

QF01/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Artificial Intelligence Department
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Study plan No.	2020/2021	University Specialization	Artificial Intelligence
Course No.	0142442	Course name	Artificial Neural Networks
Credit Hours	3	Prerequisite Co-requisite	Machine Learning
Course type	<input type="checkbox"/> MANDATORY UNIVERSITY REQUIREMENT <input type="checkbox"/> UNIVERSITY ELECTIVE REQUIREMENTS	<input type="checkbox"/> FACULTY MANDATORY REQUIREMENT <input type="checkbox"/> Support course family requirements	<input type="checkbox"/> Mandatory requirements <input checked="" type="checkbox"/> Elective requirements
Teaching style	<input type="checkbox"/> Full online learning	<input type="checkbox"/> Blended learning	Traditional learning
Teaching model	<input type="checkbox"/> 2Synchronous: 1asynchronous	<input type="checkbox"/> 2 face to face : 1synchronous	3 Traditional

Faculty member and study divisions information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail	
Division number	Time	Place	Number of students	Teaching style	Approved model

### Brief description

This course provides the following topics:  
Introduction to Classification, Logistic Regression, Artificial Neural Networks, Gradient Descent, Applications of ANN, Vectorization, Deep Learning, Types of Deep Learning, Applications of Deep learning.

### Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	<p>1- Logistic Regression Models (Chapman &amp; Hall/CRC Texts in Statistical Science) 1st Edition, 2017.</p> <p>2- Neural Networks and Deep Learning: A Textbook Charu C. Aggarwal, Springer, 2018.</p>
Supportive learning resources (Books, databases, periodicals,	1- Charu Aggarwal. Data Mining, the text book. Springer. 2015

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software, applications, others)	2- Ian Witten, Eibe Frank, Mark Hall, and Christopher Pal. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2016.			
Supporting websites				
The physical environment for teaching	Class room	<input type="checkbox"/> labs	<input type="checkbox"/> Virtual educational platform	<input type="checkbox"/> Others
Necessary equipment and software				
Supporting people with special needs				
For technical support				

Course learning outcomes (S= Skills, C= Competences K= Knowledge,)

No.	Course learning outcomes	The associated program learning output code
<b>Knowledge</b>		
<b>K1</b>	To understand how logistic regression works	<b>MK3</b>
<b>K2</b>	To have the knowledge of how ANN works	<b>MK3</b>
<b>K3</b>	To understand the different concepts related to ANN such as vectorization and parameter tuning	<b>MK3</b>
<b>Skills</b>		
<b>S1</b>	To be able to apply logistic regression models on typical problems using python	<b>MS3</b>
<b>S2</b>	To be able to apply ANN models on typical problems using python	<b>MS3</b>
<b>S3</b>	To be able to compute the output of logistic regression manually	<b>MS3</b>
<b>Competences</b>		
<b>C1</b>	To be able to use logistic regression in solving a real life problem	<b>MC1</b>

Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
First exam	0	0	%20	0
Second / midterm exam	%30	%30	%20	30%
Participation / practical applications	0	0	10	30%
Asynchronous interactive activities	%30	%30	0	0
final exam	%40	%40	%50	40%

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**Note:** Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

**Schedule of simultaneous / face-to-face encounters and their topics**

Week	Subject	learning style*	Reference **
1	<b>Introduction into Classification.</b>	Lectures	<b>Ref 1. 285-300</b>
2	<b>Applications of Classifications Introduction into Logistic Regression</b>	Lectures	<b>Ref1. 300-344 + Text1 63-71</b>
3	<b>Logistic Regression Examples in Python Gradient Descent of Logistic Regression HW1 Out</b>	Lectures	<b>Python Examples given in class + Text1 63-71</b>
4	<b>Introduction into Vectorization Vectorization in Logistic Regression</b>	Lectures	<b>Python Examples given in class</b>
5	<b>Derivative Meaning Introduction into ANN</b>	Lectures	<b>Text2 1-52</b>
6	Mid Exam Estimated + Revision	learning through problem solving	
7	<b>ANN Examples in Python HW2 Out</b>	Lectures	<b>Python Examples given in class</b>
8	<b>Vectorization of ANN Gradient Descent of ANN Loss Functions</b>	Lectures	<b>Text2 105-167</b>
9	<b>Deep ANN Deep ANN Examples in Python HW3 Out</b>	Lectures	<b>Text2 170-200 + Examples given in class</b>
10	<b>Learning Curve CNN RNN</b>	Lectures	<b>Text2 200-216</b>
11	<b>Case Study 1: ANN for estimating functions</b>	learning through problem solving	<b>Given in class</b>
12	<b>Case Study 2: ANN for</b>	learning through problem solving	<b>Given in class</b>
13	<b>Presentations</b>	participatory learning	
14	<b>Presentations.</b>	participatory learning	
15	<b>Presentations.</b>	participatory learning	
16	<b>Final Exam</b>		

\* Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.

\*\* Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.

**Schedule of asynchronous interactive activities (in the case of e-learning and blended learning)**

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Week	Task / activity	Reference	Expected results
1	Data Mining Categorization		To categorize various scenarios into their data mining types
2	Logistic Regression Part1		To compute manually the output of a regression model
3	Logistic Regression Part2		To compute manually the output of a regression model
4	One Hot Encoding		To apply one hot encoding on data
5	Logistic Regression Using Loop		To use logistic regression using python
6	Logistic Regression Using Vectorization		To apply vectorization on logistic regression using python
7	Exam		
8	Logistic Regression Using Vectorization		To apply vectorization on logistic regression using python
9	Learning Rate		To use learning rate on logistic regression
10	Biase		To use biase
11	ANN Part1		To apply ANN using python
12	ANN Part2		To apply ANN using python
13	Deep Learning		To apply Deep Learning using python
14	Presentations		To present a trending topic in ANN
15	Presentations		To present a trending topic in ANN
16	Exam		