Course Description Form	
Course Code and Name	BDA5106 Feature Extraction Engineering
Course Semester	Fall/Spring
Catalog Content	Transformation, Normalization, Filtering, Conversion, Dimension Reduction, Attribute Selection
Textbook	1. Feature Engineering for Machine Learning: Principles and Techniques for Data Scientists, Alice Zheng, Amanda Casari, 2018. 2. Feature Engineering for Machine Learning and Data Analytics,Huan Liu, Guozhu Dong, 2018. 3. Automated Feature Engineering and Advanced Applications in Data Science,Mrutyunjaya Panda, Harekrishna Misra, 2020.
Supplementary Textbooks	Feature Engineering and Selection: A Practical Approach for Predictive Models,Max Kuhn, Kjell Johnson, 2019.
Credit	8
Prerequisites of the Course (Attendance Requirements)	There is no prerequisite or co-requisite for this course. 80% attendance is required.
Type of the Course	Elective
Instruction Language	English
Course Objectives	The aim of this course is to teach the basics of data preparation and usage of domain knowledge to extract features for data intensive machine learning applications.
Course Learning Outcomes	At the end of this course, the student will be able to understand and implement preprocessing processes required for machine learning applications. Also, the student will gain the ability of dividing, uniting, transforming existing features to create new features that enhance accuracy of machine learning models.
Instruction Methods	This course is carried out only in the form of face2face training.
Weekly Schedule	1. Machine Learning Basics 2. Machine Learning Basics 3. Visualization for information retrieval 4. Handling missing data 5. Transformation and Normalization 6. Straightening, Filtering, Partitioning 7. Tf-Idf 8. Coding of categorical data 9. Dimensionality reduction 10. Non-linear feature extraction 11. Feature extraction on images 12. Feature seleection 13. Real World Examples 14. Real World Examples
Teaching and Learning Methods *(These are examples. Please fill which activities you use in the course)*	Weekly Theoretical Course Hours Reading Activities Internet Browsing, Library Work Report Preparing Preparing a Presentation Presentations Preparation of Midterm and Midterm Exam Final Exam and Preparation for Final Exam
Assessment Criteria	

	Numbers	Total Weighting (%)
Midterm Exams	1	30
Assignment	4	10
Application	0	0
Projects	1	60
Practice	0	0
Quiz	0	0
Percent of In-term Studies (%)		40
Percentage of Final Exam to Total Score (%)		60
Attendance	-	-

Workload

Activity	Total Number of Weeks	Duration (weekly hour)	Total Period Work Load
Weekly Theoretical Course Hours	14	3	42
Weekly Tutorial Hours	0	0	0
Reading Tasks	13	3	39
Studies	13	1	13
Material Design and Implementation	0	0	0
Report Preparing	8	4	32
Preparing a Presentation	2	10	20
Presentations	2	2	4
Midterm Exam and Preparation for Midterm Exam	1	20	20
Final Exam and Preparation for Final Exam	1	30	30
Other (should be emphasized)	0	0	0
Total Workload			200
Total Workload / 25			8.0
Course Credit (ECTS)			8.0

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Reaches the expansion of knowledge by conducting scientific research in the field of engineering and evaluation, interpretation and application of information.					X
2	Has extensive and in depth knowledge including the latest techniques, methods applied and their limitations in engineering.					X
3	Completes and applies knowledge by using scientific methods by using limited or missing data and				X	

		integrates information from different disciplines.					
	4	Be aware of new and developing practices of the profession, examines and learns when needed.					X
	5	Defines and formulates problems related to the field, develops methods to solve them and applies innovative methods in solutions.				X	
	6	Develops new and / or original ideas and methods, designs complex systems or processes and develops innovative / alternative solutions in their designs.				X	
	7	Designs and applies theoretical, experimental and modeling based researches, examines and solves the complex problems encountered in this process.					X
	8	Works effectively in disciplinary and multidisciplinary teams, leads such teams and develops solution approaches in complex situations, works independently and takes responsibility.			X		
	9	Communicates oral and written using a foreign language at least at the level of European Language Portfolio C1.		X			
	10	Conveys the process and results of the studies in written and oral form in a systematic and clear manner in national and international environments within or outside the field.					X
	11	Knows the social, environmental, health, security, legal aspects of engineering applications; project management, and business life applications and be aware of the constraints of these engineering applications.	X				

	12	Considers social, scientific and ethical values in the stages of data collection, interpretation and announcement and in all professional activities.		X			
The Course's Lecturer(s) and Contact Information	Computer Engineering Department bmbb@gazi.edu.tr						