<table>
<tr><th colspan="2">COURSE DESCRIPTION FORM</th></tr>
<tr><td>Course Code and Name</td><td>CENG466 PERCEPTRON NETWORKS AND APPLICATIONS (TECH.ELECT.)</td></tr>
<tr><td>Course Semester</td><td>8</td></tr>
<tr><td>Catalog Content</td><td>History of artificial neural network, biology neuron, artificial neuron, perceptron, multilayer perceptron, optimization, model training, backpropagation, convolutional neural networks, recurrent neural networks, autoencoders, generative adversarial networks and artificial neural network applications.</td></tr>
<tr><td>Textbook</td><td>Ian Goodfellow, Aaron Courville, Yoshua Bengio, “Deep Learning”, MIT Press, 2016.</td></tr>
<tr><td>Supplementary Textbooks</td><td>Seth Weidman, “Deep Learning from Scratch: Building with Python from First Principles”, O'Reilly Media, Incorporated, 2019.</td></tr>
<tr><td>Credit</td><td>6</td></tr>
<tr><td>Prerequisites of the Course
(Attendance Requirements)</td><td>-</td></tr>
<tr><td>Type of the Course</td><td>Technical Elective</td></tr>
<tr><td>Instruction Language</td><td>English</td></tr>
<tr><td>Course Objectives</td><td>To understand the basic concepts of Artificial Neural Networks, to experience the process of training and testing artificial neural networks on a recent artificial intelligence topic.</td></tr>
<tr><td>Course Learning Outcomes</td><td>1. Learning the fundamental of artificial neural networks.
2. Having knowledge about artificial neural network applications.
3. Implementing an artificial neural network for a specific task.
4. Understanding and performing model training and optimization.</td></tr>
<tr><td>Instruction Methods</td><td>The mode of delivery of this course is face to face</td></tr>
<tr><td>Weekly Schedule</td><td>1.Week: Introduction to Artificial Neural Networks
2.Week: Artificial Neural Network applications and history of Artificial Neural Network
3.Week: Biological neuron, artificial neuron
4.Week: Perceptron
5.Week: Multi-Layer Perceptron (MLP)
6.Week: Optimization
7.Week: Model training and backpropagation
8.Week: Convolutional Neural Networks (CNN)
9.Week: CNN object recognition applications
10.Week: Pre-trained CNN models and finetuning
11.Week: CNN object detection applications
12.Week: Recurrent Neural Networks (RNN) and applications
13.Week: Autoencoders and applications
14.Week: Generative Adversarial Networks and applications</td></tr>
<tr><td>Teaching and Learning Methods
(These are examples. Please fill which activities you use in the course)</td><td>Weekly theoretical course hours
Internet search and library work
Designing and implementing materials
Making a report
Preparing and making presentations
Midterm and revision for midterm
Final exam and revision for final exam</td></tr>
<tr><td>Assessment Criteria</td><td>
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<tr><th></th><th>Number(s)</th><th>Weight (%)</th></tr>
<tr><td>Midterm exam</td><td>1</td><td>30</td></tr>
<tr><td>Assignment</td><td></td><td></td></tr>
<tr><td>Application</td><td></td><td></td></tr>
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Project	1	30
Practice		
Quiz		
Final exam	1	40
Total	3	100

Workload

Activity	Number of Weeks	Duration (Weekly Hour)	End of Semester Total Workload
Weekly theoretical course hours	14	3	42
Weekly practical course hours	0	0	0
Reading activities	0	0	0
Internet search and library work	10	5	50
Designing and implementing materials	5	5	25
Making a report	1	8	8
Preparing and making presentations	1	5	5
Midterm and revision for midterm	1	10	10
Final exam and revision for final exam	1	10	10
Total workload			150
Total workload/ 25			6
Course Credit (ECTS)			6

Contribution Level Between Course Learning Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Knowledge of mathematics, science, basic engineering, computing, and computer engineering; ability to use this knowledge in solving complex engineering problems.					x
2	Ability to define, formulate and analyze complex engineering problems using basic science, mathematics and engineering knowledge and considering the UN Sustainable Development Goals relevant to the problems addressed.					x
3	Ability to design creative solutions to complex engineering problems; ability to design complex systems, processes, devices, software, algorithms or products to meet current and future requirements, considering realistic constraints and conditions.			x		
4	Ability to select, use and develop appropriate techniques, resources and modern engineering and informatics tools, including estimation and modeling, for the analysis and solution of complex engineering problems while being aware of their limitations.					x
5	Ability to use research methods to examine complex engineering problems or research topics in computer engineering, including reviewing the literature, designing experiments, conducting experiments, collecting data, analyzing and interpreting results.					x
6	Knowledge of the effects of engineering practices and the standards used in these practices on society, health and safety,					

		economy, sustainability and environment within the scope of the UN Sustainable Development Goals; awareness of the consequences of engineering solutions in the fields of information security and law.					
	7	Acting in accordance with engineering professional principles and knowledge on ethical responsibility; awareness of acting impartially, without discrimination on any issue, and being inclusive of diversity.					
	8	Ability to work effectively individually and as a team member or leader in intradisciplinary and multidisciplinary teams (face-to-face, remote, or hybrid).					x
	9	Ability to conduct effective verbal and written communication on technical issues in Turkish or English, prepare reports, make effective presentations and prepare software documentation, considering the various differences of the target audience (such as education, language, profession).					x
	10	Knowledge of business practices such as project, risk and change management and economic feasibility analysis; awareness of entrepreneurship and innovation.			x		
	11	Lifelong learning skill that includes the ability to learn independently and continuously, to adapt to new and developing scientific practices and technologies, and to think inquisitively about technological changes.					x
The Course's Lecturer(s) and Contact Information	Assist. Prof. Dr. Ceren Güzel Turhan cerenguzel@gazi.edu.tr						