

<b>Course Description Form</b>	
<b>Course Code and Name</b>	BDA5105 Machine and Deep Learning Algorithms and Structures
<b>Course Semester</b>	Fall/Spring
<b>Catalog Content</b>	Machine Learning, Artificial Neural Networks, Deep Learning
<b>Textbook</b>	<ol style="list-style-type: none"> <li>1. Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow, Sebastian Raschka, Vahid Mirjalili, 2017.</li> <li>2. Introduction to Machine Learning with Python: A Guide for Data Scientists, Andreas C. Müller, Sarah Guido, 2016.</li> <li>3. Deep Learning, I. Goodfellow, Y. Bengio and A. Courville, MIT Press, 2016.</li> </ol>
<b>Supplementary Textbooks</b>	Machine Learning A-Z: Machine Learning - Deep learning with Neural Network, Eddie Black, 2019.
<b>Credit</b>	8
<b>Prerequisites of the Course ( Attendance Requirements)</b>	There is no prerequisite or co-requisite for this course. 80% attendance is required.
<b>Type of the Course</b>	Elective
<b>Instruction Language</b>	English
<b>Course Objectives</b>	The aim of the course is to teach the theoretical subjects of Machine Learning and Deep Learning with application examples in different fields.
<b>Course Learning Outcomes</b>	<p>At the end of this course the student will be able to</p> <ol style="list-style-type: none"> <li>1. Know machine learning and deep learning methods.</li> <li>2. Know problem-specific architectural design.</li> <li>3. Know how to train and test machine learning and deep learning models.</li> </ol>
<b>Instruction Methods</b>	This course is carried out only in the form of face2face training.
<b>Weekly Schedule</b>	<ol style="list-style-type: none"> <li>1. Basic Terminology and Notations</li> <li>2. Data Preprocessing</li> <li>3. Dimensionality Reduction</li> <li>4. Classification</li> <li>5. Regression</li> <li>6. Clustering</li> <li>7. Rule Mining</li> <li>8. Multi-layer neural networks</li> <li>9. Model evaluation and hyper parameter setting</li> <li>10. Parallel training of artificial neural networks</li> <li>11. Image Classification with CNN</li> <li>12. Image Classification with CNN</li> <li>13. Sequential Data Modeling with RNN</li> <li>14. Sequential Data Modeling with RNN</li> </ol>
<b>Teaching and Learning Methods</b> <i>(These are examples. Please fill which activities you use in the course)</i>	<p>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</p>
<b>Assessment Criteria</b>	

	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.					
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				
<b>The Course's Lecturer(s) and Contact Information</b>	Computer Engineering Department bmbb@gazi.edu.tr						