

Course Description Form	
Course Code and Name	BDA5105 Machine and Deep Learning Algorithms and Structures
Course Semester	Fall/Spring
Catalog Content	Machine Learning, Artificial Neural Networks, Deep Learning
Textbook	1. Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow, Sebastian Raschka, Vahid Mirjalili, 2017. 2. Introduction to Machine Learning with Python: A Guide for Data Scientists, Andreas C. Müller, Sarah Guido, 2016. 3. Deep Learning, I. Goodfellow, Y. Bengio and A. Courville, MIT Press, 2016.
Supplementary Textbooks	Machine Learning A-Z: Machine Learning - Deep learning with Neural Network, Eddie Black, 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 the course is to teach the theoretical subjects of Machine Learning and Deep Learning with application examples in different fields.
Course Learning Outcomes	At the end of this course the student will be able to 1. Know machine learning and deep learning methods. 2. Know problem-specific architectural design. 3. Know how to train and test machine learning and deep learning models.
Instruction Methods	This course is carried out only in the form of face2face training.
Weekly Schedule	1. Basic Terminology and Notations 2. Data Preprocessing 3. Dimensionality Reduction 4. Classification 5. Regression 6. Clustering 7. Rule Mining 8. Multi-layer neural networks 9. Model evaluation and hyper parameter setting 10. Parallel training of artificial neural networks 11. Image Classification with CNN 12. Image Classification with CNN 13. Sequential Data Modeling with RNN 14. Sequential Data Modeling with RNN
Teaching and Learning Methods <i>(These are examples. Please fill which activities you use in the course)</i>	Weekly theoretical course Reading Activities Internet browsing, library work Designing and implementing materials 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
	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						X	

		scientific methods by using limited or missing data and 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	X				

		business life applications and be aware of the constraints of these engineering applications.					
	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					