



2023-2024 Academic Year
List of Courses Offered in Foreign Language

Institute of Science
Fen Bilimleri Enstitüsü

	Department <i>Bölüm</i>	Course Code <i>Ders Kodu</i>	ECTS <i>AKTS</i>	Course Title <i>Dersin Adı</i>	Semester <i>Dönem</i>	Course Content <i>Dersin İçeriği</i>	Academic Staff <i>Dersi Veren Öğretim Elemanı</i>	Online Available <i>Çevrimiçi</i>
1	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5003	6	ANALYSIS OF ALGORITHMS	Güz <i>Fall</i>	Asymptotic notation. Divide and conquer approach. Solving recurrences. Analysis of randomized quicksort. Medians and order statistics. Heaps: heap sort, priority queues. Sorting in linear time. Dynamic programming. Greedy algorithms. Amortized analysis and dynamic tables.	Assist. Prof. Hüseyin Gökhan Akçay	X
2	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5021	6	OPERATING SYSTEMS	Güz <i>Fall</i>	The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years and then cover the major components of most operating systems. This discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to two major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on operating system support for distributed systems.	Assist. Prof. Taner Danişman	X
3	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5041	6	SYSTEM ADMINISTRATION	Güz <i>Fall</i>	The objective of this course is to provide enough knowledge to install a Server operating system, understand the functionality of the different system components and be able to critically evaluate different server technologies.	Assist. Prof. Joseph William Ledet	X
4	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5045	6	MACHINE LEARNING	Güz <i>Fall</i>	This course has two parts. The first part includes an introduction to the basic machine learning concepts and algorithms, which will also provide the basis for the second part of the course. The second part covers selected recent topics in machine learning. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning.	Assist. Prof. Hüseyin Gökhan Akçay	X
5	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5051	6	DESIGN PATTERNS	Güz <i>Fall</i>	This course covers the principles behind the software design patterns and their application in constructing software components. The students who succeeded in this course; - Be able to state the intention of the pattern and show in UML notation, - Be able to identify the participants and their responsibilities, - Be able to contrast the difference in intentions between structurally similar patterns, - Be able to apply several appropriate patterns in the design of small programming assignments, - Be able to select appropriate design patterns to improve an existing design.	Assoc. Prof. Alper Bilge	X
6	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5008	6	SCIENTIFIC PROGRAMMING	Bahar <i>Spring</i>	The course will begin with an overview to programming techniques. Then, data analysis methods will be explained. The Matplotlib, a widely used library will be examined and data visualization methods will be explained. Programming examples and applications will be developed with Matlab and Python.	Assist. Prof. Hüseyin Gökhan Akçay	X
7	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5010	6	DATA MINING	Bahar <i>Spring</i>	The course is teaches basic concepts in data mining. Clustering/Classification and Association Analysis are main subjects. Data curation is the also included.	Prof. Dr. Melih Günay	X
8	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5012	6	BIOINFORMATICS	Bahar <i>Spring</i>	You'll master computer science and data science concepts applicable to the fields of genomics, microbiology, biotechnology, and biochemistry, including software and research methodologies.	Assist. Prof. Alper Özcan	X
9	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5040	6	DISTRIBUTED AND PARALLEL CO	Bahar <i>Spring</i>	Analysis of parallel algorithms. Real and apparent parallelism. Parallel programming and parallel programming compilers. Message Passing Interface. Scheduling and performance analysis. Parallel computer topologies and applications with the hypercube architecture.	Assist. Prof. Taner Danişman	X

10	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5048	6	IMAGE PROCESSING	Bahar <i>Spring</i>	This course provides an intermediate level background to image analysis and computer vision for graduates. We will start with low-level vision (early processing) techniques such as binary image analysis, filtering, edge detection and texture analysis. Then, we will cover mid-level vision topics such as image segmentation and feature extraction in detail. Finally, we will do case studies on several applications such as image classification, object recognition, and deep learning.	Assist. Prof. Mustafa Berkay Yılmaz	X
11	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5050	6	CYBER SECURITY	Bahar <i>Spring</i>	Asymmetric and symmetric encryption, stream ciphers, modes of encryption, public key cryptosystems, digital signatures, RSA, El Gamal encryption, elliptic curve cryptosystems, cryptographic hash functions, MACs, key establishment	Assist. Prof. Murat Ak	X
12	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5058	6	ARTIFICIAL INTELLIGENCE	Bahar <i>Spring</i>	Intelligent Agents, Solving Problems by Uninformed and Informed Search Methods, Constraint Satisfaction Problems, Adversarial Search, Markov Decision Process, Reinforcement Learning	Assoc. Prof. Alper Bilge	X
13	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 5074	6	SOCIAL NETWORK ANALYSIS	Bahar <i>Spring</i>	This course teaches students basic techniques to mine the online social networks (including social networks and social media). Detailed topics include three aspects: (1) Introduction to social network analysis and algorithms; (2) Online social network mining, and (3) Link prediction and information diffusion in social network.	Assist. Prof. Alper Özcan	X
14	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 7009	8	NATURAL LANGUAGE PROCESSING	Güz <i>Fall</i>	Learn to use Machine Learning, Spacy, NLTK, SciKit-Learn, Deep Learning, and more to conduct Natural Language Processing	Prof. Dr. Melih Günay	X
15	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 7011	8	THEORY OF COMPUTATION	Güz <i>Fall</i>	Finite automata, regular expressions, regular languages and their properties, the pumping lemma. Context free grammars and languages, normal forms, pushdown automata, the pumping lemma for the CFLs. Turing machines and their properties. Decidability and undecidable languages. Complexity theory, NP-completeness.	Assist. Prof. Murat Ak	X
16	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 7013	8	RECOMMENDER SYSTEMS	Güz <i>Fall</i>	Recommendation systems is a very active field in terms of both research and implementation. This course covers the basic principles of recommendation systems, with a particular focus on collaborative filtering (suggestions based on human behavior) and practical experience (a project).	Assoc. Prof. Alper Bilge	X
17	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 7021	8	VIRTUAL AND AUGMENTED REALITY	Güz <i>Fall</i>	Fundamentals of virtual reality systems, geometric modeling, transformations, graphical rendering, haptic rendering, evaluation of virtual reality systems.	Assist. Prof. Alper Özcan	X
18	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 7024	8	BLOCKCHAIN AND ITS APPLICATIONS	Bahar <i>Spring</i>	How blockchain is used in cryptocurrencies, supply-chain management, e-voting, healthcare systems.	Assist. Prof. Murat Ak	X
19	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 7030	8	DEEP LEARNING	Bahar <i>Spring</i>	History and theoretical advantages of the deep learning, basic learning algorithms and architectures for deep learning, regularization of distributed models, optimization techniques for training deep networks, convolutional networks, backpropagating and recurrent networks, autoencoders and linear factor models, learning by demonstration, deep generative networks - Boltzman machines	Assist. Prof. Hüseyin Gökhan Akçay	X
20	Bilgisayar Mühendisliği <i>Computer Engineering</i>	CSE 7052	8	GRAPH THEORY	Bahar <i>Spring</i>	This course provides a complete introduction to Graph Theory algorithms in computer science. Topics covered include: how to store and represent graphs on a computer; common graph theory problems seen in the wild; famous graph traversal algorithms (DFS & BFS); Dijkstra's shortest path algorithm (both the lazy and eager version); what a topological sort is, how to find one, and places it's used; learning about detecting negative cycles and finding shortest paths with the Bellman-Ford and Floyd-Warshall algorithms; discovering bridges and articulation points in graphs; understanding and detecting strongly connected components with Tarjan's algorithm, and finally solving the traveling salesman problem with dynamic programming.	Prof. Dr. Ümit Deniz Uluşar	X