

DERSİN KODU	DERSİN ADI	TÜRÜ	KREDİSİ	AKTS' si
LUET 501	Research Methods and Ethics	Zorunlu	3	7.5
LUET 502	Academic Reading, Writing and Presentation	Seçmeli	1	3
DS 501	Introduction to Data Science	Zorunlu	3	7.5
DS 502	Applied Statistics for Data Science	Zorunlu	3	7.5
DS 503	Machine Learning	Zorunlu	3	7.5
DS 504	Exploratory Data Analysis and Visualization	Seçmeli	3	7.5
DS 505	Deep Learning	Seçmeli	3	7.5
DS 506	Machine Learning for Natural Language Processing	Seçmeli	3	7.5
DS 507	Introduction to Computational Biology	Seçmeli	3	7.5
DS 508	Network Science	Seçmeli	3	7.5
DS 509	Optimization	Seçmeli	3	7.5
DS 510	Big Data Engineering	Seçmeli	3	7.5
DS 511	Fundamental Algorithms	Seçmeli	3	7.5
DS 512	Business Analytics	Seçmeli	3	7.5
DS 590	Graduation Project	Zorunlu	0	45

DS 501 Introduction to Data Science

This course is an introduction level course to data science, specialized on machine learning, artificial intelligence and big data. Focus will be on techniques and tools to collect, store, clean, manipulate, visualize, model and extract information from large amounts of data. Topics include data preprocessing, overview of machine learning algorithms, evaluation strategies.

DS 502 Applied Statistics for Data Science

This course covers the necessary background in statistics for data science applications. Topics include descriptive statistics, probability distributions, difference between correlation and causation, hypothesis tests, confidence intervals, linear regression.

DS 503 Machine Learning

This course introduces fundamental principles and techniques in machine learning. Topics include supervised and unsupervised learning, regression, regularization, nonparametric approaches, decision trees, kernels and support vector machines, clustering, neural networks and introduction to deep learning. The course will also cover the application of these algorithms to real world datasets and evaluation techniques to compare different algorithms .

DS 504 Exploratory Data Analysis and Visualization

Exploratory Data Analysis is a critical first step of data analysis. This course covers the main exploratory data analysis methods and visualization tools. These methods will be instrumental in data cleaning, selection of appropriate analysis methods, exploring relationships between variables. The course also aims to develop a vocabulary and framework for discussing, critiquing, and designing data visualization tools. Topics include marks and channels, use of color, effective visualization of multivariate data, networks, and text. Assignments will provide hands-on experience using cutting edge visualization systems.

DS 507 Introduction to Computational Biology

This course covers key computational challenges in molecular biology where the amount and complexity of data requires the design of complex algorithms and data structures. Some techniques that will be covered are dynamic programming, graph algorithms, hidden-markov models, clustering etc. Topics will include algorithms for sequence alignment, genome assembly, gene finding, phylogenetics, gene expression analysis, motif finding and RNA folding.

DS 508 Introduction to Network Science:

The complex systems can be represented with static or dynamic networks of interacting entities. The course is an introduction to the area of network science which investigates the topology and the dynamics of such complex networks. The course focuses on the algorithmic, computational, and statistical methods employed in the study of such networks, as well as applications in communications, biology, ecology, brain science, sociology. Topics include

empirical analysis of networks, function and structure of complex networks, epidemics, and models of information diffusion.

DS 509 Optimization:

The foundations of combinatorial optimization with an emphasis on structure and algorithms with proofs are the main objectives of the course. Topics include combinatorial and geometric methods for optimization including linear programming, the simplex method, the concept of duality, the primal-dual algorithm, and their applications to problems including network flows, matching, traveling salesmen problem, and cuts. An overview of NP-hardness and introduction to approximation algorithms are provided.

DS 510 Big Data Engineering

This course is an introduction to the design and architecture techniques for building big data applications. Topics will cover distributed file systems, data streams, event streams, real-time data processing, machine learning pipelines, automating data flow.

DS 511 Fundamental Algorithms:

Introduction to the main concepts of algorithm analysis and design. Overview of basic analysis techniques: approximating functions asymptotically, bounding sums, and solving recurrences. Discussion of efficiently solvable problems with a focus on design techniques such as divide-and-conquer, randomization, dynamic programming, amortization and greedy algorithms. Illustration of various new concepts through algorithms applied to problems related to sequences, strings, graphs, and computational geometry.

DS 512 Business Analytics

Business Analytics is the quantitative analysis of data with statistical models to enable improved insight on business operations and making fact-based decisions. Topics include descriptive analysis and visualization, customer segmentation, customer lifecycle management, cross-sell/up-sell recommendations, A/B testing in marketing, financial forecasting, link analysis, social media analysis, business process mining.