms; Constraint Satisfaction Problems; Game Theory; Logical Agents; Decision Making under Uncertainty; Probabilty Theory; Bayesian Networks; Machine Learning: Supervised learning, Unsupervised learning, Reinforcement learning; Deep Learning; Recent Trends in Artificial Intelligence.

BBB2003 (Eng) Database Management Systems 3+0 4.0

Introduction to DBMS: Overview, types, architecture, security; Relational Model and Relational Algebra; Entity-Relationship Modeling; Database Design and Normalization; SQL and PL/SQL; Query Processing and Optimization; Indexing and Physical Design; Transaction Management; Crash Recovery; Database Security; Distributed Databases; NoSQL and NewSQL Databases; Big Data and Cloud Databases.

BGT101 (Eng) Introduction to Information Security and Cyber Security 2+2 5.0

Information Systems Security; Internet of Things and Security; Malicious Attacks, Threats and Vulnerabilities; Information Security Business Drivers; Access Control; Security Operations and Management; Auditing, Testing and Monitoring; Risk, Response and Recovery; Cyber Security Fundamentals; Cyber Warfare; Introduction to Encryption; Network Security; firewalls, intrusion detection and prevention systems; Operating System security.

BGT102 (Eng) Operating Systems and Virtualization 3+0 5.0

Operating system concept and history; Operating system types and usage; Kernel concept and types; Von neuman and Harvard architectures and their differences; Process management concept and applications; Memory management concept and applications; Input output management concept and applications; File system concept and applications; Single hierarchy file; Security concept and applications in operating systems; Process communication concept and applications; Virtualization concept and applications; Factors affecting operating system performance.

BGT2001 (Eng) Cryptology 3+1 5.0

Cryptology Science and Fundamental Concepts; Classical Encryption Methods; Mathematical Background: Modular arithmetic, Euclidean algorithm, Fermat's theorem, Number theory, Finite fields; Random Number Generators and Randomness Tests; Symmetric Encryption: Block ciphers, Rijndael Feistel architecture, DES, AES; Stream Ciphers: RC4; Asymmetric Encryption: RSA, El-Gamal; Elliptic Curve Encryption; Key Exchange Management: Diffie-Hellman; Digital Signatures; Hash Functions: SHA and MD algorithms; Cryptographic Protocols: SSL/TLS, IPSec, SSH, Application layer protocols; Current Cryptology Applications.

BGT2002 (Eng) Secure Network Design 2+2 5.0

Introduction to Computer Networks and Network Security; The OSI Model and OSI Security Architecture; Attack Vectors and Threats in Networks; Introduction to AAA (Authentication, Authorization and Accounting); OSI Layer Protocols and Vulnerabilities; Perimeter Security Components (Firewall Technologies); Perimeter Security Components (IDS/IPS Systems); Next Generation Network Security Concepts; Network Security Testing and Auditing Tools; Cryptographic Systems and Virtual Private Networks (VPN); Wireless Network Security; Network Security Standards and Policies.

BGT2004 (Eng) Fundamentals of Hardware 2+1 4.0

Fundamentals of Computer Hardware; Processors (CPUs); Motherboards; BIOS and CMOS; Memory Units; Expansion Slots and Cards; Connection Interfaces (I/O Interfaces); Storage Units; Display Devices; Printers; Other Peripheral Devices; PC Component Assembly; Troubleshooting and Quality Standards; Safety and Ergonomics in the Workplace.

BGT2501 (Eng) Entrepreneurship and Innovation 3+0 4.0

Basic Concepts of Entrepreneurship and Types of Entrepreneurship, Basic Concepts of Innovation and Types of Innovation, Innovation and Creativity in Entrepreneurship, Market Research and Customer Analysis, Business Model Development, Business Plan Preparation, Sources of Financing, Marketing Strategies, Technology and Product/Service Development, Risk Management and Legal Aspects, Challenges and Motivations in Entrepreneurship and Innovation, Success Stories in Entrepreneurship and Innovation, Case Study Analysis, Project Presentations and General Evaluation.

BGT2502 (Eng) Data Security   **3+0   4.0**

Introduction to Data Security; Access Control Models; Firewalls, Intrusion Detection and Prevention Systems; Physical and Operational Security; Data Leakage and Data Breach; Secure Coding Principles; Fundamentals of Cryptography; Cryptographic Protocols; Introduction to Linux; Security Vulnerabilities and Attack Vectors; Vulnerability Scanning Tools; Defensive Security Concept; Privacy and Regulatory Requirements.

BiL801 (Eng) Object Oriented Programming   **4+0   4.0**

Introduction to C++ Programming Language; Inline Functions; Function Overloading; Function Templates; Concepts of Class and Object; Constructors; Destructors; Friend Functions and Friend Classes; Const Objects and Const Member Functions; C++ Operator Overloading; C++ Inheritance; C++ Virtual Functions; Polymorphism.Introduction to C++ Programming Language; Inline Functions; Function Overloading; Function Templates; Concepts of Class and Object; Constructors; Destructors; Friend Functions and Friend Classes; Const Objects and Const Member Functions; C++ Operator Overloading; C++ Inheritance; C++ Virtual Functions; Polymorphism.

BST101 (Eng) Information Systems and Technologies   **3+0   3.0**

Information Technologies and Basic Concepts Development of Technology in Technology: Yesterday-Today-Tomorrow; Hardware Computer Types Basic Components of the Computer; Software Software Types Malware; Operating Systems MS Windows MacOS Linux/Unix/Pardus; Office Programs Microsoft Office Apple iWorks Pardus Libre Office; Information Security Network Security Computer Security Mobile Security; Presentation Programs and Presentation Techniques; Application (preparing presentations with PowerPoint); Presentation.

BST102 (Eng) Management Information Systems   **3+0   4.0**

Management, Information and System Concepts; Information Systems in Organizations, Components of Information Systems; Basic Principles of Management Information Systems and Information Society; Information Systems, Organizations and Strategy; General Types of Information Systems and Relationship with Business Lines; Case Study; Information Management and Decision Making; Laboratory Hour Uyumsoft Application; Ethical and Social Issues in Information Systems; Information Systems Security; Achieving Operational Excellence; Project Presentations.

BST104 (Eng) Data Structures and Algorithms   **3+0   5.0**

Problem solving and algorithm development: determinism, finiteness, efficiency, input/output and analysis of algorithms; Algorithmic program design and flowcharts; Program execution speed and memory requirements: Execution time, time complexity, area cost and complexity, algorithm analysis, complexity, memory requirement, asymptotic notations, sustainable algorithm design; Sorting algorithms: Bubble sort, cluster sort, interleaving sort, selective sort, fast sort, etc; Search algorithms: Linear search, binary search; Linked lists: One-way and two-way linked lists and their applications; Stack and Queue Structures: Stack and queue design, stack and queue design with arrays and linked lists; Hash function and its applications; Tree structures: Basic tree concepts, storing trees in memory; Binary trees, AVL tree structures; B/B+ tree structures; Graph data model: Graph concepts, memory storage of graphs, neighborhood matrices and lists; Graph traversal algorithms: Depth-first search algorithm, breath first search algorithm; Shortest path finding problem and its applications.

BST2001 (Eng) Web Design and Programming I   **3+0   4.0**

Server-Client Architecture; Domain name concept; HTML; Introduction to server-based application development; ASP Sample Applications; Introduction to SQL Server; Introduction to ASP.Net; ADO.Net Architecture; XML Web Services; jQuery; Introduction to MVC; Web-based Internet of Things Applications.

BST2002 (Eng) Web Design and Programming II   **3+0   4.0**

Introduction, Extensible Markup Language (XML) and JavaScript Object Notation (JSON); Resource Description Language - RDF; Web Ontology Language - OWL; Ontologies and Rules; SPARQL Query Language ; Ontology Engineering; Theory of Graph Databases; Semantic Web Applications; Semantic Web Services.

BST2004 (Eng) Visual Programming   **3+0   4.0**

Data Types; Data Manipulation; Data Analysis; Introduction to Macros; VBA: Basics, Control structures, Error handling, File operations; Excel: User forms, Object model; C# WinForms: Event handling, Collections, Listing controls; ADO.NET; Data Retrieval; Reporting; Exporting.

FiZ105 (Eng) Physics I   **4+0   6.0**

Measurement and Units: Measurement, Units, Dimensional analysis; Vectors: Vector and scalar quantities, Coordinate systems and frames of reference; Kinematics: Motion in one dimension, Motion in two dimensions; Dynamics; Work and Energy; Momentum and Collisions; Rotational Motion: Angular velocity and angular acceleration, Moments of inertia, Work and energy in rotational motion; Static Equilibrium.Measurement and Units: Measurement, Units, Dimensional analysis; Vectors: Vector and scalar quantities, Coordinate systems and frames of reference; Kinematics: Motion in one

dimension, Motion in two dimensions; Dynamics; Work and Energy; Momentum and Collisions; Rotational Motion: Angular velocity and angular acceleration, Moments of inertia, Work and energy in rotational motion; Static Equilibrium.

FİZ107 (Eng)   Physics Laboratory I   **0+2   1.5**
SI Unit System and Dimension Analysis; Measurement and Error Calculations; Graph Analysis; Principles of Experimental Studying and Preparation of Experimental Reports; Variation of Range due to Shooting Angle; Conservation of Energy; Motion with Constant Acceleration; Measurement of Angular Velocity; Determination of Moment of Inertia; Freely Falling; Simple Pendulum; Motion on Inclined Plane; Mass-spring System; Viscosity.

İKT151 (Eng)   Economics   **3+0   3.0**
Basic Economic Concepts; Production Process; Optimal Consumer Behavior; Demand; Supply; Equilibrium Price; Market Types; Determination of Factor Prices; National Product; Nominal and Real National Income; Introduction to Monetary Theory; Factors Determining Fluctuation and National Income: Consumption expenditures, Investment expenditures, Employment; International Economic Relations: International mobility of goods and services, International mobility of factors of production; Economic Growth and Development.Basic Economic Concepts; Production Process; Optimal Consumer Behavior; Demand; Supply; Equilibrium Price; Market Types; Determination of Factor Prices; National Product; Nominal and Real National Income; Introduction to Monetary Theory; Factors Determining Fluctuation and National Income: Consumption expenditures, Investment expenditures, Employment; International Economic Relations: International mobility of goods and services, International mobility of factors of production; Economic Growth and Development.

İNG325 (Eng)   Academic English III   **3+0   3.0**
Reading Skills for Academic Study: Developing reading fluency, Adapting reading style to different text types, Practicing critical reading skills; Listening Skills for Academic Study: Listening to longer texts, Listening to short authentic texts, Recognizing stress and intonation; Speaking Skills for Academic Study: Asking for clarification, Asking for confirmation, Giving reasons and explanations, Giving short presentations on familiar topics; Writing Skills for Academic Study: Identifying different styles of paragraphs, Paraphrasing ideas in short texts, writing academic paragraphs, Writing formal and informal academic texts, Writing summaries.

İNG326 (Eng)   Academic English IV   **3+0   3.0**
Reading Skills for Academic Study: Adjusting speed and reading style to different genres and tasks, Reviewing and analyzing material, Focusing on critical reading skills, Recognizing biases in written works; Listening skills for academic study: Listening to longer authentic texts, Taking notes, Distinguishing facts from opinions, Drawing inferences; Speaking Skills for Academic Study: Participating in group discussions, Expanding opinions, Giving longer presentations on familiar topics; Writing skills for academic study: Expressing opinions in well-organized academic essays, paraphrasing ideas in texts, writing summaries of longer texts.

İSG401   Occupational Health and Safety I   **2+0   2.0**
Overview of Occupational Health and Safety: Scope, Importance, Related concepts; Workplace Accidents and Occupational Diseases: Reasons, Precautions, Costs; Occupational Health and Safety: Responsible institutions, Problems in applications, Legal basis for occupational safety, Legislation, Regulations for employers; Legal Responsibility of Employers for Workplace Accidents and Occupational Diseases: Liability concept, Regulations for employer responsibility.

İSG402   Occupational Health and Safety II   **2+0   2.0**
Compensation Claims for Occupational Health and Safety: Compensation types; Legislation for Employers not Abide by Occupational Health and Safety Instructions: Administrative sanctions, Criminal sanctions, Investigations for workplace accidents; Organization in Workplace for Occupational Health and Safety: Employee representative, Obligation for constituting board for occupational health and safety, Workplace health and safety board; International Legislation for Occupational Health and Safety: International legislation, European legislation, Comparison of national and international legislation.

İST2046 (Eng)   Statistics   **4+0   5.0**
Introduction to Statistics and Basic Concepts: Definition and application areas of statistics, Data types (Quantitative-Qualitative, Discrete-Continuous), Descriptive and Inferential Statistics, Basic terminology (Population, Sample, Parameter, Statistic); Data Collection and Organization: Data collection methods (Survey, Experiment, Observation), Frequency distributions and tables, Graphical representations (Histogram, Box plot, Bar chart, Pie chart); Measures of Central Tendency and Variability: Mean, Median, Mode, Variance, Standard Deviation, Interquartile Range (IQR), Skewness and Kurtosis; Introduction to Probability Theory: Basic probability rules, Conditional probability and Bayes' Theorem, Random variables and distributions; Discrete and Continuous Distributions: Binomial, Poisson, Normal Distribution, Standard Normal Distribution and Z-score, Central Limit Theorem; Sampling Distributions and Estimation Theory: Point estimation and Interval estimation, Confidence intervals (for Mean, Proportion), Sample size determination; Hypothesis Tests: Introduction to hypothesis testing, One-sample tests (z-test, t-test), p-value and significance level, Two-sample tests (Independent and Paired t-test); ANOVA (One-way analysis of variance); Chi-square test: Goodness-of-fit, Test of

independence; Regression Analysis: Simple Linear Regression, Least Squares Method, Correlation coefficient and interpretation; Software Applications for Data Analysis (Excel, R or Python): Implementation of basic statistical analyses using software, Data visualization techniques; Data Analysis Project Presentations.

MAT1013   **Calculus I**   **4+2   7.5**
(Eng)
Basic Concepts: Real numbers, Coordinate system in the plane, Functions and Their Graphs: Operations on functions, Trigonometric functions; Limits and Continuity: Limits of functions, Limits at infinity and infinite limits, Continuity; Derivative: Concept of derivative, Differentiation rules; Mean value theorem, Implicit differentiation; Transcendental Functions: Inverse functions, Exponential and logarithmic functions, Inverse trigonometric, hyperbolic and inverse hyperbolic functions; Applications of Derivative: Extreme values, Concavity and inflections, Sketching the graph of a function, Extreme value problems, Taylor polynomials, Indeterminate forms.Basic Concepts: Real numbers, Coordinate system in the plane, Functions and Their Graphs: Operations on functions, Trigonometric functions; Limits and Continuity: Limits of functions, Limits at infinity and infinite limits, Continuity; Derivative: Concept of derivative, Differentiation rules; Mean value theorem, Implicit differentiation; Transcendental Functions: Inverse functions, Exponential and logarithmic functions, Inverse trigonometric, hyperbolic and inverse hyperbolic functions; Applications of Derivative: Extreme values, Concavity and inflections, Sketching the graph of a function, Extreme value problems, Taylor polynomials, Indeterminate forms.

MAT1014   **Calculus II**   **4+2   7.5**
(Eng)
Integral: Sums and sigma notation, Definite integral, Properties of the definite integral, The fundamental theorem of calculus; Indefinite integral and Integration Techniques: Indefinite integral, Change of variables, Integration by parts, Improper integrals; Applications of Integration: Areas of plane regions, Volumes of solids of revolution, Arc-length, Surface area, Mass, Moments and center of mass; Complex Numbers: Representation of complex numbers in the plane, Complex arithmetic, Roots of complex numbers; Sequences and Series: Sequences and convergence, Infinite series, Power series, Taylor and Maclaurin series, Binomial theorem and Binomial series.Integral: Sums and sigma notation, Definite integral, Properties of the definite integral, The fundamental theorem of calculus; Indefinite integral and Integration Techniques: Indefinite integral, Change of variables, Integration by parts, Improper integrals; Applications of Integration: Areas of plane regions, Volumes of solids of revolution, Arc-length, Surface area, Mass, Moments and center of mass; Complex Numbers: Representation of complex numbers in the plane, Complex arithmetic, Roots of complex numbers; Sequences and Series: Sequences and convergence, Infinite series, Power series, Taylor and Maclaurin series, Binomial theorem and Binomial series.

MAT2021   **Linear Algebra**   **3+1   4.5**
(Eng)
Matrices and Systems of Linear Equations: Concept of a matrix, Operations with matrices, Systems of linear equations and solutions with matrices; Determinant: Concept of a determinant and operations with determinants, Inverse of a matrix, Some applications of determinants; Vector Spaces: Vectors in the plane and in space, Vector space and subspaces, Linear dependence, Linear independence and concept of basis; Inner Product Spaces; Linear Transformations and Matrices: Linear transforms, Matrix of a linear transform; Eigenvalues and Eigenvectors; Diagonalization of Linear Transforms.Matrices and Systems of Linear Equations: Concept of a matrix, Operations with matrices, Systems of linear equations and solutions with matrices; Determinant: Concept of a determinant and operations with determinants, Inverse of a matrix, Some applications of determinants; Vector Spaces: Vectors in the plane and in space, Vector space and subspaces, Linear dependence, Linear independence and concept of basis; Inner Product Spaces; Linear Transformations and Matrices: Linear transforms, Matrix of a linear transform; Eigenvalues and Eigenvectors; Diagonalization of Linear Transforms.

MAT239 (Eng)   Discrete Mathematics   **3+0   5.0**
Fundamental Principles of Counting; Sets; Combinatorial Tools: Induction, Inclusion-Exclusion, Pigeonholes; Binomial Coefficients and Pascal?s Triangle: The Binomial Theorem, Distribution Problems, Identities in Pascal?s Triangle; Fibonacci Numbers; Combinatorial Probability; Integers, Divisors and Primes: Divisibility of Integers, Primes and Their Properties, Fermat?s Little Theorem, The Euclidean Algorithm; Graphs; Eulerian Walks; Trees; The Travelling Salesman Problem; Matchings in Graphs; Euler?s Formula; Coloring Graphs; A Glimpse of CryptographyFundamental Principles of Counting; Sets; Combinatorial Tools: Induction, Inclusion-Exclusion, Pigeonholes; Binomial Coefficients and Pascal's Triangle: The Binomial Theorem, Distribution Problems, Identities in Pascal's Triangle; Fibonacci Numbers; Combinatorial Probability; Integers, Divisors and Primes: Divisibility of Integers, Primes and Their Properties, Fermat's Little Theorem, The Euclidean Algorithm; Graphs; Eulerian Walks; Trees; The Travelling Salesman Problem; Matchings in Graphs; Euler's Formula; Coloring Graphs; A Glimpse of Cryptography

TAR165   **Atatürk's Principles and History of Turkish Revolution I**   **2+0   2.0**
Reform efforts of Ottoman State, General glance to the stagnation period, Reform searching in Turkey, Tanzimat Ferman and its bringing, The Era of Constitutional Monarchy in Turkey, Policy making during the era of first Constitutional Monarchy, Europe and Turkey, 1838-1914, Europe from imperialism to World War I, Turkey from Mudros to Lausanne,

Carrying out of Eastern Question, Turkish Grand National Assembly and Political construction 1920-1923, Economic developments from Ottomans to Republic, The Proclamation of New Turkish State, from Lausanne to Republic.

TAR166   Atatürk's Principles and History of Turkish Revolution II   2+0   2.0

The Restructuring Period; The Emergence of the fundamental policies in the Republic of Turkey (1923-1938 Period); Atatürk's Principles, and Studies on Language, History and Culture in the period of Atatürk; Turkish Foreign Policy and Application Principles in the period of Atatürk; Economic Developments from 1938 to 2002; 1938-2002 Period in Turkish Foreign Policy; Turkey after Atatürk's period; Social, Cultural and Artistic Changes and Developments from 1938 to Present.

TÜR125   Turkish Language I   2+0   2.0

Language: Characteristics of language, Relationship between language and thought and language and emotion, Theories about the origin of languages, Language types, The position of Turkish Language among world languages; Relationship Between Language and Culture; Historical Progress of the Turkish Language; Alphabets Used for Writing in Turkish; Turkish Language Studies; Turkish Language Reform; Phonetics; Morphology and Syntax; The Interaction of Turkish Language with Other Languages; Wealth of Turkish Language; Problems Facing Turkish Language; Derivation of Terms and Words; Disorders of Oral and Written Expression.

TÜR126   Turkish Language II   2+0   2.0

Composition: Written composition, Paragraph and ways of expression in paragraphs; Punctuation; Spelling Rules; Types of Written Expression and Practices I: Expository writing; Types of Written Expression and Practices II: Narrative writing; Academic Writing and Types of Correspondence; Reading and Listening: Reading, Reading comprehension strategies, Critical reading; Listening; Relationship between Listening and Reading; Oral Expression: Basic principles of effective speech; Body Language and the Role of Body Language in Oral Expression; Speech Types; Principles and Techniques of Effective Presentation; Some Articulatory Features of Oral Expression.

**YZM1001   Introduction to Artificial Intelligence and Machine Learning   4+0   6.0
(Eng)**

Artificial Intelligence; Intelligent Agents and Gaming; Search Methods; Informational Search Algorithms; Constraint Satisfaction; Probability and Uncertainty; Expert Systems; Knowledge Representation and Reasoning; Machine Learning; Machine Learning; Supervised Learning: Regression and Classification; Unsupervised Learning: Clustering and Dimensionality Reduction; Association Analysis; Reinforcement Learning; Feature Selection; Artificial Neural Networks and Deep Learning; Model Evaluation; Overfitting; Image Processing; Natural Language Processing; Robotics; Ethics of Artificial Intelligence.

**YZM1002   Python Programming   2+1   4.0
(Eng)**

Why Python? C vs. Python Comparison; Python Syntax: Variables, I/O, Operators, Control Flow; Data Structures: Lists, Methods, Slicing, Tuples, Dictionaries, Sets; Functions: def, *args, **kwargs, and Scope; Modules, Packages and Standard Library; Advanced String Manipulation methods; File Handling; Exception Handling; Introduction to OOP in Python; Artificial Intelligence and Machine Learning Libraries.