



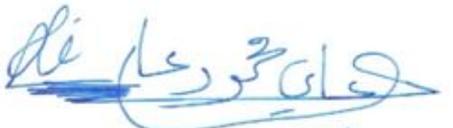
# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية



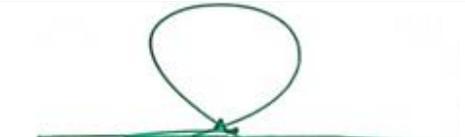
Module Information			
معلومات المادة الدراسية			
Module Title	Data Science		Module Delivery
Module Type	C		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar
Module Code	AI1201		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	1	Semester of Delivery	
Administering Department	AI	College	CSIT
Module Leader	Ali Mahmoud Ali	e-mail	<a href="mailto:ali.mahmoud@uowa.edu.iq">ali.mahmoud@uowa.edu.iq</a>
Module Leader's Acad. Title	Assist lecturer	Module Leader's Qualification	MS.c
Module Tutor	Ali Mahmoud Ali	e-mail	<a href="mailto:ali.mahmoud@uowa.edu.iq">ali.mahmoud@uowa.edu.iq</a>
Peer Reviewer Name	Mahmood Jaseem	e-mail	<a href="mailto:mahmood.jassem@uowa.edu.iq">mahmood.jassem@uowa.edu.iq</a>
Scientific Committee Approval Date	01/03/2026	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	--
Co-requisites module	None	Semester	--

  
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Department Head Approval



  
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Dean of the College Approval

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<b>Module Objectives</b> أهداف المادة الدراسية	This course has been designed to help learners to understand the core concepts and applications of Data Science and Familiarize them with essential data manipulation and visualization techniques. Various data sources and collection methods will be explored in this course to enable learners develop skills in data cleaning and preprocessing. It is anticipated that learners, at the end of this course, will be able to effectively communicate data insights and build data narratives by creating reports and visualizations for data communication.
<b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية	Upon completion of this course, learners will be able to: <ol style="list-style-type: none"><li>1. <b>Data Acquisition &amp; Ingestion:</b> Programmatically retrieve data from diverse sources including SQL databases, NoSQL stores, web APIs, and unstructured files.</li><li>2. <b>Advanced Data Wrangling:</b> Perform complex data transformations, feature engineering, and handling of missing or biased data using professional libraries (e.g., Pandas, Polars).</li><li>3. <b>Statistical Inference:</b> Apply <math>p</math>-values, confidence intervals, and Bayesian logic to determine the significance of observed data trends.</li><li>4. <b>Exploratory Analysis (EDA):</b> Identify hidden correlations and multivariate relationships using statistical summaries and diagnostic plotting.</li><li>5. <b>Supervised Learning:</b> Build and optimize regression and classification pipelines using frameworks like Scikit-Learn to predict continuous and categorical outcomes.</li><li>6. <b>Unsupervised Learning:</b> Implement clustering and dimensionality reduction techniques (e.g., K-Means, PCA) to discover latent structures in unlabeled data.</li><li>7. <b>Model Evaluation &amp; Tuning:</b> Quantify model performance using metrics like RMSE, F1-Score, and ROC-AUC, while refining models through hyperparameter optimization.</li><li>8. <b>Data Visualization &amp; Dashboarding:</b> Design compelling, interactive dashboards using tools like Tableau, Power BI, or Polly to communicate complex narratives.</li><li>9. <b>Data Ethics &amp; Privacy:</b> Navigate the legal and ethical landscape of data science, focusing on GDPR compliance, algorithmic fairness, and data anonymization.</li><li>10. <b>Scientific Communication:</b> Translate technical findings into concise executive summaries and oral presentations tailored for diverse business audiences.</li><li>11. <b>Professional Portfolio (Capstone):</b> Manage a full-scale data science project from problem definition to deployment, showcasing a mastery of the end-to-end data lifecycle.</li></ol>
<b>Indicative Contents</b> المحتويات الإرشادية	<ul style="list-style-type: none"><li>• Definition and scope of Data Science.</li><li>• Data preprocessing: encoding, scaling, and normalization.</li><li>• Data cleaning techniques: handling missing data, data formatting.</li><li>• Descriptive statistics: mean, median, variance, skewness.</li><li>• Exploratory data analysis techniques: box plots, scatter plots, histograms.</li></ul>

	<ul style="list-style-type: none"> <li>Correlation Analysis, Analysis of variance, and non-parametric statistical tests.</li> <li>Time series data exploration.</li> <li>Data extraction and manipulation using SQL.</li> <li>Data wrangling techniques: filtering, merging, pivoting</li> <li>Ethical considerations in data collection and analysis.</li> <li>Building data narratives and reports.</li> <li>Applying data science skills to a real-world project.</li> </ul>
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Hands-on Practical Exercises Case Studies and Real-World Examples Collaborative Learning Continuous Assessment and Feedback

Student Workload (SWL) الحمل الدراسي للطلاب محسوب ل ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	57	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	15% (10)	2,3,5,8,12	LO #1, #2 and #10, #11
	Assignments	5	10% (10)	3,4,6,9,11	LO #3, #4 and #6, #7
	Projects / Lab.	10	10% (10)	Continuous	All
	Report	1	5% (5)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

## Delivery Plan (Weekly Syllabus)

### المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Data Science
Week 2	Data and information
Week 3	Data analytics Lifecycle
Week 4	Data Collection and Cleaning
Week 5	Exploratory Data Analysis (EDA)
Week 6	Data Visualization
Week 7	Statistical Analysis
Week 8	Time Series Analysis
Week 9	Data Wrangling
Week 10	Feature Engineering
Week 11	Data Ethics and Privacy
Week 12	Data Storytelling and Communication
Week 13	Capstone Project
Week 14	SQL and Databases for Data Science
Week 15	Project Presentations and Wrap-up

## Delivery Plan (Weekly Lab. Syllabus)

### المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Data Collection and Cleaning
Week 2	Exploratory Data Analysis (EDA)
Week 3	Data Visualization
Week 4	Statistical Analysis
Week 5	Time Series Analysis
Week 6	Data Wrangling

<b>Week 7</b>	Feature Engineering
<b>Week 8</b>	Data Ethics and Privacy
<b>Week 9</b>	Data Storytelling and Communication
<b>Week 10</b>	Capstone Project

### Learning and Teaching Resources

#### مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Introducing Data Science, Davy Cielen, Anro DB Meysman, Mohamed Ali	No
<b>Recommended Texts</b>	Data Science Job: How to Become a Data Scientist, Przemek Chojcki	No
<b>Websites</b>	<a href="#">The Data Science Course: Complete Data Science Bootcamp 2026</a>	

### Grading Scheme

#### مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
<b>Success Group (50 - 100)</b>	<b>A - Excellent</b>	امتياز	90 - 100	Outstanding Performance
	<b>B - Very Good</b>	جيد جدا	80 - 89	Above average with some errors
	<b>C - Good</b>	جيد	70 - 79	Sound work with notable errors
	<b>D - Satisfactory</b>	متوسط	60 - 69	Fair but with major shortcomings
	<b>E - Sufficient</b>	مقبول	50 - 59	Work meets minimum criteria
<b>Fail Group (0 - 49)</b>	<b>FX – Fail</b>	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	<b>F – Fail</b>	راسب	(0-44)	Considerable amount of work required

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.