

Course title	Code	semester	T+U	credit	ECTS
Deep Learning		7	3+ 0	3	4
<b>Prerequisite Courses</b>	None				
<b>Language of the Course</b>	English				
<b>Course Level</b>	Undergraduate				
<b>Type of Course</b>	Compulsory				
<b>Course Coordinator</b>					
<b>Instructors</b>					
<b>Course Assistants</b>					
<b>The aim of lesson</b>	To teach the concept of Deep Learning and deep learning algorithms. Developing projects using these algorithms.				
<b>Course Content</b>	Concept of Deep Learning, Installation of Python and deep learning libraries, Neuron, Activation Function, Working of Artificial Neural Networks, Gradient Descent, Stochastic Gradient Descent, Backpropagation, ANN Application, Evaluation, improvement and tuning of ANN results, Convolutional Neural Networks, Convolution Operation, ReLU Layer , Pooling, Flattening, Full Connection, CNN Application, Evaluation, improvement and adjustment of CNN results, Recurrent Neural Networks, LSTMs, RNN Application, Evaluation, improvement and adjustment of RNN results, Self Organizing Maps, SOM Application, Boltzman Machine, Boltzman Machine Application, AutoEncoder, AutoEncoder Application				
<b>Course Learning Outcomes</b>	<p>Students who successfully complete this course;</p> <ol style="list-style-type: none"> <li>1. Students can evaluate common deep learning methods in terms of effectiveness.</li> <li>2. Students can evaluate the advantages and disadvantages of the deep learning method that is considered to be used.</li> <li>3. Students can design and test basic deep learning solutions.</li> <li>4. Students identify and apply the appropriate deep learning architecture and algorithm for the predicted solution.</li> <li>5. Students have knowledge about editing and optimization methods of deep models.</li> </ol>				
<b>Weeks</b>	<b>Topics</b>				
one	Deep Learning Concept, Python and installation of deep learning libraries				
2	Neuron, Activation Function, Working of Artificial Neural Networks				
3	Gradient Descent, Stochastic Gradient Descent, Backpropagation, ANN Implementation				
4	Evaluating, Improving and Tuning the ANN				
5	Convolutional Neural Networks				
6	Convolution Operation, ReLU Layer, Pooling, Flattening, Full Connection				
7	CNN App, evaluation, improvement and adjustment of CNN results				
8	Recurrent Neural Networks, LSTMs				
9	Evaluating, improving and adjusting RNN results				
10	Self Organizing Maps, SOM Application				
11th	Boltzman Machine				
12	Boltzman Machine Application				
13	AutoEncoder				
14	AutoEncoder Application I				
15	AutoEncoder Application II				
<b>General Competencies</b>					
They have knowledge about the concept of deep learning. They can use deep learning algorithms. They can use Python deep learning libraries. They can develop projects using deep learning algorithms.					
<b>resources</b>					

C. Francois. Deep learning with python. Manning Publications Co., 2017.

**Evaluation System**

The dates, days and hours of the Midterm Exam, Quiz, Final Exam and Evaluations will be announced later, according to the decision of the Faculty Administrative Board.

<b>WITH PROGRAM LEARNING OUTCOMES COURSE LEARNING OUTCOMES RELATIONSHIP TABLE</b>											
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>
<b>LO1</b>	5	5	5	5	4	4	4	5	5	4	3
<b>LO2</b>	5	4	4	4	4	3	3	3	5	4	5
<b>LO3</b>	5	5	5	4	5	3	3	4	3	4	3
<b>LO4</b>	4	4	4	4	5	3	3	4	3	4	3
<b>LO5</b>	4	4	4	4	5	3	3	3	3	4	3
<b>LO: Learning Outcomes OP: Program Outcomes</b>											
<b>Contribution Level</b>	<b>1 Very Low</b>		<b>2 Low</b>		<b>3 Medium</b>		<b>4 High</b>		<b>5 Very High</b>		

**Relation of Program Outcomes and Related Course**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>
<b>Deep Learning</b>	4	4	4	4	5	3	3	4	3	4	3