

<b>University of Petra</b>		 جامعة البترا - الجامعة علم University of Petra
<b>Faculty of Information Technology</b>		كلية تكنولوجيا المعلومات
<b>Department of Data Science and Artificial Intelligence</b>		قسم علم البيانات والذكاء الاصطناعي

### Course Syllabus

Year: 2024/2025

Semester: 2

Course No.	Course Title	Prerequisite	Co-requisite	Credit Hours Lectures / Lab.	Equivalent hours in NQF	Course level according to NQF
606384	Computer Vision	606361	-	3:3-0	54	7

Course Form		Course Model		
<input checked="" type="checkbox"/> Blended	<input type="checkbox"/> Online	<input checked="" type="checkbox"/> 2+1	<input type="checkbox"/> 1+1	<input type="checkbox"/> 1+2

<b>Learning Management System Platform</b>	Moodle
<b>URL to access the platform</b>	Moodle <a href="https://lms.uop.edu.jo/moodle/">https://lms.uop.edu.jo/moodle/</a> Microsoft Teams <a href="https://www.microsoft.com/en-us/microsoft-teams/">https://www.microsoft.com/en-us/microsoft-teams/</a>
<b>Link to tutorial videos to access the platform and technical help</b>	<b>Moodle Tutorial:</b> <a href="https://lms.uop.edu.jo/oldmoodle/course/view.php?id=345">https://lms.uop.edu.jo/oldmoodle/course/view.php?id=345</a> <b>Moodle Mobile Tutorial:</b> <a href="https://lms.uop.edu.jo/moodle20213/mod/page/view.php?id=78">https://lms.uop.edu.jo/moodle20213/mod/page/view.php?id=78</a> <b>Microsoft Teams Tutorial:</b> <a href="https://lms.uop.edu.jo/moodle20213/course/view.php?id=13">https://lms.uop.edu.jo/moodle20213/course/view.php?id=13</a>

Instructor Name	e-mail	Office No.	Office ext.
Dr Hussam Fakhouri	Hussam.fakhouri@uop.edu.jo	7308	12-1 Sunday, 12-1 Tuesday

Office Hours	Platform used	Link to office hours platform
12-1 Sunday	Teams	<a href="https://teams.microsoft.com/l/channel/19%3a2dIGAHRX6Thm-S1ZT8Mtq8RUinDYRTxI8BWnzGjliA81%40thread.tacv2/General?groupId=f7d18527-4154-4d7e-9d3f-4cd94e9ef28f&amp;tenantId=97e5760c-fa12-4aae-b4e4-31b43f04e79d">https://teams.microsoft.com/l/channel/19%3a2dIGAHRX6Thm-S1ZT8Mtq8RUinDYRTxI8BWnzGjliA81%40thread.tacv2/General?groupId=f7d18527-4154-4d7e-9d3f-4cd94e9ef28f&amp;tenantId=97e5760c-fa12-4aae-b4e4-31b43f04e79d</a>
12-1 Tuesday	Teams	<a href="https://teams.microsoft.com/l/channel/19%3a2dIGAHRX6Thm-S1ZT8Mtq8RUinDYRTxI8BWnzGjliA81%40thread.tacv2/General?groupId=f7d18527-4154-4d7e-9d3f-4cd94e9ef28f&amp;tenantId=97e5760c-fa12-4aae-b4e4-31b43f04e79d">https://teams.microsoft.com/l/channel/19%3a2dIGAHRX6Thm-S1ZT8Mtq8RUinDYRTxI8BWnzGjliA81%40thread.tacv2/General?groupId=f7d18527-4154-4d7e-9d3f-4cd94e9ef28f&amp;tenantId=97e5760c-fa12-4aae-b4e4-31b43f04e79d</a>

[4cd94e9ef28f&tenantId=97e5760c-fa12-4aae-b4e4-31b43f04e79d](https://example.com/4cd94e9ef28f&tenantId=97e5760c-fa12-4aae-b4e4-31b43f04e79d)

**Coordinator's Name:** (if applicable) **Dr Hussam Fakhouri**

**Course Description**  
 This course presents an introduction to Computer Vision. Topics covered: basic principles of image formation, imaging processing algorithms, different algorithms for 3D reconstruction and recognition from single or multiple images (video). This course emphasizes the core vision tasks of scene understanding and recognition. Applications to 3D modelling, video analysis, video surveillance, object recognition and vision-based control will be discussed.

**Commented [MA1]:** This is the original short description of the course. Kindly check if the topics covered abide by this!! Topics has been modified

**Course Objectives**

- (a) Demonstrate a solid understanding of image sensing, pixel arrays, and digital image representations.
- (b) Effectively apply image processing techniques for image enhancement and analysis.
- (c) Implement computer vision algorithms for feature extraction, image classification, image retrieval, object detection, feature extraction, and image generation.
- (d) Apply computer vision and image processing methods to solve real-world problems.
- (e) Recognize and evaluate the significance of deep learning applications in computer vision.

**Course Intended Learning Outcomes (ILOs) and their Alignment with Program ILOs, Teaching and Learning Methods, and Assessment Methods:**

Upon successful completion of this course, students are expected to achieve the following learning outcomes:

Course ILOs	Program ILOs	Teaching and Learning Method	Assessment Method
<b>Knowledge (K)</b>			
K1. Identify the different concepts of computer vision , and get familiar with image processing and computer vision programming.	7.2	Interactive lectures	Midterm Exam
<b>intellectual skill(I)</b>			
I1: Design and use image segmentation and feature extraction techniques	2.1	Interactive lectures	Midterm Exam
<b>Practical skills (P)</b>			
P1. Apply Deep neural network techniques to in computer vison and object detection	DS&AI 6.1	Interactive lectures	Assignments, quiz
<b>Transferable Skills (T)</b>			
T1 Demonstrate effective written skills through writing a report on program for a computer vision, object detection.	3.2	Project	report evaluation rubric

**Commented [MA2]:** This course requires 2 Transferable skills: T1 for oral presentation and T2 for Select and evaluate technical literature and other sources of information to address problems. Please include both

**Commented [MA3]:** This course requires 2 Transferable skills: T1 for oral presentation and T2 for Select and evaluate technical literature and other sources of information to address problems. Please include both

T2 Search, analyze, summarize, and write a comprehensive report for solving real life problems using one of DM tools.	3.3	Project	report evaluation rubric
<b>Competencies (C)*</b>			
C1. Solution development	C2	Interactive lectures	Midterm Exam
<b>C2. Communication Skills</b>	<b>C3</b>	Project	report evaluation rubric
C3. Data Analysis Proficiency, AI Expertise.	DS-C6:	Interactive lectures + Project	Project
C4. Knowledge integration	C7	Interactive lectures	Midterm Exam

\* Competencies :knowledge,skills,and behaviors that lead to successful professional performance

### Course Schedule:

Topic No.	Week	Topics	Topics Details	Reference	ILO No.	Tasks required from students	Teaching activities *
1	1	Introduction to Computer Vision	Introduction to Computer Vision Introduction to Human Visual System	Lecture notes	<b>K1</b>	Interactive Lectures and Activities	<u>(Synchronous)</u> <u>Asynchronous</u>
2	2-3	Image Processing Operations	Image Formation and Digital Image Representations Camera Model and Geometry Camera models and pinhole camera geometry Light, color perception, and image formation Fundamental image transformations and manipulations Introduction to spatial filtering, edge detection, and corner detection Gradient-based methods for feature extraction Hands-on practice with software libraries for image processing	Lecture notes	<b>K1, P1</b>	Interactive Lectures and Activities	<u>(Synchronous)</u> <u>Asynchronous</u>
3	4-5	Feature Extraction	Designing Image Descriptors, Feature Descriptors, Global and Local Features, Feature Maps, Feature Aggregation		<b>K1</b>	Interactive Lectures and Activities	<u>(Synchronous)</u>

							<u>Asynchronous</u>
4	6-7	3D Images and Videos	3D reconstruction and recognition from single or multiple images (video)	Lecture notes	<b>II, P1</b>	Interactive Lectures and Activities	<u>(Synchronous)</u> <u>Asynchronous</u>
	8-9	Applications to 3D modelling	Applications to 3D modelling, video analysis, video surveillance				
5	10-11	Introduction to Deep Learning in Vision	Fundamentals of convolutional neural networks (CNNs) Training methods and popular CNN architectures (AlexNet, VGG, ResNet)	Lecture notes	<b>P1</b>	Interactive Lectures and Activities	<u>(Synchronous)</u> <u>Asynchronous</u>
	12-13	Deep learning for object detection	Deep learning for object detection: R-CNN variants, YOLO, SSD				
6	14	project submission and Presentation Discussion					<u>(Synchronous)</u>
	15-16	<b>Final exam</b>					

#### Assessment Methods and Grading System:

Assessment method	Grade	Metrics/ Rubrics/ Expected performance
<b>I. Individual Work</b>		
Quizzes / Assignments/Activities	15%	Assignments, Discussions, Online Quizzes, Online Asynchronous Activities
Code and report	15%	Report discussion rubric
Mid Exam	30%	Online exam.
Final exam	40%	Online exam.
<b>Total</b>		
	<b>100%</b>	

#### Learning References:

##### **I- Textbook (s):**

Forsyth, David A. and Ponce, Jean, Computer Vision: A Modern Approach, 2nd Edition, Pearson, 2019.  
Szeliski, Richard, Computer Vision: Algorithms and Applications (2nd Ed.), Springer, 2022.

#### **Quality Assurance , Planning and Performance Management Unit**

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<b>2- References:</b>
Gonzalez, Rafael and Woods, Richard, Digital Image Processing, 4th Edition, 2018.
<b>3- Other Resources:</b>
Lectures Notes

### Requirements of the Course

Taken the course 606361

### Course Policies<sup>1</sup>

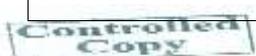
- Attendance Policy: University regulations apply to attendance.
- Academic Honesty: Academic dishonesty is an unacceptable mode of conduct, and will not be tolerated in any form at the University of Petra. All persons involved in academic dishonesty and plagiarism in any form will be disciplined in accordance with university rules and regulations.

### Topics Design:

\*\* Topic number matches the numbers in the course schedule

<b>Topic Number **:</b>	1		
<b>Topic / Chapter title:</b>	Introduction to Computer Vision		
<b>Learning Outcomes targeted:</b>	K1. Identify the different concepts of computer vision , and get familiar with image processing and computer vision programming.		
<b>Resources/ Materials: (Video, Web, game, PDF...)</b>	<ul style="list-style-type: none"> <li>• PowerPoint slide</li> <li>• Interactive lecture</li> </ul>		
<b>Teaching methods ( including Teaching Mode)</b>	<ul style="list-style-type: none"> <li>• Synchronous lectures</li> <li>• Pre class YouTube video (asynchronous)</li> <li>• Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evaluation criteria.			
* Students should be given feedback after each evaluation.			
<b>Assessment Method Type</b>	<b>Grade</b>	<b>Rubric/ performance</b>	<b>Course ILO</b>
Assignment	2		K1
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
<b>Student-to-student interactions</b>	MS Teams in group channels		
<b>Instructor-to- student interactions</b>	<ul style="list-style-type: none"> <li>• Solving examples during the lectures</li> <li>• Answering questions on the posts and lectures</li> </ul>		
<b>Student self assessment:</b>	<ul style="list-style-type: none"> <li>• Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		

Self-based learning	<ul style="list-style-type: none"> <li>• Answering Forum Post (individual).</li> <li>• Choice: check students understanding the topic and get feedback from them</li> </ul>
Student collaboration	<ul style="list-style-type: none"> <li>• Forum (divide student into groups)</li> </ul>
<b>Teaching flow</b> (Describe, step by step, how the lesson will be developed)	
<b>Estimated time</b>	<b>Activity</b>
15minutes	Review Python basics and syntax

<b>Topic Number **:</b>	2		
<b>Topic / Chapter title:</b>	- Image Processing Operations		
<b>Learning Outcomes targeted:</b>	K1. Identify the different concepts of computer vision , and get familiar with image processing and computer vision programming.		
<b>Resources/ Materials:</b> (Video, Web, game, PDF...)	<ul style="list-style-type: none"> <li>• PowerPoint slide</li> <li>• Interactive lecture</li> </ul>		
<b>Teaching methods</b> ( including Teaching Mode)	<ul style="list-style-type: none"> <li>• Synchronous lectures</li> <li>• Solve and submit homework- assignment (asynchronous)</li> <li>• Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evaluation criteria. * Students should be given feedback after each evaluation.			
<b>Assessment Method Type</b>	<b>Grade</b>	<b>Rubric/ performance</b>	<b>Course ILO</b>
Assignment	2		K1
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
<b>Student-to-student interactions</b>	MS Teams in group channels		
<b>Instructor-to- student interactions</b>	<ul style="list-style-type: none"> <li>• Solving examples during the lectures</li> <li>• Answering questions on the posts and lectures</li> </ul>		
<b>Student self assessment:</b>	<ul style="list-style-type: none"> <li>• Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		
Self-based learning	<ul style="list-style-type: none"> <li>• Answering Forum Post (individual).</li> <li>• Choice: check students understanding the topic and get feedback from them</li> </ul>		
Student collaboration	<ul style="list-style-type: none"> <li>• Forum (divide student into groups)</li> </ul>		
<b>Teaching flow</b> (Describe, step by step, how the lesson will be developed)			
<b>Estimated time</b>	<b>Activity</b>		
<b>Quality Assurance , Planning and Performance Management Unit</b>			
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15minutes	Watch vedio on Numpy, very useful to get started with Pandas
15minutes	Assignment

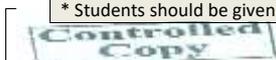
<b>Topic Number **:</b>	2		
<b>Topic / Chapter title:</b>	Feature Extraction		
<b>Learning Outcomes targeted:</b>	II: Design and use image segmentation and feature extraction techniques		
<b>Resources/ Materials: (Video, Web, game, PDF...)</b>	<ul style="list-style-type: none"> <li>• PowerPoint slide</li> <li>• Interactive lecture</li> </ul>		
<b>Teaching methods ( including Teaching Mode)</b>	<ul style="list-style-type: none"> <li>• Synchronous lectures</li> <li>• Solve and submit homework- assignment (asynchronous)</li> <li>• Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evluation criteria. * Students should be given feedback after each evaluation.			
<b>Assessment Method Type</b>	<b>Grade</b>	<b>Rubric/ performance</b>	<b>Course ILO</b>
Assignment	2		K1
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
<b>Student-to-student interactions</b>	MS Teams in group channels		
<b>Instructor-to- student interactions</b>	<ul style="list-style-type: none"> <li>• Solving examples during the lectures</li> <li>• Answering questions on the posts and lectures</li> </ul>		
<b>Student self assessment:</b>	<ul style="list-style-type: none"> <li>• Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		
<b>Self-based learning</b>	<ul style="list-style-type: none"> <li>• Answering Forum Post (individual).</li> <li>• Choice: check students understanding the topic and get feedback from them</li> </ul>		
<b>Student collaboration</b>	<ul style="list-style-type: none"> <li>• Forum (divide student into groups)</li> </ul>		
<b>Teaching flow (Describe, step by step, how the lesson will be developed)</b>			
<b>Estimated time</b>	<b>Activity</b>		
15minutes	Navigate Pandas documnetation website		
15minutes	Assignment		

<b>Topic Number **:</b>	3		
<b>Topic / Chapter title:</b>	Segmentation and Classical Object Detection		



<b>Learning Outcomes targeted:</b>	K1. Identify the different concepts of computer vision , and get familiar with image processing and computer vision programming.		
<b>Resources/ Materials:</b> (Video, Web, game, PDF...)	<ul style="list-style-type: none"> <li>• PowerPoint slide</li> <li>• Interactive lecture</li> </ul>		
<b>Teaching methods</b> ( including Teaching Mode)	<ul style="list-style-type: none"> <li>• Synchronous lectures</li> <li>• Solve and submit homework- assignment (asynchronous)</li> <li>• Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evaluation criteria. * Students should be given feedback after each evaluation.			
<b>Assessment Method Type</b>	<b>Grade</b>	<b>Rubric/ performance</b>	<b>Course ILO</b>
Assignment	2		K1
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
<b>Student-to-student interactions</b>	MS Teams in group channels		
<b>Instructor-to- student interactions</b>	<ul style="list-style-type: none"> <li>• Solving examples during the lectures</li> <li>• Answering questions on the posts and lectures</li> </ul>		
<b>Student self assessment:</b>	<ul style="list-style-type: none"> <li>• Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		
<b>Self-based learning</b>	<ul style="list-style-type: none"> <li>• Answering Forum Post (individual).</li> <li>• Choice: check students understanding the topic and get feedback from them</li> </ul>		
<b>Student collaboration</b>	<ul style="list-style-type: none"> <li>• Forum (divide student into groups)</li> </ul>		
<b>Teaching flow</b> (Describe, step by step, how the lesson will be developed)			
<b>Estimated time</b>	<b>Activity</b>		
15minutes	Review the Series and how to create custom indices		
15minutes	Assignment		

<b>Topic Number **:</b>	3		
<b>Topic / Chapter title:</b>	Introduction to Deep Learning in Vision		
<b>Learning Outcomes targeted:</b>	P1. Apply Deep neural network techniques to in computer vision and object detection		
<b>Resources/ Materials:</b> (Video, Web, game, PDF...)	<ul style="list-style-type: none"> <li>• PowerPoint slide</li> <li>• Interactive lecture</li> </ul>		
<b>Teaching methods</b> ( including Teaching Mode)	<ul style="list-style-type: none"> <li>• Synchronous lectures</li> <li>• Solve and submit homework- assignment (asynchronous)</li> <li>• Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evaluation criteria. * Students should be given feedback after each evaluation.			



Assessment Method Type	Grade	Rubric/ performance	Course ILO
Assignment	2		K1
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
Student-to-student interactions	MS Teams in group channels		
Instructor-to- student interactions	<ul style="list-style-type: none"> <li>Solving examples during the lectures</li> <li>Answering questions on the posts and lectures</li> </ul>		
Student self assessment:	<ul style="list-style-type: none"> <li>Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		
Self-based learning	<ul style="list-style-type: none"> <li>Answering Forum Post (individual).</li> <li>Choice: check students understanding the topic and get feedback from them</li> </ul>		
Student collaboration	<ul style="list-style-type: none"> <li>Forum (divide student into groups)</li> </ul>		
<b>Teaching flow (Describe, step by step, how the lesson will be developed)</b>			
Estimated time	Activity		
15minutes	Import CSV file to Pandas and perform scaling methods (practice)		
15minutes	Assignment		

Topic Number **:	3		
Topic / Chapter title:	Deep learning for object detection		
Learning Outcomes targeted:	P1. Apply Deep neural network techniques to in computer vision and object detection		
Resources/ Materials: (Video, Web, game, PDF...)	<ul style="list-style-type: none"> <li>PowerPoint slide</li> <li>Interactive lecture</li> </ul>		
Teaching methods ( including Teaching Mode)	<ul style="list-style-type: none"> <li>Synchronous lectures</li> <li>Solve and submit homework- assignment (asynchronous)</li> <li>Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, case study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evaluation criteria.			
* Students should be given feedback after each evaluation.			
Assessment Method Type	Grade	Rubric/ performance	Course ILO
Assignment	2		K1
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
Student-to-student interactions	MS Teams in group channels		
Instructor-to- student interactions	<ul style="list-style-type: none"> <li>Solving examples during the lectures</li> <li>Answering questions on the posts and lectures</li> </ul>		

<b>Student self assessment:</b>	<ul style="list-style-type: none"> <li>Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>
<b>Self-based learning</b>	<ul style="list-style-type: none"> <li>Answering Forum Post (individual).</li> <li>Choice: check students understanding the topic and get feedback from them</li> </ul>
<b>Student collaboration</b>	<ul style="list-style-type: none"> <li>Forum (divide student into groups)</li> </ul>
<b>Teaching flow</b> (Describe, step by step, how the lesson will be developed)	
<b>Estimated time</b>	<b>Activity</b>
15minutes	Read about two popular oversampling methods
15minutes	Assignment

<b>Topic Number **:</b>	4		
<b>Topic / Chapter title:</b>	training and evaluation of deep models		
<b>Learning Outcomes targeted:</b>	P1. Apply Deep neural network techniques to in computer vision and object detection		
<b>Resources/ Materials:</b> (Video, Web, game, PDF...)	<ul style="list-style-type: none"> <li>PowerPoint slide</li> <li>Interactive lecture</li> </ul>		
<b>Teaching methods</b> ( including Teaching Mode)	<ul style="list-style-type: none"> <li>Synchronous lectures</li> <li>Solve and submit homework- assignment (asynchronous)</li> <li>Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evaluation criteria. * Students should be given feedback after each evaluation.			
<b>Assessment Method Type</b>	<b>Grade</b>	<b>Rubric/ performance</b>	<b>Course ILO</b>
Assignment	2		K1&l1
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
<b>Student-to-student interactions</b>	MS Teams in group channels		
<b>Instructor-to- student interactions</b>	<ul style="list-style-type: none"> <li>Solving examples during the lectures</li> <li>Answering questions on the posts and lectures</li> </ul>		
<b>Student self assessment:</b>	<ul style="list-style-type: none"> <li>Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		
<b>Self-based learning</b>	<ul style="list-style-type: none"> <li>Answering Forum Post (individual).</li> <li>Choice: check students understanding the topic and get feedback from them</li> </ul>		
<b>Student collaboration</b>	<ul style="list-style-type: none"> <li>Forum (divide student into groups)</li> </ul>		
<b>Teaching flow</b> (Describe, step by step, how the lesson will be developed)			
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Estimated time	Activity
15minutes	Download and read real-life dataset to pandas and perform a simple Statistical analysis as well as extraction of some useful information about the data (count, number of features, etc.)
15minutes	Assignment

Topic Number **:	6		
Topic / Chapter title:	3D reconstruction and recognition from single or multiple images (video)		
Learning Outcomes targeted:			
Resources/ Materials: (Video, Web, game, PDF...)	<ul style="list-style-type: none"> <li>• PowerPoint slide</li> <li>• Interactive lecture</li> </ul>		
Teaching methods ( including Teaching Mode)	<ul style="list-style-type: none"> <li>• Synchronous lectures</li> <li>• Solve and submit homework- assignment (asynchronous)</li> <li>• Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evluation criteria.			
* Students should be given feedback after each evaluation.			
<b>Assessment Method Type</b>	<b>Grade</b>	<b>Rubric/ performance</b>	<b>Course ILO</b>
Assignment	2		K2
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
<b>Student-to-student interactions</b>	MS Teams in group channels		
<b>Instructor-to- student interactions</b>	<ul style="list-style-type: none"> <li>• Solving examples during the lectures</li> <li>• Answering questions on the posts and lectures</li> </ul>		
<b>Student self assessment:</b>	<ul style="list-style-type: none"> <li>• Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		
<b>Self-based learning</b>	<ul style="list-style-type: none"> <li>• Answering Forum Post (individual).</li> <li>• Choice: check students understanding the topic and get feedback from them</li> </ul>		
<b>Student collaboration</b>	<ul style="list-style-type: none"> <li>• Forum (divide student into groups)</li> </ul>		
<b>Teaching flow (Describe, step by step, how the lesson will be developed)</b>			
<b>Estimated time</b>	<b>Activity</b>		
15 minutes	Upload data files on HDFS and perform analysis <ul style="list-style-type: none"> <li>• Word-count</li> <li>• Log analysis</li> </ul>		
2 minutes	Submit the results (assignment)		
<b>Quality Assurance , Planning and Performance Management Unit</b>			
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<b>Topic Number **:</b>	7		
<b>Topic / Chapter title:</b>	<b>Data merging with Spark</b> - Spark DataFrames - Read data using PySpark - Joins using PySpark - Data streams processing (real-time processing)		
<b>Learning Outcomes targeted:</b>			
<b>Resources/ Materials: (Video, Web, game, PDF...)</b>	<ul style="list-style-type: none"> <li>• PowerPoint slide</li> <li>• Interactive lecture</li> </ul>		
<b>Teaching methods ( including Teaching Mode)</b>	<ul style="list-style-type: none"> <li>• Synchronous lectures</li> <li>• Solve and submit homework- assignment (asynchronous)</li> <li>• Group work</li> </ul>		
<b>Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)</b>			
* Students should be given clear written instructions of what is required, how to submit, and evaluation criteria.			
* Students should be given feedback after each evaluation.			
<b>Assessment Method Type</b>	<b>Grade</b>	<b>Rubric/ performance</b>	<b>Course ILO</b>
Assignment	2		K2&l1
<b>Interactions &amp; collaboration: (including Student Engagement)</b>			
<b>Student-to-student interactions</b>	MS Teams in group channels		
<b>Instructor-to- student interactions</b>	<ul style="list-style-type: none"> <li>• Solving examples during the lectures</li> <li>• Answering questions on the posts and lectures</li> </ul>		
<b>Student self assessment:</b>	<ul style="list-style-type: none"> <li>• Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		
<b>Self-based learning</b>	<ul style="list-style-type: none"> <li>• Answering Forum Post (individual).</li> <li>• Choice: check students understanding the topic and get feedback from them</li> </ul>		
<b>Student collaboration</b>	<ul style="list-style-type: none"> <li>• Forum (divide student into groups)</li> </ul>		
<b>Teaching flow (Describe, step by step, how the lesson will be developed)</b>			
<b>Estimated time</b>	<b>Activity</b>		
15 minutes	Read data of different sources using Pyspark and perform joins on them		
2 minutes	Submit the results (assignment)		

Topic Number **:	8		
Topic / Chapter title:	Report and presentation		
Learning Outcomes targeted:	<b>T1: Demonstrate effective oral communication skills. T2: Search, analyze, summarize, and write a comprehensive report for solving real life problems using one of DM tools.</b>		
Resources/ Materials: (Video, Web, game, PDF...)	<ul style="list-style-type: none"> <li>• PowerPoint slide</li> <li>• Interactive lecture</li> </ul>		
Teaching methods ( including Teaching Mode)	<ul style="list-style-type: none"> <li>• Synchronous lectures</li> <li>• Solve and submit homework- assignment (asynchronous)</li> <li>• Group work</li> </ul>		
Assessment Method: (Survey, Quiz, Exam, casse study,.. etc)			
* Students should be given clear written instructions of what is required, how to submit, and evaluation criteria. * Students should be given feedback after each evaluation.			
Assessment Method Type	Grade	Rubric/ performance	Course ILO
Rubric evaluation		15	T1 and T2
Interactions & collaboration: (including Student Engagement)			
Student-to-student interactions	MS Teams in group channels		
Instructor-to- student interactions	<ul style="list-style-type: none"> <li>• Solving examples during the lectures</li> <li>• Answering questions on the posts and lectures</li> </ul>		
Student self assessment:	<ul style="list-style-type: none"> <li>• Self-evaluation training by answering quiz questions more than on time (non-grading quiz)</li> </ul>		
Self-based learning	<ul style="list-style-type: none"> <li>• Answering Forum Post (individual).</li> <li>• Choice: check students understanding the topic and get feedback from them</li> </ul>		
Student collaboration	<ul style="list-style-type: none"> <li>• Forum (divide student into groups)</li> </ul>		
Teaching flow (Describe, step by step, how the lesson will be developed)			
Estimated time	Activity		
-	Prepare a report and create a presentation of a project  Perform analysis on a real-life dataset  introduce your work in front on students in the classroom		