<table>
<tr><th colspan="2">COURSE DESCRIPTION FORM</th></tr>
<tr><td>Course Code and Name</td><td>CENG443 GENERATIVE ARTIFICAL INTEELLIGENCE (TECH. ELECT.)</td></tr>
<tr><td>Course Semester</td><td>7</td></tr>
<tr><td>Catalogue Data of the Course (Course Content)</td><td>Introduction to artificial intelligence, machine learning, types of learning, deep feedforward networks, autoencoder, variational autoencoder, recurrent neural networks, restricted Boltzmann machine, restricted Boltzmann machine applications, deep belief networks, adversarial generative networks, adversarial generative network applications.</td></tr>
<tr><td>Course Textbooks</td><td>1. Goodfellow I., Bengio Y., Courville A., Deep Learning, MIT Press, 2016.
2. Dhamani N., Engler M., Introduction to Generative AI, Manning, 2024</td></tr>
<tr><td>Supplementary Textbooks</td><td>1. Machine Learning: A Probabilistic Perspective, K. P. Murphy, MIT press, 2012.
2. Dummies J., Sinclair A., “Generative AI”, Independently Published, 2023.</td></tr>
<tr><td>Credit (ECTS)</td><td>6</td></tr>
<tr><td>Prerequisites for the Course (Attendance Requirements)</td><td>Attendance is mandatory</td></tr>
<tr><td>Course Type</td><td>Technical Elective</td></tr>
<tr><td>Language of Instruction</td><td>English</td></tr>
<tr><td>Course Objectives</td><td>To teach the machine learning, types of learning, deep feedforward networks, autoencoder, variational autoencoder, recurrent neural networks, restricted Boltzmann machine, restricted Boltzmann machine applications, deep belief networks, adversarial generative networks, adversarial generative network applications.</td></tr>
<tr><td>Course Learning Outcomes</td><td>1. Explains machine learning.
2. Defines the types of learning.
3. Explain deep feedforward networks.
4. Explains Autoencoder and its types.
5. Explains recurrent neural networks and their types.
6. Explains the restricted boltzmann machine and its applications.
7. Explains deep belief networks.
8. Explain contentious producer networks and their practices.</td></tr>
<tr><td>Instruction Method
(Face-to-face, Distance education etc.)</td><td>Face-to-face</td></tr>
<tr><td>Weekly Schedule of the Course</td><td>Week 1: Introduction to Artificial Intelligence
Week 2: Machine Learning
Week 3: Types of Learning
Week 4: Deep Feedforward Networks
Week 5: Autoencoder
Week 6: Variational autoencoder
Week 7: Recurrent Neural Networks
Week 8: Recurrent Neural Networks
Week 9: Restricted Boltzmann Machine
Week 10: Restricted Boltzmann Machine
Week 11: Restricted Boltzmann Machine Applications
Week 12: Deep Belief Networks
Week 13: Adversarial Generative Networks
Week 14: Adversarial Generative Network Applications</td></tr>
<tr><td>Teaching Activities
(The time spent for the activities listed here will determine the amount of credit required)</td><td>Weekly theoretical course hours: 3
Reading activities
Internet search and library work
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>
<table>
<tr><th></th><th>Number(s)</th><th>Weight (%)</th></tr>
<tr><td>Midterm exam</td><td>1</td><td>35</td></tr>
<tr><td>Assignment</td><td>4</td><td>10</td></tr>
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Application	-	-
Project	1	15
Practice	-	-
Quiz	-	-
Final exam	1	40
Total		100

Workload of the Course

Activity	Number of Weeks	Duration (Weekly Hour)	End of Semester Total Workload
Weekly theoretical course hours	14	3	42
Weekly practical course hours	-	-	-
Reading activities	14	2	28
Internet search and library work	14	2	28
Designing and implementing materials	-	-	-
Making a report	4	3	12
Preparing and making presentations	1	4	4
Midterm and revision for midterm	1	12	12
Final exam and revision for final exam	1	24	24
Total workload			52
Total workload/ 25			6
Course Credit (ECTS)			6

Contribution Level between Course 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.				X	
	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.					
	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.					

Lecturer(s) and Contact Information	Lecturer's First/Last Name: Prof. Dr. M. Ali AKCAYOL E-mail address: akcayol@gazi.edu.tr