Course Description Form	
Course Code and Name	5331329 Deep Learning
Course Semester	Fall-Spring
Catalog Content	Deep learning and machine learning basics, probability, mathematical distributions, artificial neural networks, autoencoders and applications, convolutional neural networks and applications, restricted Boltzmann machines, deep belief networks, recurrent neural networks and applications.
Textbook	I. Goodfellow, Y. Bengio and A. Courville, Deep Learning, MIT Press, 2016.
Supplementary Textbooks	(1) Russell, S. and Norvig, N. Artificial Intelligence: A Modern Approach, Prentice Hall, 2003. (2) Hastie, T., Tibshirani, R. and Friedman, J., The Elements of Statistical Learning, Springer, 2001. (3) Murphy, Kevin P. Machine learning: a probabilistic perspective. MIT press, 2012.
Credit	8
Prerequisites of the Course (Attendance Requirements)	There is a 80% attendance requirement for the course. Students enrolled in the course must have the following prior knowledge: - Linear Algebra - Probability and Statistics
Type of the Course	Elective
Instruction Language	Turkish
Course Objectives	The aim of the course is to teach the basics of deep learning and machine learning, artificial neural networks, autoencoders and their applications, convolutional neural networks and applications, restricted Boltzmann machines, deep belief networks, recurrent neural networks and applications.
Course Learning Outcomes	At the end of this course the students will gain the following qualifications; 1. Knows the application areas of deep learning and machine learning. 2. Knows comparison of deep learning methods and evaluate application results. 3. Knows classification and clustering on data using deep learning methods. 4. Knows analysis, classification and clustering on image and video using deep learning methods. 5. Knows how to apply deep learning methods on different data types.
Instruction Methods	The mode of delivery of this course is face to face.
Weekly Schedule	1. Week: Introduction to deep learning 2. Week: Probability, mathematical distributions 3. Week: Machine learning basics 4. Week: Artificial neural network 5. Week: Multilayered neural networks 6. Week: Autoencoders 7. Week: Applications of autoencoders 8. Week: Convolutional neural networks 9. Week: Applications of convolutional neural networks 10. Week: Restricted Boltzmann machines 11. Week: Deep belief networks 12. Week: Applications of deep belief networks 13. Week: Recurrent neural networks 14. Week: Applications of recurrent neural networks

Teaching and Learning Methods

(These are examples. Please fill which activities you use in the course)

Weekly theoretical course hours:
Weekly lab course hours
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	
Assignment	4	
Application	1	
Projects	1	
Practice		
Quiz		
Percent of In-term Studies (%)		60
Percentage of Final Exam to Total Score (%)		40
Attendance	%80	

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	14	3	42
Studies	14	32	42
Material Design and Implementation	1	18	18
Report Preparing	5	4	20
Preparing a Presentation	1	8	8
Presentations	1	1	1
Midterm Exam and Preperation for Midterm Exam	1	15	15
Final Exam and Preperation for Final Exam	1	20	20
Other (should be emphasized)			0
Total Workload			208
Total Workload / 25			8,32
Course Credit (ECTS)			8

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 integrates information from different disciplines.				X	
	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 B2.		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 Informations	Name, Surname : Prof. Dr. M. Ali AKCAYOL E-mail address : akcayol@gazi.edu.tr						