جمهورية مصر العربية
وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education and Scientific Research

SH. A.
أكاديمية الشروق

المعهد العالى للحاسبات وتكنولوجيا المعلومات
مدينة الشروق - القاهرة
شعبة علوم الحاسب

Course specification

Course Code: BS 210

Course Title: Probability and Statistics

Academic Year: 2023 /2024

Course specification
(BS 210 Probability and Statistics)

Course Outline	
Faculty :	*HICIT- (**Higher Institute for Computers & Information Technology**-El Shorouk Academy)*
Programme(s) on which the course is given:	Undergraduate program in Computer Science
Major or minor element of programme:	Core
Department offering the program	Department of Computer Science
Department offering the course:	Department of Computer Science
Level	2nd Year – 2nd Semester
Date of specification approval	DD/MM/YYYY

Basic Information				
Code:	BS 210	***Title:***	Probability and Statistics	
Prerequisites:	BS 101 Calculus			
Weekly Hours:				
Lecture: 2	**Exercise:** ٢	**Practical :** -	**Total:** 3 credit hours	

Professional Information

Course Aims:

This course introduces the techniques

• Understand the principles of probability theories and basic of statistics.

• Understand methods of processing statistical data .

• Studying probability and statistics will allow you to see the world from an entirely different perspective, since the subject will give you the tools to model and analyze situations, which involve uncertainty.

•Understand the application of statistical data.

Program ILOs Covered by Course			
Knowledge and understanding	**Intellectual Skills**	**Professional and practical skills**	**General and Transferable skills**
A1,A4	B1 ,B5, B8, B13, B14	C16	D1,D2,D3,D8

Intended learning outcomes of course (ILOs)

a. Knowledge and Under-Standing:

a1- Understand the basic principles of probability including ways of assigning probability, distinguish between continuous and discrete. Understands Categories of probability distributions of discrete and continuous outcomes. Mean and variance for both discreet and continuous

a2- Understand concepts of Binomial, Poisson, and Geometric distributions as well as Uniform, Exponential, and Normal distributions.

a3- Understand the logic of hypothesis testing and know how to establish null and alternative hypotheses.

a4- Introduce the world of statistics ,and become aware of wide range of applications of it in business and science .

a5- Know how to classify numbers by level of data and understand why doing so is important. Moreover, recognize the difference between grouped and ungrouped data, and knew how to construct a frequency distribution and histogram, pie chart, a stem and leaf plot.

a6- Know how to use statistical techniques to describe data.

a7- Distinguish between measures of central tendency techniques, measures of variability, measures of shape and measures of association .

b. Intellectual Skills:

b1- Apply the principles of probability to assigning probability.

b2- Select the appropriate law of probability to use in solving problems and verify and analyze the obtained solution.

B3- Apply statistical techniques to classify and describe data.

B4 -Apply the fundamental laws of statistics to draw conclusions about scientific systems and drive requirements from the problems which need to be solved.

C .Professional and practical skills

c1- Use full range of a numerical and graphical methods that allow users to analyze and gain insights from any data set.

c2- Use calculus and other types of mathematical support to obtain the solution.

c3- Apply the principles of probability and statistics to the real-life problems in business, economy, engineering medicine and computer science.

D. General and transferable skills

d1-Predict the results using based on likelihood for practical problems.

d2- Make Statistical analysis for projects.

d3 – Have ability for thinking and making decision.

d4– Presents reports in statistical forms for different domains.

Contents		
Topic	**Contact Hours**	
	lecture	**Ex/Lab**
Introduction to probability, random Experiment , sample space , event , set theory and Venn Diagram . Some illustrated examples.	2	2
Axioms of Probability (complement, Intersction, General addition rule , mutually exclusive events ,difference ,….independent events. Some illustrated examples	2	2
Conditional probability, independence , selection with replacement and without replacement. Some illustrated examples.	2	2
Total probability , Bays" Theorem with proof and Some illustrated examples.	2	2
Random Variables , Discrete random variables ,discrete probability distribution function ,The cumulative distribution function , Mean ,Variance and Covariance. Some illustrated examples.	2	2
Properties of mean and variance for discrete random variables , Some discrete distributions : Binomial distribution, Poisson distribution and Geometric distribution . Some illustrated examples	2	2
Continuous random variables ,Continuous probability distribution function ,The cumulative distribution function, Mean ,Variance and Covariance . Some illustrated examples.	2	2
Properties of mean and variance for continuous random variables. Some continuous distributions: Uniform distribution Exponential distribution, Normal distribution . Some illustrated examples.	2	2
Introduction to statistics : Descriptive Statistics, inferential statistics , Variables , Levels of measurement , Distributions and construct a grouped frequency distribution for continuous variable . Some illustrated examples	2	2
Graphing distribution : steam and leaf ,histograms, frequency polygons, box plots ,bar charts ,line graphs, dot plots	2	2
Measures of Central Tendency : mean , median , mood, additional measures of central tendency and comparing measures. Some illustrated examples.	2	2
Measures of variability: range , inter-quartile range , variance and stander deviation Some illustrated examples.	2	2
correlation and Shapes of distributions. Some illustrated examples.	2	2
Hypothesis testing and confidence intervals using the normal distribution, interpreting sampled data using the normal distribution , the central limit theorem . confidence intervals. Some illustrated examples.	2	2

Teaching and learning methods	
Teaching and learning methods	**Used**
Lectures	√
Tutorial Exercises	√
Practical Lab	
Discussions.	√

Self – Learning (Reading material, Websites search,)	√
Self-studies	√
Group work	√
Presentation	
Problem solving/problem solving learning based	√
Case study	
E-Learning	√
Video lectures	√

Student assessment methods & Schedule		
Methods	**Used**	**Week#**
Midterm Exam	√	**8**
Final Exam	√	**16**
Course Project		
Course Work & Quizzes	√	**2-14**
Practical Exam		

Assessment Weight	
Assessment	Weight %
Mid Term Exam	20
Practical Exam and Project	
Final Exam	60%
Course Work & Quizzes	20%
Total	100

Course Work &Quizzes
Short Exams, Assignments, Research, Reports, Presentations
Class/Project discussion

List of references	
Essential books (textbooks)	-Ross, Sheldon M. Introduction to probability and statistics for engineers and scientists. Academic press, 2020. - Jim Frost Introduction to Statistics: An Intuitive Guide for Analyzing Data and Unlocking Discoveries . **State college, Pennsylvania ,2020** -Bruce Hansen, Probability and Statistics for Economists, **Princeton University Press, 2022**

Course notes	E-Learning Portal
Periodicals, website	
Videos link	

Required Facilities		
Tools & SW (Technology facilities):	-Microsoft TEAMS to create virtual classrooms for lectures, discussions -portal (MOODLE) to make electronic quizzes and electronic midterm exam -portal (MOODLE) to upload lectures and assignments - academy portal (MOODLE) to upload electronic material	
Teaching facilities:	Whiteboard	√
	Computer Lab	√
	Data show	√
	E-Learning	√
	Videos	√
	Website	√

Course Content/ILO Matrix

Course Contents	**Knowledge & understanding**							**Intellectual skills**				**Professional and practical skills**			**General and transferable skills**			
	a1	**a2**	**a3**	**a4**	**a5**	**a6**	**a7**	**b1**	**b2**	**b3**	**b4**	**c1**	**c2**	**c3**	**d1**	**d2**	**d3**	**d4**
Introduction to probability. Some illustrated examples.	√	√						√	√			√		√				
Axioms of Probability	√	√						√	√	√	√	√		√				
Conditional probability, independence ,	√	√						√	√	√	√	√		√		√		

Total probability , Bays" Theorem	√	√						√	√	√	√	√		√				
Random Variables , probability distribution	√	√	√	√	√			√	√	√	√	√		√				
Properties of mean , variance, Some discrete distributions	√		√	√	√	√		√	√	√	√	√		√		√		
Introduction to statistics								√	√	√	√	√		√	√	√		
Graphing distribution	√							√	√		√	√		√	√	√		
Measures of Central Tendency	√							√	√		√	√		√	√	√		
Measures of variability.	√							√	√		√	√		√	√	√		
correlation and Shapes of distributions.	√							√	√	√	√	√		√	√	√		
Hypothesis testing and confidence intervals using the normal distribution,	√							√	√		√	√		√		√		

Learning Method /ILO Matrix																		
Learning Method	**Knowledge & understanding**							**Intellectual skills**				**Professional and practical skills**			**General and transferable skills**			
	a1	**a2**	**a3**	**a4**	**a5**	**a6**	**a7**	**b1**	**b2**	**b3**	**b4**	**c1**	**c2**	**c3**	**d1**	**d2**	**d3**	**d4**
Lectures	√	√						√	√			√		√				
Tutorial Exercises	√	√						√	√	√	√	√		√				
Reading material	√	√						√	√	√	√	√		√		√		
Websites search	√	√						√	√	√	√	√		√				
Research and reporting	√	√	√	√	√			√	√	√	√	√		√				
Problem solving	√		√	√	√	√		√	√	√	√	√		√		√		
Group work								√	√	√	√	√		√	√	√		
Discussions.	√							√	√		√	√		√	√	√		

Assessment Methods /ILO Matrix																		
Assessment Methods	**Knowledge & understanding**							**Intellectual skills**				**Professional and practical skills**			**General and transferable skills**			
	a1	**a2**	**a3**	**a4**	**a5**	**a6**	**a7**	**b1**	**b2**	**b3**	**b4**	**c1**	**c2**	**c3**	**d1**	**d2**	**d3**	**d4**
Mid Term Exam	√	√						√	√			√		√				
Final Exam	√	√						√	√	√	√	√		√				
Course Work &Quizzes	√	√						√	√	√	√	√		√		√		

Course ILOs Vs Program ILOs													
Prog ILOs / Course ILOs		Knowledge & understanding		Intellectual skills					Professional and practical skills	General			
		A1	A4	B1	B5	B8	B13	B14	C16	D1	D2	D3	D8
Knowledge and Understanding	a1	X	X										
	a2	X	X										
	a3	X	X										
	a4	X	X										
	a5	X	X										
	a6	X	X										
	a7	X	X										
Intellectual skills	b1			X		X	X						
	b2			X			X	X					
	b3				X	X	X	X					
	b4							X					
Professional and practical skills	c1								X				
	c2								X				
	c3								X				
General skills	d1									X	X		
	d2										X		
	d3											X	X
	d4											X	X

Course Coordinator: Dr. Nisreen Yassen ( )

Head of Department: Pro. Dr. Ahmed El Abassy ( )

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