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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM101 | Introduction to Artificial Intelligence and Data Engineering  | 4 | 0 | 4 | 6 |
| **Course Description** |
| An introduction to the "Artificial Intelligence and Data Engineering" program, the courses within the program, and relevant research areas will be provided. The aim is to equip students with fundamental knowledge in the fields of Artificial Intelligence and Data Engineering. Students will be informed about the profession of Artificial Intelligence and Data Engineering, its problems, solution methods, and application areas. |
| **Supplementary Resources** |
| Artificial Intelligence: A Modern Approach. Stuart Russell, Peter Norvig, Prentice Hall, Second Edition. |
| Data Engineering With Python, Paul Crickard |

**1st Year Fall Semester**

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM103 | Algorithm and Programming I | 3 | 2 | 4 | 6  |
| **Course Description** |
| Fundamental concepts in computer programming will be emphasized. Students will acquire skills in formalizing problems and developing algorithms through step-by-step analysis. Methods for creating flowcharts will be taught. Concepts related to structured programming will be discussed, and data types along with variable definitions will be examined in detail. Basic command structures, conditional and loop statements will be covered. Additionally, information will be provided on one-dimensional and multi-dimensional arrays in programming languages. |
| **Supplementary Resources** |
| Kochan, S., G., 2005, Programming in C, Sams Publishing, 543 p. 2. Lafore, R., 1990, The Waite Groups C Programming Using Turbo C , The Waite Group, Inc., USA, 796 p. |
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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| MAT161 | Mathematics I | 4 | 0 | 4 | 6 |
| **Course Description** |
| Real numbers, variables and functions, limits and continuity, sequences; derivatives and differentials, Taylor's formulas, indefinite integrals and integrals of elementary functions, integrals of rational and irrational functions. |
| **Supplementary Resources** |
| Basic and General Mathematics I-II, Prof. Dr. H.Hilmi Hacısalihoğlu |
| General Mathematics, Prof. Dr. Mustafa BALCI |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| FİZ111 | Physics I | 4 | 0 | 4 | 6 |
| **Course Description** |
| Measurement and uncertainty; vectors, uniform linear motion, motion in 2 and 3 dimensions; force and motion: Newton's Laws; kinetic energy and work, potential energy and conservation of energy, thrust-momentum, center of mass, rotational motion, torque and angular momentum.  |
| **Supplementary Resources** |
| Physics for Scientist&Engineers with Modern Physics-I, Sounders Collage Publishing, 1992 |
| Fundamentals of Physics-1, John Wiley&Sons, 1981 |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YDI 107 | English I | 2 | 0 | 2 | 2 |
| **Course Description** |
| To equip students with the basic English knowledge to follow the vocational English they will see in the following years, to improve their listening comprehension, self-expression, reading comprehension and written self-expression skills at an intermediate level. |
| **Supplementary Resources** |
| New Headway Beginner Student's Book-Workbook Liz and John Soars |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| TRD 109 | Turkish Language I | 2 | 0 | 2 | 2 |
| **Course Description** |
| Definition, types and features of language, language-thought-culture-literature relations, analyzing informative texts, written expression information, prepared and unprepared speech (discussion, open forum), note-taking, summarizing techniques, Turkish grammar (phonology, morphology). |
| **Supplementary Resources** |
| Turkish Written and Oral Expression, Hasan Kavruk, Malatya, 2005 |
| Turkish Written and Oral Expression, Hüseyin Ağca, Atatürk Culture Center, Ankara, 2001. |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| FİZ105 | Physics Laboratory I | 0 | 2 | 1 | 2 |
| **Course Description** |
| Vectors, equilibrium, moment of a force, linear motion, Newton's second law, planar motion, work and energy, implus and momentum, rotational motion, elasticity, harmonic motion. |
| **Supplementary Resources** |
| Fishbane, P.M., Gasiorowicz, S., & Thornton, S.T. Translation Editor: Türkoğulları, Ü. Basic Physics. Ankara: Arkadaş Publishing House, 2003 |
| Physics for Science and Engineering, Serway-Beichner, Translation: Kemal Colakoglu, Palme Publishing, 2008 |

**1st Year Spring Semester**

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM102 | Software Engineering | 3 | 0 | 3 | 7 |
| **Course Description** |
| The scope of software engineering; software development life cycle models and software process will be emphasized. Software teams, software tools and software testing will be discussed. Modules and objects will be examined in the context of reusability and portability principles in the software development process. Requirements, classical analysis and object-oriented analysis methods will be evaluated, as well as managerial issues such as planning, cost and time estimation. Design types and object-oriented design principles will be emphasized; implementation and integration phases will be discussed. |
| **Supplementary Resources** |
| Sommerville, Software Engineering, 8th Edition, Addison-Wesley, 2007 |
| SWEBOK, Guide to the Software Engineering Body of Knowledge: 2004 Version, IEEE |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM104 | Algorithm and Programming II | 3 | 2 | 4 | 7 |
| **Course Description** |
| Introduction to object oriented programming, using methods. Objects and classes, data space encapsulation, object arrays, immutable object and class concepts and definition. Object oriented thinking, class abstraction and encapsulation concepts, package, public, default, private concepts. Inheritance, superclasses and subclasses. Polymorphism, method overriding and overloading. Exception handling. File class and file input/output operations (File class, PrintWriter and Scanner). Abstract classes. Interfaces (interfaces). Class design guidelines. Graphical user interface (GUI) |
| **Supplementary Resources** |
| Programming with C++ - Paul Deitel |
| The C++ Programming Language - Bjarne Stroustrup |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| MAT 162 | Mathematics II | 4 | 0 | 4 | 5 |
| **Course Description** |
| Real numbers, variables and functions, limits and continuity, sequences; derivatives and differentials, Taylor's formulas, indefinite integrals and integrals of elementary functions, integrals of rational and irrational functions. |
| **Supplementary Resources** |
| Basic and General Mathematics I-II, Prof. Dr. H.Hilmi Hacısalihoğlu |
| General Mathematics, Prof. Dr. Mustafa BALCI |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| FIZ 112 | Physics II | 4 | 0 | 4 | 5 |
| **Course Description** |
| Electricity, electrostatics, coulomb's law, electric field, potential, capacitance, properties of dielectrics, electrokinetics, current and resistance, direct current circuits, alternating currents |
| **Supplementary Resources** |
| Physics for Scientist&Engineers with Modern Physics-I, Sounders Collage Publishing, 1992 |
| Fundamentals of Physics-1, John Wiley&Sons, 1981 |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| FIZ 106 | Physics Laboratory II | 0 | 2 | 1 | 2 |
| **Course Description** |
| Electricity, electrostatics, coulomb's law, electric field, potential, capacitance, properties of dielectrics, electrokinetics, current and resistance, direct current circuits, alternating currents |
| **Supplementary Resources** |
| 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 Colakoglu, Palme Publishing, 2008 |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| TRD110 | Turkish Language II | 2 | 0 | 2 | 2 |
| **Course Description** |
| World and Turkish languages, analyzing informative and narrative texts, written expression information, prepared and unprepared speech, Turkish grammar (syntax, semantics), Turkish usage (expression elements, language mistakes), Turkish spelling and punctuation information |
| **Supplementary Resources** |
| Turkish Written and Oral Expression, Hasan Kavruk, Malatya, 2005. |
| Turkish Written and Oral Expression, Hüseyin Ağca, Atatürk Culture Center, Ankara, 2001. |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YDI 108 | English II | 2 | 0 | 2 | 2 |
| **Course Description** |
| Simple Past Tense, Auxiliary Verbs (Be, Do), Must, Have to, Has to, Going to From, Adverbs of Time, Regular and Irregular Verbs, Possessive Pronouns |
| **Supplementary Resources** |
| Johannsen, K. L. 2006; English for the Humanities, Thomson ELT, 25 Boston, Massachusetts |

**2nd Year Fall Semester**

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 203 | Fundamentals of Machine Learning | 3 | 2 | 5 | 9 |
| **Course Description** |
| Guided learning, Linear regression, classification, Naive Bayes, k-nearest neighbor, decision trees. Classification, Logistic Regression. Optimization, gradient descent, momentum. Feature extraction and selection. Artificial neural networks, deep learning models. Unguided learning, k-means clustering, spectral clustering. Singular value decomposition and principal component analysis for dimensionality reduction. |
| **Supplementary Resources** |
| Machine learning, Ethem Alpaydın |
| Introduction to Machine Learning |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 205 | Database Management Systems | 3 | 2 | 5 | 8 |
| **Course Description** |
| Developmental stages of database systems, data description languages, data organization and models, data access, three-level database architecture, SQL and QBE languages, logical database design, indexed sequential file organization, introduction to DBMS.  |
| **Supplementary Resources** |
| 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). |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 207 | Discrete Structures | 2 | 0 | 2 | 3 |
| **Course Description** |
| Introduction to the fundamentals of discrete mathematics for application in software engineering discipline; functions, relations, sets, simple proof techniques, Boolean algebra, propositional logic, numerical logic, elementary number theory, counting concept. Propositional logic, recursive relations, graphs, trees, matrices, computable complexity, elementary computability, discrete probability. |
| **Supplementary Resources** |
| [Discrete Structures, Logic, and Computability](http://www.amazon.com/Discrete-Structures-Logic-Computability-James/dp/0763772062/ref%3Dsr_1_1?ie=UTF8&s=books&qid=1259760159&sr=8-1) by [James L. Hein](http://www.amazon.com/James-L.-Hein/e/B001ITTNZA/ref%3Dsr_ntt_srch_lnk_1?_encoding=UTF8&qid=1259760159&sr=8-1). |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| MAT 215 | Linear Algebra | 2 | 0 | 2 | 2 |
| **Course Description** |
| Systems of Linear Equations, Solution set of Systems of Linear Equations, Matrix algebra, Dimension and Rank Determinant, Vector Space, Null space, column space, linearly dependent and linearly independent vectors, Linear Transformations, Eigenvalues and Eigenvectors, Diagonalization, Interior product space, Perpendicular projection, Gram-Schmidt method, Applications of interior product space. |
| **Supplementary Resources** |
| D. C. Lay, Linear Algebra and Its Applications, Pearson Education, 2010 |
| Otto Bretscher, Linear Algebra with Applications , Pearson Education, 2010 |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YDI 201 | Vocational English | 2 | 0 | 2 | 3 |
| **Course Description** |
| The aim of the course is to improve students' English language skills in order to contribute to their academic success in their field of study. The aim is to introduce students to the basic English concepts in their field of study and to meet their professional English needs. |
| **Supplementary Resources** |
| English for Specific Purposes (Cambridge Language Teaching Library) by [Tom Hutchinson](http://www.amazon.com/Tom-Hutchinson/e/B001IXS3LG/ref%3Dsr_ntt_srch_lnk_3?_encoding=UTF8&qid=1259761723&sr=8-3) and Alan Waters (Paperback - Feb 27, 1987) |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| İST 234 | Probability and Statistics | 3 | 0 | 3 | 3 |
| **Course Description** |
| Variable definition, data types, numerical and graphical presentation techniques appropriate to data types, population and sample, point and interval estimation, hypothesis testing. |
| **Supplementary Resources** |
| Introduction to Statistics, Prof. Dr. Fikret İDİZ, Barış Y. , İzmir, 2000. |
| Statistics , Murat Açıköğretim Yayınları, Ankara, 2001. |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| AIT 201 | Ataturk's Principles and Revolution History  | 2 | 0 | 0 | 2 |
| **Course Description** |
| The concepts of revolution, the characteristics of the Turkish revolution and its difference from other revolutions, Atatürk's understanding of revolution, the reasons that prepared the Turkish revolution, the disintegration of the Ottoman Empire, Mustafa Kemal Pasha's exit to Anatolia in Samsun, the establishment of the regular army |
| **Supplementary Resources** |
| Atatürk's Principles and History of Revolution, Ömer Küçükoğlu, YÖK Publications, Ankara, 1997. |

**2nd Year Spring Semester**

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 202 | Machine Learning | 3 | 2 | 4 | 8 |
| **Course Description** |
| Fundamental principles and techniques in machine learning. Includes an introduction to supervised and unsupervised learning, regression, regularization, nonparametric approaches, decision trees, kernels and support vector machines, clustering, neural networks and deep learning. |
| **Supplementary Resources** |
| Machine Learning with Python, Engin Sorhun, Abaküs Kitap (2021) |
| Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 2nd Edition |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 204 | Web Programming | 3 | 2 | 4 | 6 |
| **Course Description** |
| Internet, Intranet, Internet services and protocols. Hierarchical organization of the web page, format, page transitions, target audience, scope, nature, quality, color harmony, layout, interaction, document preparation, animated text and images.ASP.NET Basics Web editor, frames, tables, lists, forms, layout of visual elements, links, text and line types, buttons and menus. Web domain selection; domain name, quality, capacity, Internet service providers, database and web programming support, e-mail limit and cost. File transfer protocols and software, Internet service provider connection, web page installation and update. |
| **Supplementary Resources** |
| Asp.net 4.0 with C#, Zafer Demirkol, Kodlab 2011. |
| Learning Web Design: A Beginner's Guide to (X)HTML, StyleSheets, and Web Graphics, Jennifer Niederst Robbins , O'Reilly Media,2007 |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 206 | Data Structures | 3 | 0 | 3 | 4 |
| **Course Description** |
| Lists, abstract data types and linked lists; unordered and ordered linked lists, stacks and queues; search and sort algorithms, binary trees and algorithms, graph definition and algorithms. |
| **Supplementary Resources** |
| Data Structures and Algorithm Basics, Sefer Kurnaz |
| Data Structures and Algorithms in Computer Programming and Software Engineering, Rifat Çölkesen |
| Data Structures and Algorithms (Addison-Wesley Series in Computer Science and Information Pr) (Paperback) by [Alfred V. Aho](http://www.amazon.com/Alfred-V.-Aho/e/B000APLJR8/ref%3Dntt_athr_dp_pel_1) |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 208 | Information Security | 3 | 0 | 3 | 4 |
| **Course Description** |
| Cryptology, cryptological classification, classical symmetric cryptological systems; data integrity, digital signature, cryptological protocols, authentication, key agreement schemes, secret signature, electronic money and electronic election protocols |
| **Supplementary Resources** |
| [Principles of Information Security](http://www.amazon.com/Principles-Information-Security-Michael-Whitman/dp/1423901770/ref%3Dsr_1_1?ie=UTF8&s=books&qid=1259763603&sr=8-1) by [Michael E. Whitman](http://www.amazon.com/Michael-E.-Whitman/e/B001ILM9UY/ref%3Dsr_ntt_srch_lnk_1?_encoding=UTF8&qid=1259763603&sr=8-1) and [Herbert J. Mattord](http://www.amazon.com/Herbert-J.-Mattord/e/B001ILIBBA/ref%3Dsr_ntt_srch_lnk_1?_encoding=UTF8&qid=1259763603&sr=8-1) (Paperback - Dec 21, 2007) |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| MAT 272 | Differential Equations | 4 | 0 | 4 | 4 |
| **Course Description** |
| First Order Ordinary Differential Equations and Engineering Applications, Linear Differential Equations and Engineering Applications, Green's Functions, Introduction to Linear Algebra, Simultaneous Linear Differential Equations, Finite Differences, Mechanical Systems and Electrical Circuits, Fourier Series and Integral, Laplace Transform. Partial Differential Equations, Derivation of Equations, D'Alembert Solution of Wave Equation, Method of Separation into Variables, Numerical Solution of Partial Differential Equations, Bessel Functions and Legendre Polynomials, Vector Spaces and Linear Transformations, Vector Analysis, Calculus of Variations, Analytical Functions with Complex Variables |
| **Supplementary Resources** |
| Erwin Kreyszig, Advanced Engineering Mathematics, Wiley, 9th Ed, 2005. |
| Bekir Karaoğlu, Mathematical Methods, Seçkin Publishing, 2007 |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 210 | Financial Technologies | 2 | 0 | 2 | 2 |
| **Course Description** |
| This course is primarily focused on understanding the technological developments and innovation affecting the financial services sector and the implications for startups operating in this field. In this context, the following topics will be covered: The Future of the Financial Services Industry; The Role of Financial Technologies in the Development of Innovation and New Business Models; Opportunities and Threats of Financial Technologies; FinTech Ecosystem; Technological Trends and Use Cases; Open Banking and API Economy; Blockchain Technology; FinTech Regulations; FinTech Startups and Business Models; Strategic Collaboration Models of Organizations and Startups. |
| **Supplementary Resources** |
| Chishti, S., & Barberis, J. (2016). The Fintech book: The financial technology handbook for investors, entrepreneurs and visionaries. John Wiley & Sons. |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| AIT 201 | Ataturk's Principles and History of Turkish Revolution II | 2 | 0 | 0 | 2 |
| **Course Description** |
| The aim of reading Turkish Revolution History and Kemalism course and the concept of revolution, the collapse of the Ottoman Empire and the reasons that prepared the Turkish revolution, the disintegration of the Ottoman Empire, the armistice of Mondros and the subsequent events, the situation of the country in the face of the occupations and the reaction of Mustafa Kemal Pasha, Mustafa Kemal Pasha's departure to Samsun and the opening of the Last Ottoman Parliamentary Assembly, the opening of the Turkish Grand National Assembly and the management of the war of liberation |
| **Supplementary Resources** |
| Atatürk and the History of the Republic of Turkey, Oğuz AYTEPE et al. Siyasal Kitapevi, Ankara, 2003 |
| Atatürk's Principles and Turkish Revolution History, Bayram BAYRAKTAR, Detay Publishing Istanbul, 2009 |

**3rd Year Fall Semester**

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 301 | Data Mining | 3 | 2 | 4 | 7 |
| **Course Description** |
| This course provides information about the methods and algorithms used in data collection, storage and analysis. It includes detailed information about the methods used in the literature and their application areas. Project assignments are required within the scope of the algorithms described in the course and the effective use of the algorithms taught is measured. |
| **Supplementary Resources** |
| Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Morgan Kauffman. |
| Basic Data Mining with Concepts and Algorithms, Dr. Gökhan SILAHTAROGLU, Papatya Publishing |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 305 | Big Data | 3 | 2 | 5 | 6 |
| **Course Description** |
| Big data concepts, terminology, data analytics features, types of big data such as 5V-structural-structural-unstructured-metadata. Parallel processing and other design patterns in big data processing such as Cloudera virtual machine, HDFS (Hadoop Distributed File System), YARN (Yet Another Resource Negotiator and Hue). Storage concepts such as clustering, distributed file systems, relational database systems, NoSQL, in-memory storage and parallel, distributed, batch data processing. |
| **Supplementary Resources** |
| Big Data Fundamentals: Concepts, Drivers & Techniques (1st ed.). Thomas Erl, Wajid Khattak, and Paul Buhler. Prentice Hall Press, Upper Saddle River, NJ, USA. 2016 |
| Hadoop: The Definitive Guide, Tom White, O’Reilly, 2015. |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 307 | Algorithm Analysis | 3 | 0 | 3 | 3 |
| **Course Description** |
| Mathematical analysis of the complexity of algorithms: lower bounds, worst-case and average-case behavior; general methods in algorithm design: divide and conquer, greedy and dynamic programming approaches, sorting and optimization problems, introduction to the NP-completeness problem. |
| **Supplementary Resources** |
| [Introduction to the Design and Analysis of Algorithms (2nd Edition)](http://www.amazon.com/Introduction-Design-Analysis-Algorithms-2nd/dp/0321358287/ref%3Dsr_1_1?ie=UTF8&s=books&qid=1259763694&sr=8-1) by Anany V. Levitin (Paperback - Feb 24, 2006) |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 309 | Professional Practice I | 0 | 2 | 1 | 2 |
| **Course Description** |
| It is the education in which students see how the theoretical knowledge or laboratory-scale practical applications they have acquired during their education and training periods take place in large-scale industrial productions, develop their knowledge and skills by actively participating in the studies, and take the first step into the profession. Within the scope of the vocational practice I course, it is realized as 20 working days at the end of the 4th semester.Vocational Practice-1 course, “Eng. Fak. Practical Work (Internship) Directive” and ‘Directive on Student Internships within the Department’ and is carried out during weekly class hours.  |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM360 | Cyber Security Systems(Technical Elective Course I) | 3 | 0 | 3 | 6 |
| **Course Description** |
| Basic concepts. Cyber warfare. Introduction to encryption. Network security; firewalls. Intrusion recognition and interception systems. Operating system security. Secure software development. Web application security, Penetration testing. Examination of malicious software. |
| **Supplementary Resources** |
| Cryptography and Network Security: Principles and Practice, William Stallings, Prentice Hall. |
| Computer Forensics and Cyber Crime, Marjie T. Britz, Pearson. |
| Cyber War: The Next Threat to National Security and What to Do About It, Richard O. Clarke, Harper Collins |

**3rd Year Spring Semester**

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 306 | Deep Learning | 3 | 2 | 4 | 5 |
| **Course Description** |
| Deep Learning, Neural Networks and Convolutional Neural Networks, Optimization and Regularization, Supervised and Unsupervised Methods, Discriminative Networks, Training of Networks, Deep Generative Networks, Adversarial Techniques, Classification applications, Recurrent Neural Networks, Temporal Prediction Applications, Advanced Deep Learning techniques and applications, deep reinforcement learning. |
| **Supplementary Resources** |
| I. Goodfellow, Y. Bengio, A. Courville, Deep Learning, MIT-Buzdağı Publications, 2019. |
| F. Chollet, Deep Learning with Pyhton, Buzdağı Publications, 2019 |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 355 | Image Processing (Technical Elective Course I) | 3 | 0 | 3 | 6 |
| **Course Description** |
| Fundamentals of digital image, properties of light, color information, human visual system, cameras, computer vision systems, black and white image, color image, color models (RGB, CMY, TIQ), digital image. Sampling and quantization of image signal. Image formats, image enhancement techniques; point processing methods, black and white image, slicing gray scale values, brightness adjustment, contrast enhancement and computerized applications. Image filtering systems. Two-dimensional transforms of image; two-dimensional Fourier transform and application of fast Fourier transform to images. |
| **Supplementary Resources** |
| Digital Image Processing, Rafael C. Gonzalez , Richard E. Woods, Prentice Hall; 2nd edition (January 15, 2002) |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM359 | Web Services (Technical Elective Course II) | 3 | 0 | 3 | 6 |
| **Course Description** |
| Basic concepts and definitions of web technologies, Hybrid understandings of New Media Technologies, Introduction to Web Services, SOAP, WSDL, Restful services and general applications for the working logic of web services. |
| **Supplementary Resources** |
| Web Services Essentials (O'Reilly XML) 1st Edition |
| Web Services: Principles and Technology 1st Edition |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 366 | Machine Vision (Technical Elective Course II) | 3 | 0 | 3 | 6 |
| **Course Description** |
| Introduction to machine vision. Learning concepts. Structuring and coding data. Learning in neural networks and hybrid systems. Efficiency and error analysis methods in learning. Improving reliability in machine learning. Pattern recognition and classification systems. Feature extraction techniques: Binary coding-based, boundary-based, regional and mathematical morphology-based features. Feature vectors and classifier designs for signature, fingerprint, object etc. recognition systems. Sensors, image capture cards and other machine vision hardware elements. |
| **Supplementary Resources** |
| Machine Vision: Theory, Algorithms, Practicalities, E.R. Davies, Academic Press, 1997 |
| Neuro-Fuzzy and Soft Computing = A Computational Approach Learning and Machine Intelligence, Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Muzutani, Pearson Education, 1996. |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 302 | Formal Languages and Automata Theory | 3 | 0 | 3 | 5 |
| **Course Description** |
| The main topics of this course are: automata and regular languages, finite state machines, regular languages and push down automata. Context-free languages and grammars, regular structural grammars, instability and undecidability. Turing machines and their use in problem solving. |
| **Supplementary Resources** |
| H.R. Lewis, C.H. Papadimitriou, Elements of the theory of computation, second edition, Prentice-Hall. |
| Ünal Yarımağan, Formal Languages and Automata Theory |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 304 | Applied Data Engineering | 3 | 2 | 4 | 6 |
| **Course Description** |
| In this course, students will learn and experiment with components of a data pipeline architecture such as NoSQL database, ETL tools, data warehouse, data indexing tools, system automation tools, visualization software. |

**4th Year Fall Semester**

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 401 | Artificial Intelligence and Data Engineering Design | 2 | 6 | 5 | 8 |
| **Course Description** |
| In this course, under the supervision of the advisor, the student conducts a comprehensive literature research on the complex engineering problem that he/she will work on in the design project, determines the realistic constraints of the problem, describes the requirements of the solution by considering the relevant engineering standards. In the report submitted at the end of the semester, the student describes the scope of the problem, design constraints, relevant literature, relevant engineering standards, appropriate solutions, possible risks. |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 403 | Innovative Artificial Intelligence Applications | 3 | 2 | 5 | 5 |
| **Course Description** |
| Current methods and applications in the field of artificial intelligence. Methods for developing applications for real-world problems using an artificial intelligence approach. Designing practical artificial intelligence methods for basic topics such as image processing, video processing, audio processing and text processing. |
| **Supplementary Resources** |
| Artificial Intelligence (AI) Recent Trends and Applications Edited By S. Kanimozhi Suguna, M. Dhivya, Sara Paiva (2021) |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 407 | Graduation Project-I | 0 | 2 | 1 | 6 |
| **Course Description** |
| Literature research, problem posing, preparing a detailed analysis and design for an artificial intelligence or data engineering problem. Design, project reports and seminar presentations |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 409 | Professional Practice II | 0 | 2 | 1 | 2 |
| **Course Description** |
| It is the education in which students see how the theoretical knowledge or laboratory-scale practical applications they have acquired during their education and training periods take place in large-scale industrial productions, develop their knowledge and skills by actively participating in the studies, and take the first step into the profession. Within the scope of the vocational practice I course, it is realized as 20 working days at the end of the 6th semester.Vocational Practice-2 course, “Eng. Fak. Practical Work (Internship) Directive” and ‘Directive on Student Internships within the Department’ and is carried out during weekly class hours. The relevant juries evaluate the presentations prepared by the students about their internships by listening and asking questions. |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 405 | Natural Language Processing | 3 | 0 | 3 | 3 |
| **Course Description** |
| Morphemic Analysis; Syntactic Analysis, Language and Language Structures; Regular Languages, Word Processing Algorithms; Machine Learning, Text Classification; Information Extraction, Access to Information; Question Answering Systems; Synonymy |
| **Supplementary Resources** |
| Natural Language Understanding, J.Allen, Benjamin-Cummings |
| Speech and Language Processing, Jurafsky and Martin, Prentice Hall |

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 405 | ( Technical Elective I) | 3 | 0 | 3 | 6 |
| **Course Description** |
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| **Supplementary Resources** |
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**4th Year Spring Semester**

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| **CODE** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 402 | Graduation Project-II | 0 | 2 | 1 | 4 |
| **Course Description** |
| Graduation Project studies; “Faculty of Eng. Graduation Project Directive” and ‘Departmental Graduation Project Procedure Directive’, in consultation with the Project Manager. Examination and development of the project work under the supervision of the Project Manager. Giving the midterm exam grade according to the student's work performance. Examination and development of the project work under the supervision of the Director. Writing the project work in a thesis format in accordance with the spelling rules and preparing it for presentation. Submission of the Graduation Project. |

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| **KODU** | **COURSE NAME** | **THEORY** | **PRACTICE** | **CREDIT** | **ECTS CREDIT** |
| YVM 406 | Applied Engineering Education | 8 | 14 | 14 | 26 |
| **Course Description** |
| In order to train qualified engineers needed in the industry and to prepare engineer candidates for real business life, students work in an institution or company for 14 weeks in order to use and put into practice the theoretical knowledge they have acquired during their university education. |