

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Engineering Statistics		Module Delivery
Module Type	FE		<input type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	CREQ 220		
ECTS Credits	5.00		
SWL (hr/sem)	125		
Module Level	2	Semester of Delivery	
Administering Department	Type Dept. Code	College	Type College Code
Module Leader	١١١١	e-mail	ladil.abed@muc.edu.iq
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	12/06/2023	Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives أهداف المادة الدراسية</p>	<ol style="list-style-type: none">1. To apply statistical methods and techniques for analyzing, interpreting and presenting data in engineering applications.2. To use statistical tools such as hypothesis testing, regression analysis, analysis of variance (ANOVA), and design of experiments (DOE) for optimization, quality control, and decision making in engineering.3. To understand the principles and assumptions of probability theory and statistical inference and apply them to solve real-world engineering problems.4. To develop skills in data analysis and visualization using statistical software packages such as Excel.
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none">1. Data collection and analysis: Civil engineers continually collect data and use it to make important decisions, from designing structures to making project cost evaluations. Knowing engineering statistics helps engineers properly analyze and interpret the available data.2. Understanding variability: Civil engineering projects often involve working with large datasets affected by various types of variability. Engineers trained in statistics can identify and interpret the sources of variability in their data, and develop solutions to manage them.3. Risk assessment and management: Civil engineering projects have many potential risks associated with them, from functional failures to budget overruns. Using statistical techniques can help in identifying and mitigating such risks.4. Predictive modelling: Engineers often need to make predictions about how a project will perform, such as estimating the useful life of a bridge or predicting how pavement will wear. Statistics helps in testing hypotheses and develop models to make accurate predictions.5. Benchmarking and quality control: Engineers often must deal with high-stakes and complex engineering problems. Having a statistics background enables engineers to benchmark their processes and evaluate the effectiveness of their operations. Overall, learning engineering statistics is an important requisite for all civil engineers, as it helps them collect, analyze, and interpret data, and apply that understanding to solve real-world problems.
<p>Indicative Contents المحتويات الإرشادية</p>	<p>Indicative content includes the following.</p> <ul style="list-style-type: none">• Probability theory: The study of the chances of a particular outcome in an engineering process or system.• Descriptive statistics: The use of statistical methods to summarize and describe the various properties of a data set, such as mean, median, mode, variance, and standard deviation• Inferential statistics: The use of statistical methods to make inferences about a population based on a sample

	<ul style="list-style-type: none"> • Time series analysis: The study of the behavior of a phenomenon over time, including forecasting future values Experimental design The process of designing experiments to determine the effectiveness of a particular treatment or product

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	<ol style="list-style-type: none"> 1. Active learning: Engineering statistics involves a lot of data analysis and interpretation, which require students to engage actively in the learning process by working on case studies, projects, and real-world problems. 2. Experimental learning: Engineering statistics courses often include hands-on experiments and simulations to help students understand statistical concepts, as well as the strengths and limitations of different data analysis methods. 3. Classroom discussion: Students are encouraged to participate in classroom discussions and debates to promote critical thinking and problem-solving skills. 4. Technology integration: The use of computer-based statistical software is essential in engineering statistics, and should be integrated into the teaching and learning processes to prepare students for real-world applications. 5. Assessment: Students are assessed using a variety of strategies, such as exams, quizzes, projects, and presentations, to evaluate their understanding of statistical concepts and applications.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

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

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Review of Statistics , Introduction , definitions.
Week 2	Data Presentation, Tables, Graphical.
Week 3	Frequency Distribution, Relative Frequency, Cumulative Frequency , Frequency Histogram , Frequency Polygon, Frequency Curve, Frequency Cumulative Polygon.
Week 4	Forms of Distributions.
Week 5	Measures of Central Tendency (Arithmetic Mean, Geometric Mean, Harmonic Mean, Mean of Mean, Meadian, Mode).
Week 6	Measures of Dispersion (Range, Mean Deviation, Varaince, Mean Deviation, Standard Deviation , Standard Error.)
Week 7	Measures of Skeweness, Kurtosis.
Week 8	Random Variables and Probability Distributions (Discreet probability distribution, mathematical expectations, Binomial Distribution, Poisson Distribution, Continuous Probability Distribution, Normal Distribution, Standard normal distribution, t-distribution, chi-square distribution, f-distribution).
Week 9	Sampling Theory(sampling methods, sampling distribution of sample means, central limit theorem, distribution of the difference between two sample means, distribution of proportions, distribution of two sample variances).
Week 10	Confidence Limits of Mean (Confidence limits of variances).
Week 11	Testing Hypothesis (test about means, tests about variances, goodness' of fit test).

Week 12	Correlation(linear correlation, partial correlation, multiple correlation, significance of correlation).
Week 13	Regression(single linear regression, single non-linear regression, linear multiple regression, non-linear multiple regression)
Week 14	Stochastic Models (time series analysis.
Week 15	Viewport
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	"Applied Statistics and Probability for Engineers"	Yes
Recommended Texts	"Introduction to Statistical Data Analysis" Peak, Olsen, Devone	No
Websites	http://www.math.jyu.fi/~geiss/teaching_S_08.html	

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.