



Ministry of Higher Education and
Scientific Research - Iraq
Northern Technical University
Engineering Technical College/Mosul
Department of Cyber security and Cloud
Computing Techniques Engineering



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Introduction to Probability and Statistics		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar	
Module Code	BCYSCE106-S2			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	1	Semester of Delivery		2
Administering Department	CYSCE	College	TECM	
Module Leader	Asst. Lecturer Afaf Nasser		e-mail	E-mail
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	MSc	
Module Tutor			e-mail	Afaf.nasser@ntu.edu.iq
Peer Reviewer Name			e-mail	E-mail
Scientific Committee Approval Date	20/06/2023	Version Number	1.0	

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MATHEMATICS (BCYSCE100-S1)	Semester	1
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	<ol style="list-style-type: none"> 1. Understand the basic concepts: Students should be able to define and understand key concepts in probability, such as events, outcomes, sample space, probability, and random variables. 2. Comprehend probability laws: Students should become familiar with the laws and rules of probability. 3. Solve probability problems: Students should be able to solve probability problems using both theoretical calculations and practical applications, such as calculating probabilities of events, determining expected values, and understanding the law of large numbers. 4. Understand independence and dependence: Students should learn the concepts of independence and dependence between events and random variables, and how they affect probability calculations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<ol style="list-style-type: none"> 1. Understand the basic concepts and terminology used in probability and statistics. 2. Comprehend the fundamental principles of probability theory, including probability axioms, random variables, and probability distributions. 3. Analyze and interpret data using descriptive statistics, including measures of central tendency (mean, median, mode) and variability (variance, standard deviation). 4. Understand the concept of sampling and its importance in statistical inference. 5. Apply basic regression analysis techniques to examine relationships between variables. 6. Understand the limitations and assumptions associated with various statistical methods. 7. Use statistical software or programming languages to analyze and visualize data.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	<ol style="list-style-type: none"> 1. Understanding the problem: Begin by reading and understanding the problem statement carefully and identifying key information, variables, and what is required. 2. Define the problem in probabilistic terms: Determine how the problem can be translated into a probabilistic framework. 3. Use appropriate probability models: Determine the appropriate probability model or distribution that best represents the problem at hand. 4. Break down complex problems: If a problem seems complex, it should be broken down into smaller, easier-to-handle parts.
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Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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	3	10% (10)	5, 8 and 10	LO #1, #2 and #10, #11
	Assignments	5	10% (10)	2,4,8,9,10	LO #3, #4 and #6, #7
	Projects / Lab.	15	10% (10)	Continuous	All
	Report	1	5% (5)	13	LO #5, #8 and #10
	Seminar	1	5% (5)	10	LO #7, #9 and #13
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 Statistics <ul style="list-style-type: none"> An overview of the role of statistics in science. types of statistics (descriptive and inferential).
Week 2	Introduction to Statistics <ul style="list-style-type: none"> data presentation. (arithmetical mean, median, mode).
Week 3	Introduction to Statistics

	<ul style="list-style-type: none"> • exploring Univariate Data, types of data. • mean and median, standard Deviation and Variance.
Week 4	Introduction to Statistics <ul style="list-style-type: none"> • range, IQR and Finding Outliers. • graphs and Describing Distributions. • Overview of software security and defense practices
Week 5	Introduction to Probability <ul style="list-style-type: none"> • Introduction to Probability. • Counting Techniques. • combinations and Permutations
Week 6	Introduction to Probability <ul style="list-style-type: none"> • sets and Venn Diagrams. • basic probability models. • general probability rules.
Week 7	probabilistic models <ul style="list-style-type: none"> • Introduction to discrete distributions. • random variables. • binomial distributions.
Week 8	probabilistic models <ul style="list-style-type: none"> • geometric distributions. • continuous distributions. • density curves.
Week 9	probabilistic models <ul style="list-style-type: none"> • Introduction to Suricata. • Installation and configuration of Suricata. • Rulesets, and signatures. • Understanding the rules and rule management
Week 10	Normal Distribution <ul style="list-style-type: none"> • Introduction to normal distribution. • Standard Normal Calculations. • density curves.

	<ul style="list-style-type: none"> bivariate data.
Week 11	Axioms of probability <ul style="list-style-type: none"> Scatter plots, the least squares regression line, residuals, nonlinear models. relations in categorical data, Samples and experiments: sampling, designing experiments. simulating experiments, estimation: margins of error and estimates.
Week 12	Confidence Interval <ul style="list-style-type: none"> confidence interval for a proportion, confidence interval for the difference of two proportions. confidence interval for a mean, confidence interval for the difference of two means.
Week 13	Axioms of probability <ul style="list-style-type: none"> Tests of significance, inference for the mean of a population. sample proportions. inference for a population proportion.
Week 14	Comparing Two Means, comparing two proportions, goodness of fit test and two-way tables, inference for regression, confidence intervals, test for slope of regression lines.
Week 15	Review
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to R
Week 2	Lab 2: Data structures in R programming (Vectors, Matrices, Array)
Week 3	Lab 3: Data structures in R programming (Lists, Data Frame, Factor)
Week 4	Lab 4: Data type
Week 5	Lab 5: R-decision making, R-loops, loop control statements
Week 6	Lab 6: Functions in R.
Week 7	Lab 7: R-Operators (Arithmetic operators, Relational operators, Logical operators, Assignment Operator)
Week 8	Lab 8: Graphics
Week 9	Lab 9: Importing and Exporting Data.
Week 10	Lab 10: Distribution types

Week 11	Lab 11: Package Building
Week 12	Lab 12: Advanced package Building
Week 13	Lab 13: Data Manipulation
Week 14	Lab 14: Data Transformation
Week 15	Lab 15: Review and presentation
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Freund, J. E. (2012). <i>Introduction to probability</i> . Courier Corporation.	Yes
Recommended Texts	Pishro-Nik, H. (2016). <i>Introduction to probability, statistics, and random processes</i> .	Yes
Websites		

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.				