Course Code	Course Name	T P C	AKTS	Course Content	Course Book	Supplementary Books
TRD109	Turkish Language I	2 0 2	2	What is language? The role and importance of language as a social institution in national life; the relationship between language and culture; the position of Turkish among world languages; the development and historical phases of Turkish; the current state and areas of spread of Turkish; sounds in Turkish and their classification; sound characteristics of Turkish and rules related to phonetics, syllable knowledge, spelling rules and application, punctuation marks and application.	Vahab KABAHASANOĞLU, 'Universities' Turkish Language', Istanbul, Der, 2000 Kavruk H., Salman R., 'Turkish Language (Written and Oral Expression)', Uğurel Printing House, Malatya, 2003.	Yusuf ÇOTUKSÖKEN, 'Applied Turkish Language', Papatya Publishing, 2002.
YDI107	English I	2 0 2	2	Simple Present Tense, Articles, Numbers, Present Progressive Tense, Possessive Adjectives, can, Singular and Plurals, How Many, How Much, Some, Any, A Little, A Few, Some Prepositions.	Johannsen, K. L. 2006, 'English for the Humanities', Thomson ELT, 25 Boston, Massachusetts	Supporting course notes prepared by the lecturers.
FIZ111	Physics I	4 0 4	6	Vectors, equilibrium, moment of a force, linear motion, Newton's second law, planar motion, work and energy, impulse and momentum, rotational motion, elasticity, harmonic motions.	Fishbane, P.M., Gasiorowicz, S., & Thornton, S.T., Edited by Türkoğulları, Ü., 'Basic Physics', Arkadaş Publishing, Ankara, 2003.	'Physics for Scientists and Engineers', Serway-Beichner, Translated by Kemal Çolakoğlu, Palme Publishing, 2008.
FIZ105	Physics Lab-I	0 2 1	2	Vectors, equilibrium, moment of a force, linear motion, Newton's second law, planar motion, work and energy, impulse and momentum, rotational motion, elasticity, harmonic motions.	Fishbane, P.M., Gasiorowicz, S., & Thornton, S.T., Edited by Türkoğulları, Ü., 'Basic Physics', Arkadaş Publishing, Ankara, 2003.	'Physics for Scientists and Engineers', Serway-Beichner, Translated by Kemal Çolakoğlu, Palme Publishing, 2008.
MAT161	Mathematics I	4 0 4	6	Real and complex numbers, sentences, permutation, inversion and combination calculations, probability, group, ring, field, vector spaces, length, angle and projection calculations, matrices and determinants, linear equation systems.	Edwards,C.H.,Penney D.E., "Calculus and Analytic Geometry", Prentice Hall, Englewood Clifss, New Jersey; Wylie,C.R., "Advanced Engineering Mathematics",McGraw-Hill,Inc.; Swokowski, E. W., "Calculus with Analytic Geometry", Prindle, Weber & Schmidt; Grossman, S. I., "Calculus", International Edition; Trim, D.W., "Calculus and Analytic Geometry", Addison Wesley.	Stroud, K. A., "Engineering Mathematics", Macmillan.
YMÜ111	Algorithm and Programming-I	3 2 4	8	Problem solving. Input-Process-Output process. Algorithm design. Certainty,	Introduction to Algorithms and	Introduction to Programming and Algorithms, Soner

				finiteness, efficiency, input-output in algorithms. Constants, variables and expressions. Arithmetic, relational and logical operators. Input-Output statements. Conditional and Loop statements. Vector and matrix representations. Character data processing. Subroutines and Function subprograms. Recursion. Applications in a structured programming language.	Programming, Dr. Fahri Vatansever, Sistem Yayıncılık, 2006.	ÇELİKKOL, Academic Book Publishing.
YMÜ113	Introduction to Computer Science	3 0 3	4	Detailed examination of the coding phase in the software development life cycle. Program logic design. Programming languages. Introduction to object-oriented methods. Database management systems. Computer networks and communication. Internet and World Wide Web. Programming technologies for the Web. Computers and security. Computers and social issues.	Parker, C. S., "Understanding Computers Today and Tomorrow", Harcourt Inc., (2000).	N/A
TRD110	Turkish Language II	2 0 2	2	Turkish suffixes and their applications, general information about composition, plan and application used in composition writing, Turkish noun and verb inflections, narration methods in composition and their applications, usage of adverbs and prepositions in Turkish.	Vahab KABAHASANOĞLU, Üniversitelerde Türk Dili, İstanbul, Der, 2000; Kavruk H., Salman R., Türk Dili (Yazılı ve Sözlü Anlatım), Uğurel Matbaası, Malatya, 2003.	Yusuf ÇOTUKSÖKEN, Applied Turkish Language, Papatya Publishing, 03-2002.
YDI108	English II	2 0 2	2	Simple Past Tense, Auxiliary Verbs (Be, Do), Must, Have to, Has to, Going to Form, Adverbs of Time, Regular and Irregular Verbs, Possessive Pronouns.	Johannsen, K. L. 2006; English for the Humanities, Thomson ELT, 25 Boston, Massachusetts.	Supplementary lecture notes prepared by lecturers.
FIZ112	Physics II	3 0 3	5	Electricity, electrostatics, Coulomb's law, electric field, potential, capacitance, properties of dielectrics, electrokinetics, current and resistance, direct current circuits, alternating currents.	Physics for Scientists and Engineers, sixth editions (2004) by Raymond A. SERWAY and John W. Jewett, Jr., Brooks/Cole-Thomson Learning; Physics for Scientists and Engineers, fifth editions (2000) by Raymond A. SERWAY and Robert J.BEICHNER, Saunders College Publishing.	Physics for Science and Engineering, Serway-Beichner, Translation: Kemal Çolakoğlu, Palme Publishing, 2008.
FIZ106	Physics Lab-II	0 2 1	2	Electricity, electrostatics, Coulomb's law, electric field, potential, capacitance, properties of dielectrics, electrokinetics, current and resistance, direct current circuits, alternating currents.	Physics for Scientists and Engineers, sixth editions (2004) by Raymond A. SERWAY and John W. Jewett, Jr., Brooks/Cole-Thomson Learning;	Physics for Science and Engineering, Serway-Beichner, Translation: Kemal Çolakoğlu, Palme Publishing, 2008.

					Physics for Scientists and Engineers, fifth editions (2000) by Raymond A. SERWAY and Robert J.BEICHNER, Saunders College Publishing.	
MAT162	Mathematics II	4 0 4	6	Definition and types of functions, absolute value functions, full value functions, trigonometric functions, sign functions and their graphs, exponential and logarithmic functions and their applications, sequences, continuity and limit, derivative, differential and approximate calculation applications, integral.	Sherman K. Barcellos, A., Calculus and Analytic Geometry, Vol. 1 and 2. Translated: Beno Kuryel and Firuz Balkan. Literatür Publishing, 2003.	Mathematical Formulas and Tables Handbook, Science and Technology Bookstore, Eskişehir, 2000.
YMÜ116	Algorithm and Programming-II	3 2 4	8	Introduction to Object-Oriented Programming and appropriate programming environment. Basic concepts in this language (expressions, data types, variables, control structures, arrays, etc.). Divide and Conquer Method. Modular software development (methods and classes). Class Variables and Local Variables. Form Elements. Introduction to Event-Driven Programming. Dynamic Arrays. Linked Lists. Search and Sorting Algorithms. Files. Selection of appropriate structures in algorithms. Development of effective algorithms.	(Harvey & Paul) Deitel & Deitel ; C++ How to Program, 6/E ISBN-10: 0136152503 , ISBN-13: 9780136152507 Publisher Prentice Hall , Copyright: 2008	Herbert Schildt, “C#: “The Complete Reference”, McGraw-Hill, 2002, Turkish edition titled “Herkes İçin C#”, Alfa Yayınları, 2002.
YMÜ118	Fundamentals of Software Engineering	3 0 3	5	Scope of software engineering. Software development life cycle models. Software process. Software teams. Software tools. Software testing. Modules and objects. Reusability and portability. Planning, cost, and time estimation. Requirements. Classical analysis. Object-oriented analysis. Design types and object-oriented design. Implementation and integration. Maintenance of software products post-delivery.	Sommerville, Software Engineering, 8e, Addison-Wesley, 2007.	SWEBOK, Guide to the Software Engineering Body of Knowledge: 2004 Version, IEEE.
AIT201	Atatürk's Principles and History of Revolution I	2 0 2	2	Purpose of studying Turkish Revolution History and Atatürk's Principles. Concept of revolution. Collapse of the Ottoman Empire and factors leading to the Turkish revolution. Partitioning of the Ottoman Empire. Mondros Armistice Agreement and subsequent events. Country's situation in the face of occupations and Mustafa Kemal Pasha's reactions. Mustafa Kemal Pasha's departure to Samsun and the opening of the last Ottoman Parliament. Establishment of the Turkish Grand National	Atatürk ve Türkiye Cumhuriyeti Tarihi, Oğuz AYTEPE et al., Siyasal Kitapevi, Ankara, 2003.	N/A

				Assembly and its leadership in the War of Independence.		
YMÜ211	Discrete Structures	3 0 3	6	Fundamentals of discrete mathematics. Functions. Relations. Sets and basic proof techniques. Boolean algebra. Propositional logic. Digital logic. Elementary number theory. Fundamentals of counting.	Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, An Applied Introduction, 5th Edition, Addison Wesley, 2004.	N/A
YMÜ213	Professional English - I	2 0 2	3	English terms for main computer components, abbreviations used in computing, explanations of operating systems, classifications and definitions of microprocessors, network structures, cause-effect structures, adjective and noun clauses, conjunctions, passive and causative sentences, tenses used in academic publications, sentence structures, academic terms. Translation of articles, professional book chapters, and user manuals.	Computing for Non-Specialists, Nanda Bandyo- padhyay, Pub. Addison-Wesley; Internet Complete. New Perspectives on Computer Concepts, 10th Ed., Thomson Course Technology.	N/A
YMÜ225	Software Requirements and Analysis	3 0 3	3	Requirements engineering in the software lifecycle. Requirements elicitation and modeling: problems and techniques. Documentation and management of requirements. Standards and CASE tools. Cognitive and socio-organizational issues.	Requirements Engineering for Software and Systems, by Phillip A. Laplante, CRC Press, 2009 ISBN: 978-1-4200-6467-4.	Bray, Lan. (2002). Introduction to Requirements Engineering. Addison-Wesley. KALIPSIZ, O., BUHARALI, A., and BİRİCİK, G., System Analysis and Design, Papatya Yayıncılık, 2012.
YMÜ223	Data Structures	3 2 4	6	Introduction to Data Structures. Introduction to Java Programming Language. Recursion. Stack, Queue, and Lists. Trees. Binary Trees and Balanced Trees. Operations on Trees. Comparison of Algorithms. Time and Space Complexities. Sorting and Searching. Graphs.	Lafore, R., 'Data Structures & Algorithms in Java', 2nd Edition, SAMS Publishing, 2003. 776p.	N/A
MAT205	Linear Algebra	3 0 3	4	Vectors. Vector addition and scalar-vector multiplication, vector spaces, scalar product, length of a vector and angle between two vectors, linear combination, linearly dependent and independent vectors, basis and dimension, orthogonal and orthonormal vectors, dual basis and dual space, subspace. Matrices and matrix operations, vectors and matrices, invertible matrices, elementary row operations and echelon form, determinants and their properties, determinant expansions, linear transformations and their properties, representation of transformations with matrices and basis transformations, rank of a linear transformation, linear equation systems and solution spaces, Cramer system, rank rule and its geometric interpretation, convex sets,	Linear Algebra (H Hilmi Hacisalihoğlu)	Solved Linear Algebra Problems (H Hilmi Hacisalihoğlu)

				characteristic value and characteristic vectors, diagonalization of symmetric matrices, quadratic forms, inner product and inner product spaces, vector and cross products, area, and volume.		
MAT271	Differential Equations	4 0 4	6	Infinite series, their properties, and types. Convergence in infinite series and convergence tests. Power series, Taylor and Maclaurin expansions. Fourier series. Definitions and properties of Bessel, Gamma, and Beta special functions. Complex Functions. Complex Integrals and Residue Theorem. First-order ordinary differential equations and applications. Applications of second-order differential equations with constant coefficients. Applications of higher-order linear differential equations. Series solutions of linear differential equations. Laplace transform and its properties. Inverse Laplace transform and some applications. Partial differential equations and applications.	Course Notes	Lectures on Differential Equations (Mathematics Foundation Publications)
AIT202	Atatürk's Principles and History of Revolution II	2 0 2	2	Abolition of the caliphate, Progressive Republican Party and the Law of Maintenance of Order period, Educational Revolution, Cultural Revolution, Alphabet Reform, Turkish History Revolution, Turkish Language Revolution, Izmir Economic Congress, Transition to multi-party life, Women's rights revolution, hat, dress, and clothing reforms, Turkey's foreign policy, Atatürk's principles, political events, relations between the TBMM government and the Istanbul government, military developments, Kars Treaty, Ankara Agreement, Great Offensive, Mudanya Armistice, abolition of the Ottoman sultanate, Lausanne Peace Treaty.	Atatürk ve Türkiye Cumhuriyeti Tarihi, Oğuz AYTEPE et al., Siyasal Kitapevi, Ankara, 2003.	N/A
YMÜ222	Numerical Methods	3 0 3	5	Mathematical modeling and solving engineering problems. Programming and software, error analysis. Solving linear equations, solving nonlinear equations. Optimization, curve fitting. Numerical differentiation, numerical integration. Solving ordinary differential equations, solving partial differential equations. Fourier series.	Numerical Methods for Engineers with Software and Programming Applications, Steven C. Chapra, Raymond P. Canale, Literatür Yayıncılık, 2003.	N/A
YMÜ214	Professional English - II	2 0 2	3	Translation of technical articles in the computer field, translation techniques, rules for writing technical articles, English article writing practices.	Computing for Non-Specialists, Nanda Bandyo- padhyay, Pub. Addison-Wesley; Internet Complete.	N/A

YMÜ228	Software Design and Architecture	3 2 4	6	Architectural concepts, observer patterns, decorator patterns, factory patterns, singleton patterns. Group projects, the importance of requirement studies, software system design, schematic and graphical approaches, specification evaluation techniques, specification and design tools, and alternative design approaches for developing system tests.	Introduction to Design Patterns in C++ with Qt 4, An:1/e for (Bruce Perens' Open Source Series), 2007	Software Engineering 8, Ian Sommerville, 8th Ed. Addison Wesley, 2007, ISBN: 0-321-31379-8
YMÜ224	Object-Oriented Programming	3 2 4	7	Developing effective and flexible object-oriented software, concepts of object-oriented programming, basics of Java programming, inheritance, polymorphism, dynamic binding, design pattern concepts, implementation of some design patterns.	Xiaoping Jia., "Object-Oriented Software Development Using Java", Addison-Wesley Publishing Company, Inc. (2003)	James W. Cooper., "The Design Patterns Java Compinian", Addison-Wesley Publishing Company, Inc. (1998)
YMÜ226	Software Economics	2 0 2	3	What is Science?, Economy and its issues, production unit and its purpose, production factors, the concept of 'period', production function and iso-product curves, returns to scale, law of diminishing returns, decision-making in the long term.	Reports and articles prepared by the lecturer.	KEPENEK, Yakup and Nurhan Yentürk, Türkiye Ekonomisi, 10. B., Remzi Kitabevi, Istanbul, 2000
İST234	Statistics and Probability	3 0 3	4	Definition of variables, data types, numerical and graphical presentation techniques suitable for data types, population and sample, point and interval estimation, hypothesis testing.	Introduction to Statistics, Prof. Dr. Fikret İDİZ., Barış Y., İzmir, 2000.	Statistics, Murat Açıköğretim Publications, Ankara, 2001.
YMÜ313	Web Design and Programming	3 2 4	5	Internet, Intranet, Internet services, and protocols. Software for developing images, graphics, animation, sound, video. Hierarchical organization of the web page, format, page transitions, target audience, scope, quality, color harmony, layout, interaction, document preparation.	Learning Web Design: A Beginner's Guide to (X)HTML, StyleSheets, and Web Graphics, Jennifer Niederst Robbins, O'Reilly Media, 2007.	N/A
YMÜ315	Operating Systems	3 0 3	4	Introduction to Operating Systems, Computer System Structure, Operating System Structure, Processes, Threads, CPU Scheduling, Process Synchronization, Deadlocks, Memory Management, Virtual Memory, File System Interface, File System Implementation, Input/Output Systems.	Operating System Concepts, Siberschatz, Galvin, and Gagne, Wiley, 2003.	Operating Systems, İbrahim Türkoğlu lecture notes, Fırat University, 2006.
YMÜ317	Database Management Systems	3 2 4	6	Database Processing, Fundamentals of Relational Implementation, Query Languages, Data Modeling, Normalization, Databases and Internet Technology, Managing Multi-User Databases.	Kroenke, D. M., "Database Processing: Fundamentals, Design and Implementation", Prentice Hall.	Halpin, T., Evans, K., Hallock, P., Maclean, B., "Database Modeling with Microsoft Visio for Enterprise", Morgan Kaufmann Publishers, (2003).
YMÜ311	Formal Languages and Automata	3 0 3	6	Basic concepts: alphabet, language concepts, basic proof methods. Recursive definitions. Regular expressions. Finite automata models. Examples of finite automata applications:	Introduction to Automata Theory, Languages, and Computation, 2nd Ed., Addison-Wesley, (2001).	Modern Compiler Design, D. GRUNE, John Wiley & Sons, 2000.

				communication protocol design, word analysis. Kleene's theorem.		
YMÜ319	Programming Languages	3 0 3	5	Fundamental concepts of programming languages and basic programming paradigms, illustrating the introduced concepts with examples, structures provided by various programming languages like Pascal, C, C++, Java.	Sebesta, R., "Concepts of Programming Languages", Addison-Wesley Publishing, 2002.	Pratt, T.W., Zelkowitz, M.V., "Programming Languages - Design and Implementation", Prentice Hall, 1996.
YMÜ325	Logic Circuits	3 0 3	3	Digital Systems, Combinational Logic, Sequential Logic, Registers, and Counters.	Logic and Computer Design Fundamentals & XILINX 6.3 Student Edition, 3/E, M. Morris Mano, California State University, Los AngelesCharles R. Kime, University of Wisconsin, 1999.	N/A
YMÜ323	Professional Practice - I	0 2 1	1	Professional Practice - I course is conducted within the framework of the principles specified in the “Engineering Faculty Practical Work (Internship) Directive” and the “Intra-Departmental Student Internships Directive”.	The student will obtain sources according to the work subjects in the summer internship workplace.	N/A
YMÜ316	Algorithm Analysis	3 0 3	5	Algorithm design and analysis. Importance of optimal algorithm design, data processing, development of optimal and fast algorithms, mathematical foundations, counting theory, functions, asymptotic notation, master theorem, sorting theory and comparative sorting algorithms, worst-case time analysis of sorting algorithms, linear time sorting, basic data structures, hash tables, binary trees, red-black trees, B-trees, evolving data structures, average runtime analysis, binary heaps, binomial heaps, and Fibonacci heaps.	Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. Publisher: The MIT Press, September 2001 Second Edition.	N/A
KAM208	Labor Law	3 0 3	4	Introduction to law, introduction to labor law, general concepts, rights and responsibilities of the parties, protection of workers, termination of labor law, collective bargaining agreements.	Tuncomağ, Kenan., İş Hukukunun Esasları, Centel, Tankut., İş Yasası.	Tuncomağ, Kenan., İş Hukukunun Esasları
YMÜ314	Information Systems and Security	3 0 3	5	Classification of computer networks. History of computer networks. Network topologies. Concept of protocol and layering of protocols. Open System Interconnections. Reference model of computer networks. Switching methods in computer networks. Internet concepts, architecture, and Internet protocol. Transmission Control Protocol, Internet Control Message Protocol, Domain Name Systems, File Transfer Protocol.	Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Pearson Education Inc., 2003, ISBN: 0-13-038488-7.	N/A

YMÜ340	Data Mining	3 2 4	4	Expert knowledge extraction process. Data warehouse concepts. Data preprocessing. Data mining functions. Data mining algorithms. Web mining concepts. Web mining applications.	Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Morgan Kauffman, 2001.	Margareth H. Dunham, Data Mining Introductory and Advanced Topics, Prentice Hall, Pearson Education.
YMÜ320	Optimization Techniques	3 2 4	6	Introduction and basic concepts. Unconstrained optimization. Analytical solutions, numerical methods, and algorithms for unconstrained optimization. Constrained optimization: Optimization under equality constraints, optimization under equality and inequality constraints, optimization under specific constraints. Application of algorithms to real-life problems and computer-based solutions.	M.A. Bhatti, Practical Optimization Methods, with Mathematica Applications, Springer-Verlag New York, Inc., 2000.	N/A
YMÜ322	Computer Graphics and Animation	3 2 4	6	Basic concepts of computer graphics, raster graphics, line and curve drawing, 2D basic drawing algorithms, polygons, basic shape filling, clipping, graphic devices, 2D and 3D geometry, transformations, 3D viewing coordinate transformation, visible surface determination, lighting, polygon visual rendering, texture mapping, OpenGL graphics library.	Computer Graphics with OpenGL (3rd Edition) by Donald Hearn and M. Pauline Baker.	Angel, E., Interactive Computer Graphics, A Top-Down Approach with OpenGL, Addison-Wesley.
YMÜ326	Çoklu Ortam Yazılımı Geliştirme	3	2	4	6	Çoklu ortam yazılımı mühendisliğinin iskeleti. Çoklu ortam yazılımı mühendisliğinde bakış açıları. Görsel Diller. Çoklu ortam dilleri. Aktif gösterge. Tele-aksiyon nesneler. Çoklu ortam geliştirme araçları. Çoklu ortam uygulamalarında prorotip oluşturma. Çoklu ortam dillerinin tasarımı. Dağıtık çoklu ortam sistemleri tasarımı. Çoklu ortam uygulamalarının özellikleri.
YMÜ328	Biyoinformatik	3	2	4	6	Bilgisayarın moleküler biyolojide kullanımı ve internet üzerinden biyolojik bilgiye erişim, gen ve protein veritabanları, genom veritabanları ve diğer veritabanlarına erişim, dizi karşılaştırma, gen ve protein dizilerinde homoloji tarama, filogenetik analizler,

						restriksiyon haritalama, bilgisayar destekli PCR primeri tasarlama konuları.
YMÜ330	Veritabanı Tasarımı ve Yönetimi	3	2	4	6	Veritabanı sistemlerinin bileşenleri, veritabanı yönetim sistemi, (DBMS) fonksiyonları, mimarisi, veri bağımsızlığı, veri modelleri, kavramsal modeller, nesne yönelimli modeller ve ilişkisel veri modeli. Kavramsal şemaların ilişkisel şemalara çevrilmesi, ilişkisel cebir ve ilişkisel hesaplama, bağlar, anahtar tipleri, fonksiyonel bağımlılık, normal formlar, çok-değerli bağımlılık ve veritabanı tasarımı.
YMÜ332	İleri Görsel Programlama	3	2	4	6	Nesne Yönelimli programlaya tekrar bakış. Görsel programlamanın temel taşları: değer türleri, operatör yeniden tanımlama, olağandışı durum ve olay işleme. Grafiksel Kullanıcı Arayüzü çerçeve yapılarını kullanım. Dosya ve XML tabanlı verilerle çalışma.
YMÜ334	Servis Odaklı Mimari	3	2	4	6	Web Servisleri, Servis Odaklı Mimari, Servis Kompozisyonu, İş Süreç Yönetimi.
YMÜ336	Doğal Dil İşleme	3	2	4	6	Biçimbirimsel Analiz; Sözdizimsel Analiz; Dil ve Dil Yapıları; Düzenli Diller; Kelime İşleme Algoritmaları; Makine Öğrenmesi; Text Sınıflandırma; Bilgi Çıkarımı; Bilgiye Erişim; Soru Cevaplama Sistemleri; Eş Dizimlilik.
YMÜ338	Mikroişlemciler ve Programlama	3	2	4	6	Bilgisayarlar ve mikroişlemciler. Mikroişlemci mimarisi ve çalışması. Mikroişlemci programlama. Adresleme modlar. Veri transfer komutları, aritmetik ve lojik

						komutlar, program kontrol komutları. Hafıza arabirimi ve hafıza organizasyonu.
YMÜ411	Yazılım Örüntüleri	3	0	3	5	Tasarım şablonları dahilinde yazılım geliştirmenin gözden geçirilmesi. Nesne yönelimli programlamanın gözden geçilmesi. Güçlü tip kullanımı ve yerdeğiştirmenin temel ilkeleri. Değiştirilebilirlik için tasarı teknikleri. Nesne yönelimli tasarım için tasarım şablonları.
YMÜ326	Multimedia Software Development	3 2 4	6	Framework of multimedia software engineering. Perspectives in multimedia software engineering. Visual Languages. Multimedia languages. Active indicators. Tele-action objects. Multimedia development tools. Prototyping in multimedia applications. Design of multimedia languages. Designing distributed multimedia systems. Characteristics of multimedia applications.	David Gries, Paul Gries, 2004, Multimedia Introduction to Programming Using Java, Springer	N/A
YMÜ328	Bioinformatics	3 2 4	6	Use of computers in molecular biology and access to biological information via the internet, gene and protein databases, genome databases, and access to other databases, sequence comparison, homology search in gene and protein sequences, phylogenetic analyses, restriction mapping, computer-aided PCR primer design topics.	1. Introduction to Bioinformatics: a Theoretical and Practical Approach. Krawetz, S.A. and Womble, D.D. (ed.). Humana Press, Totowa, New Jersey, 2003.	3. Bioinformatics: Genes, Proteins and Computers. Orengo, C., Jones, D. and Thornton, J. (eds.). Garland Science/BIOS Scientific Publishers, New York, 2003.
YMÜ330	Database Design and Management	3 2 4	6	Components of database systems, DBMS functions, architecture, data independence, data models, conceptual models, object-oriented models, and relational data models. Conversion of conceptual schemas to relational schemas, relational algebra and relational calculation, relationships, types of keys, functional dependency, normal forms, multi-value dependency, and database design.	J. D. Ullman and J. Widom, A First Course In Database Systems, 2nd Ed., Prentice-Hall, 2002 (ISBN: 0-13-122520-0)	N/A
YMÜ332	Advanced Visual Programming	3 2 4	6	Overview of object-oriented programming. Fundamentals of visual programming: value types, operator overloading, exception and event handling. Using graphical user interface frameworks. Working with files and XML-based data.	Microsoft® Visual C++ .NET Step by Step by Julian Templeman, Andy Olsen, Microsoft Press, 2002, ISBN: 0-7356-1907-7	Ivor Horton’s Beginning Visual C++ 2005, ISBN: 0-7645-7197-4
YMÜ334	Service-Oriented Architecture	3 2 4	6	Web Services, Service-Oriented Architecture, Service Composition, Business Process Management.	Gustavo Alonso, Fabio Casati, Harumi Kuno, Vijay Machiraju, Web	Papazoglou, M. P., Web Services: Principles and

					Services, Springer 2004 (ISBN: 3540440089)	Technology, Prentice Hall, 2007, ISBN: 0-321-15555-6
YMÜ336	Natural Language Processing	3 2 4	6	Morphological Analysis; Syntax Analysis; Language and Language Structures; Regular Languages; Word Processing Algorithms; Machine Learning; Text Classification; Information Extraction; Information Retrieval; Question Answering Systems; Collocations.	Natural Language Understanding, J. Allen, Benjamin-Cummings; Speech and Language Processing, Jurafsky and Martin, Prentice Hall	Foundations of Statistical Natural Language Processing, C. D. Manning, H. Schütze, MIT
YMÜ338	Microprocessors and Programming	3 2 4	6	Computers and microprocessors. Microprocessor architecture and operation. Microprocessor programming. Addressing modes. Data transfer instructions, arithmetic and logical instructions, program control instructions. Memory interface and organization. Basic input/output interface. Programmable parallel interface. Interrupts. Programmable interrupt control.	Microprocessors, Microcomputers, and Assembly Programming, Turhan Özkan, Beta Publishing, 2003	N/A
YMÜ411	Software Patterns	3 0 3	5	Review of software development within design patterns. Overview of object-oriented programming. Principles of strong typing and polymorphism. Techniques for designing for modifiability. Design patterns for object-oriented design. Introduction to design patterns. Structural patterns. Behavioral patterns. Analysis patterns. Architectural patterns. Refactoring.	Head First Design Patterns, O'Reilly, Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates, First Edition October 2004	Design Patterns: Elements of Reusable Object-Oriented Software, E. Gamma, R. Helm, R. Johnson, and J. Vlissides, Addison-Wesley Professional, 1995.
YMÜ413	Data Communication and Computer Networks	3 2 4	6	Fundamentals of data communication, multiplexing, analog and digital data communication, physical data communication media, computer network architectures, ISO OSI reference model, switching techniques, local network protocols, medium access control (MAC) protocols, data link layer, framing, error control, sliding window protocol, routing layer, network level addressing, application layer. TCP/IP suite, IP routing protocol, TCP and UDP protocols. Application development with Java and term project.	COMPUTER NETWORKING, BY J. F. KUROSE & K.W. ROSS (6TH EDITION)	COMPUTER NETWORKS, BY ANDREW S. TANENBAUM (5TH EDITION)
YMÜ415	Software Validation and Testing	3 2 4	6	Introduction to software validation and verification, introduction to software testing, basics of software security, software test utilities, software test tools, black-box unit test technique, white-box unit testing and control-flow testing, data-flow testing, website testing, usability testing, genetic algorithms, testing for security and code reviews, software test criteria.	Software Testing 2nd edition, by Ron Patton, Sams Publishing, 2006 (ISBN 0-672-32798-8)	Foundations of Software Testing: ISTQB Certification, Dorothy Graham, Erik Van Veenendaal, Isabel Evans and Rex Black, Thomson Learning, 2008.

YMÜ417	Professional Practice II	0 2 1	1	Professional Practice-2 course is conducted within the principles set out in the 'Engineering Faculty Practical Work (Internship) Directive' and the 'In-Department Student Internship Directive'. Evaluation of students' presentations related to their internships by related juries and asking questions. Giving 1st midterm grades based on students' working performance at the internship place and documents filled by the workplace. Evaluating students' presentations again for the 2nd midterm grades.	Students will procure resources based on their workplace internship topics.	N/A
YMÜ419	Agile Methods in Software Development	3 2 4	6	Introduction to Agile Methods. eXtreme Programming (XP), Lean, Scrum, Crystal, Feature-driven Development (FDD), Kanban. Dynamic System Development Method (DSDM). Architectural and design topics in Agile software methods.	Mike Cohn, Succeeding with Agile: Software Development Using Scrum, Addison-Wesley Professional; 1 edition (November 5, 2009), ISBN-10: 0321579364	James Shore and Shane Warden, The Art of Agile Development, O'Reilly Media; 1 edition (November 2, 2007) - ISBN-10: 0596527675
YMÜ421	Distance Education and E-Learning	3 2 4	6	Definitions, history, and theories of distance education and e-learning. Instructional design. Tools and technologies used in distance education. Multimedia learning. Computer-supported collaborative learning. Learning management systems. New developments and trends.	Distance Education: A Systems View, by Michael G. Moore, Greg Kearsley. Wadsworth, 2004	e-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning (2nd Edition), by Ruth Colvin Clark, Richard E. Mayer. John Wiley & Sons, 2008.
YMÜ423	System Modeling and Simulation	3 2 4	6	Dynamic Simulation. User data types, operators, and control structures in simulation. Model generators. Simulation Programming. Simulation Problems.	Petrone, G., Cammarata, G. 2008. Modelling and Simulation. InTech. ISBN-13: 9783902613257.	Banks, Carson, Nelson, and Nicol, Discrete-Event System Simulation (Fourth Edition), Prentice-Hall, 2005
YMÜ425	Applied Neural Networks	3 2 4	6	Introduction to neural networks. Perceptron learning rules. Backpropagation algorithms. Generalization and overtraining. Adaptive linear filters. Radial basis networks. Self-organizing maps. Learning vector quantization. Feedback networks.	Haykin (1999). Neural Networks: A Comprehensive Foundation (2nd Edition) Macmillan	N/A
YMÜ427	Soft Computing	3 2 4	6	Overview of basic intelligent system structures. Data mining. Decision trees. Neural computation, biological neural networks, and learning algorithms. Applications of Artificial Neural Networks (ANNs). Learning tasks as classification and regression problems. Error calculations. Design of ANNs and fuzzy systems using software (MATLAB, C++). Fuzzy control and fuzzy expert systems. Genetic algorithms (GAs).	Neuro-Fuzzy and Soft Computing, J. S. R. JANG, C. T. SUN, and E. MIZUTANI Prentice Hall, 1997	Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms: Industrial Applications, Lakhmi C. JAIN and N. M. MARTIN, CRC Press, 1998

YMÜ429	Distributed Software Engineering	3 2 4	6	Programming interfaces for distributed software engineering. Network protocols. Distributed and concurrent software using network protocol services. Applications of internet and network-based software.	Distributed Systems: Principles and Paradigms (2nd edition), Andrew S. Tanenbaum, Maarten Van Steen, 2007, ISBN 0-13-239227-5	N/A
YMÜ431	Grid Programming	3 2 4	6	Introduction to Grid Computing; Virtualization of computing resources, Example Grids, OGSA, WSRF, Web Services, and Grid. Grid Architecture; Virtual Organizations, Resource sharing, Web Services: Advantages, Disadvantages, Web Service Architectures, Service-Oriented Architecture, Web Service Standards: WSDL, SOAP, UDDI, WS-Addressing, Grid Services, Grid Service Factories, OGSA-Open Grid Services Architecture, OGSI-Open Grid Services Infrastructure, GT3. Grid Technologies; Globus, Nexus, Condor, MDS-Metacomputing Directory Service, Remote file and program execution and management, Resource Management. Grid security infrastructure/Authentication, Parallel Computing; Peer-to-Peer Computing, Peer-to-Peer networks, Algorithms, Grid Applications, Semantic Grid.	Higher-Order Components for Grid Programming, Jan Dünnweber, Sergei Gorlatch, Springer, 2009	N/A
YMÜ433	Biomedical Engineering	3 2 4	6	Image Formation in Computed Tomography, Multi-Slice Tomography, Flat Detector Technology, Positron Emission Technology, Magnetic Resonance Imaging, Image Processing in Nuclear Medicine, Noise Reduction in Nuclear Medicine Images, Color Flow Imaging, Clinical Tomography, Archiving of Medical Image: PACS and DICOM Standards, WEB-based Image Transmission, Compression of Medical Images.	Lecture Notes	E. Yazgan, M. Korürek, Medical Electronics, İTÜ Publications
YMÜ410	Artificial Intelligence and Expert Systems	3 2 4	6	Overview and Scope of Artificial Intelligence; Approaches in AI; Areas of Use; Concept of Expert System; Organization and Management of Knowledge in Expert Systems; Knowledge Acquisition and Validation; Knowledge Representation; Inference Mechanism; Building Expert Systems; Developing Expert Systems with PROLOG; Introduction to Neural Networks; Neural Computations.	Artificial Intelligence: A Modern Approach (2nd ed.), Stuart J. Russell, Peter Norvig, 2003	Turban, E., Aronson, J.E., Decision Support System and Intelligent Systems, Sixth Edition, Prentice Hall Int. Inc.
YMÜ412	Software Quality Assurance and Testing	3 2 4	6	Quality; how it is guaranteed and realized, and the cultural need for quality. Avoidance of errors and other quality problems. Inspection	Jeff Tian, 2005, Software Quality Engineering: Testing, Quality	Foundations of Software Testing: ISTQB Certification, Dorothy

				and review. Validation testing and approval techniques. Quality process standards. Product and process assurance. Problem analysis and reporting. Statistical approaches to quality control.	Assurance, and Quantifiable, Wiley-IEEE Computer Society.	Graham, Erik Van Veenendaal, Isabel Evans, Rex Black, Thomson Learning, 2008
YMÜ414	Graduation Project	0 2 1	3	Literature research, problem formulation, detailed analysis, and design for a software engineering problem. Design, project reports, and seminar presentations.	N/A	N/A
YMÜ416	Software Project Management	2 0 2	3	Introduction to software project management. Overview of project planning. Selection of appropriate project approach. Software effort estimation. Activity planning. Risk analysis and management. Resource sharing. Project monitoring and control. Contract management. Managing people and organizing teams. Software quality assurance. Configuration management. Various tools related to software project management.	Software Project Management (Fourth Edition), By Bob Hughes & Mike Cotterell, ISBN 0-07-7109899, McGraw-Hill Publication, 2006	Effective Project Management (2nd edition), R. Wysocki, R. Beck, Crane, ISBN 9971-51-402-8, Wiley, 2000
YMÜ420	Game Design and Programming	3 2 4	6	Programming-focused, intermediate-level game programming techniques using DirectX library; game development using Direct3D; understanding and utilizing Direct3D API; programmable graphics pipelines with modern graphics cards and 3D libraries; various graphics techniques, lighting, particle effects, vector and pixel shading programming.	Introduction to 3D Game Programming with DirectX 9.0, Frank Luna, Publisher: Jones & Bartlett Publishers; 1 edition (June 9, 2003), ISBN-10: 1556229135, ISBN-13: 978-1556229138.	Kenan Tuncomağ, İş Hukukunun Esasları.
YMÜ422	Mobile Software Development	3 2 4	6	Features of mobile applications, state machine diagrams, performance and memory management, multitasking, XML, graphics, user interface performance, packaging, and distribution of mobile applications.	Reza B'Far and Roy T. Fielding, 2004, Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, Cambridge University Press.	
YMÜ424	Digital Image Processing Methods	3 2 4	6	Fundamentals of digital images, properties of light, color information, human visual system, cameras, computer vision systems, black-and-white images, colored images, color models (RGB, CMY, TIQ), digital images. Sampling and quantization of image signals. Image formats, image enhancement techniques; point processing methods, brightness adjustment, contrast enhancement, and computer-based applications. Image filtering systems. 2D transformations of images; 2D Fourier transformation and application of fast Fourier transformation on images.	Digital Image Processing, Rafael C. Gonzalez, Richard E. Woods, Prentice Hall; 2nd edition (January 15, 2002).	

YMÜ426	Robot Programming	3 2 4	6	General information about robots, classification of robots by axes, robot types, sensors and their applications, motion control systems and selection of robot motors, position measurement and selection of position measurement sensors, robot programming, work-time diagram analysis, SCORBOT-ER robot programming, robot assembly applications using Lego parts.	L. Saciavicco, B. Siciliano, Modeling and Control of Robot Manipulators, Springer, London, 2000.	Varol, A, Robotik, Milli Eğitim Bakanlığı, İstanbul, 2000.
YMÜ428	E-Commerce	3 2 4	6	Importance of electronic commerce in business and technological infrastructure, Internet, intranet, extranet, business models, security, authentication, privacy, electronic payment systems, e-commerce services and other related e-commerce topics and technologies, developing appropriate business models, organizational challenges, and potential solutions.	Reports and articles provided by the instructor.	
YMÜ430	Human-Computer Interaction	3 2 4	6	Psychological principles of human-machine interaction. Evaluation of user interfaces. Usability engineering. Task analysis. User-centered design and prototyping. Conceptual models and metaphors. Logical foundations of software design. Design of menus and command buttons. Voice and natural language input/output. Response time and feedback. Properties of color, object, and sound. International conventions and local adaptations. User interface architectures and application programs. Project and case studies.	Alan Dix, Janet E. Finlay, Gregory D. Abowd, Russell Beale, 2003, Human-Computer Interaction, Prentice Hall.	
YMÜ432	Machine Learning	3 2 4	6	Paradigms of automatic learning. Learning. Logical results of learning from observations, hypothesis results, and abductive forms. Factors affecting learning ability. Connection model. Programming environments for learner programs.	Introduction to Machine Learning, Ethem Alpaydın, The MIT Press, 2004.	Pattern Recognition and Machine Learning, Christopher M. Bishop, 2006.