Course Syllabus

Code - Course Title	**BVA230 - MLOps and Data Streaming Systems**
Course Type	IV. SEMESTER
Laboratory + Practice	2+2
ECTS	**4.0**
Language of Instruction	Türkçe
Course Type	Area Elective Courses
Course Instructor(s)	ÖĞR. GÖR. AHMET MÜCAHİD ARVASİ

Mode of Delivery	Face to face
Prerequisites	There are no prerequisites or corequisites for this course.

Course Syllabus

Weeks	Learning Outcomes	Topics	Teaching Methods
Week - 1		Introduction to the Concept of MLOps: Machine Learning Lifecycle, DevOps - MLOps Relationship, and Maturity Levels	
Week - 2		Experiment Tracking: Experiment Logging, Hyperparameter and Metric Monitoring with MLflow	
Week - 3		Data and Model Versioning (DVC): Model Registry, Data Management, and Reproducibility	
Week - 4		Model Packaging and Deployment 1: Containerization of Models (Docker) and Isolation of the Work Environment	
Week - 5		Model Packaging and Deployment 2: Batch Processing and Online Serving Architectures	
Week - 6		Continuous Integration and Deployment (CI/CD Pipelines) in Machine Learning	
Week - 7		Model Monitoring: Performance Tracking, Detection of Data Drift and Concept Drift	
Week - 8		Midterm Exam	
Week - 9		Introduction to Real-Time Data Streaming: Message Queues and the Producer-Consumer Model	
Week - 10		Apache Kafka Architecture: Topic, Partition, and Consumer Groups	
Week - 11		Stream Processing and Time/Windowing Techniques	
Week - 12		Machine Learning Model Integration with Kafka: Real-Time Inference on Streaming Data	
Week - 13		Workflow Orchestration: Managing Data and Model Pipelines with Apache Airflow or Kubeflow	
Week - 14		Project-Based Applications: End-to-End MLOps and Real-Time Data Streaming Project Presentations	

Learning Outcomes

#	Learning Outcome
1	Upon successful completion of this course, students will gain the competence to integrate DevOps principles into data science projects by understanding the machine learning lifecycle and MLOps maturity levels; ensure the reproducibility of machine learning models by performing experiment tracking, model, and data versioning using tools like MLflow and DVC; package models using container architectures and deploy them for batch or online serving via continuous integration and deployment (CI/CD) pipelines; track the performance of models in production to detect situations such as data drift and concept drift; and simultaneously design real-time data streaming systems with message queues, stream processing, and windowing techniques using Apache Kafka, integrating these systems into end-to-end machine learning projects with the help of workflow orchestration tools.

Sustainable Development Goals

No content has been provided.

Course Theme

No content has been provided.

AKTS Workload

Activity	Duration (Hour)	Count	Workload
Teorik Derse Katılım	0	0	0
Sınıf Dışı Çalışma (Ön Hazırlık & Pekiştirme Amaçlı)	0	0	0
Ödevler	0	0	0
Proje - Rapor - Sunum Hazırlama	0	0	0
Ara Sınav Hazırlığı (sınav süresi dahil)	0	0	0
Final Sınavı Hazırlığı (sınav süresi dahil)	0	0	0
Uygulama (Laboratuvar, Müzik/Enstrüman Uygulaması, Atölye/Saha Çalışması vb.)	0	0	0
Staj Uygulaması	0	0	0
		Calculated ECTS	**0**

Assessment Method and Passing Requirements

No content has been provided.