MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Data Science**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**AI1201**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	AI		**College**	CSIT	
Module Leader	Ali Mahmoud Ali		**e-mail**	ali.mahmoud@uowa.edu.iq	
Module Leader's Acad. Title	Assist lecturer		**Module Leader's Qualification**	MS.c	
Module Tutor	Ali Mahmoud Ali		**e-mail**	ali.mahmoud@uowa.edu.iq	
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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**	--

Department Head Approval

Dean of the College Approval

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives **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.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	Upon completion of this course, learners will be able to: 1. **Data Acquisition & Ingestion:** Programmatically retrieve data from diverse sources including SQL databases, NoSQL stores, web APIs, and unstructured files. 2. **Advanced Data Wrangling:** Perform complex data transformations, feature engineering, and handling of missing or biased data using professional libraries (e.g., Pandas, Polars). 3. **Statistical Inference:** Apply p-values, confidence intervals, and Bayesian logic to determine the significance of observed data trends. 4. **Exploratory Analysis (EDA):** Identify hidden correlations and multivariate relationships using statistical summaries and diagnostic plotting. 5. **Supervised Learning:** Build and optimize regression and classification pipelines using frameworks like Scikit-Learn to predict continuous and categorical outcomes. 6. **Unsupervised Learning:** Implement clustering and dimensionality reduction techniques (e.g., K-Means, PCA) to discover latent structures in unlabeled data. 7. **Model Evaluation & Tuning:** Quantify model performance using metrics like RMSE, F1-Score, and ROC-AUC, while refining models through hyperparameter optimization. 8. **Data Visualization & Dashboarding:** Design compelling, interactive dashboards using tools like Tableau, Power BI, or Polly to communicate complex narratives. 9. **Data Ethics & Privacy:** Navigate the legal and ethical landscape of data science, focusing on GDPR compliance, algorithmic fairness, and data anonymization. 10. **Scientific Communication:** Translate technical findings into concise executive summaries and oral presentations tailored for diverse business audiences. 11. **Professional Portfolio (Capstone):** Manage a full-scale data science project from problem definition to deployment, showcasing a mastery of the end-to-end data lifecycle.
Indicative Contents **المحتويات الإرشادية**	● Definition and scope of Data Science. ● Data preprocessing: encoding, scaling, and normalization. ● Data cleaning techniques: handling missing data, data formatting. ● Descriptive statistics: mean, median, variance, skewness. ● Exploratory data analysis techniques: box plots, scatter plots, histograms.

	• Correlation Analysis, Analysis of variance, and non-parametric statistical tests. • Time series data exploration. • Data extraction and manipulation using SQL. • Data wrangling techniques: filtering, merging, pivoting • Ethical considerations in data collection and analysis. • Building data narratives and reports. • Applying data science skills to a real-world project.

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 للطالب محسوب لـ ١٥ اسبوعا**			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	93	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	6
Unstructured SWL (h/sem) **الحمل الدراسي غير المنتظم للطالب خلال الفصل**	57	**Unstructured SWL (h/w)** **الحمل الدراسي غير المنتظم للطالب أسبوعيا**	4
Total SWL (h/sem) **الحمل الدراسي الكلي للطالب 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

Week 7	Feature Engineering
Week 8	Data Ethics and Privacy
Week 9	Data Storytelling and Communication
Week 10	Capstone Project

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Introducing Data Science, Davy Cielen, Anro DB Meysman, Mohamed Ali	No
Recommended Texts	Data Science Job: How to Become a Data Scientist, Przemek Chojecki	No
Websites	The Data Science Course: Complete Data Science Bootcamp 2026	

Grading Scheme
مخطط الدرجات

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