هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification
(Bachelor)

Course Title:	**Introduction to Probability and Statistics**
Course Code:	**STA 1111**
Program:	**Bachelor of Science in Physics**
Department:	**Physics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**7 October 2024**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (.....)					
3 (2 Lectures, 0 Lab, 2 Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Program	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (.....)					
Level 2 / Year 1					
4. Course General Description:					
This course describes the most important ideas, theoretical results, and examples of descriptive statistics, counting, random variables, probability distributions, simple linear regression and sampling distribution. The course includes the essential fundamentals of these topics. The emphasis is on calculations, and some applications are mentioned. The use of Microsoft Excel software is essential for the descriptive statistics and linear regression.					
5. Pre-requirements for this course (if any):					
MAT 1101					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
• To develop students' abilities to analyze and interpret data using various statistical methods, including measures of central tendency, variability, and correlation. • To find the linear regression lines of scattered points in the plane. • To equip students with a solid understanding of the fundamental concepts of probability, including events, sample spaces, and the axioms of probability. • To familiarize students with common probability distributions (e.g., binomial, geometric, hypergeometric, normal) and their applications in real-world scenarios. • Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	***Traditional classroom***	60	100%
2	**E-learning**	0	0%
3	**Hybrid** • Traditional classroom • E-learning	0	0%
4	**Distance learning**	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	6
3.	Field	0
4.	Tutorial	24
5.	Others (specify)	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	To state the principles of descriptive.	K1, K2	2 lecture hours per week 2 tutorial hours per week Self-study	**Direct:** Practical assessments Regular Exams Homework assignments
1.2	To demonstrate an understanding of basic probability concepts and theorems.	K1, K2	2 lecture hours per week 2 tutorial hours per week Self-study	**Direct:** Practical assessments Homework assignments
1.3	To define some special distributions (discrete and continuous)	K1, K2	2 lecture hours per week 2 tutorial hours per week Self-study	**Direct:** Practical assessments Regular Exams Homework assignments
2.0	Skills			
2.1	To analyze data sets using appropriate statistical methods.	S1, S3	2 lecture hours per week 2 tutorial hours per week Self-study Real-life problems	**Direct:** Practical assessments Regular Exams Homework assignments
2.2	To solve problems involving probability and randomness.	S1, S3	2 lecture hours per week 2 tutorial hours per week Self-study Real-life problems	**Direct:** Practical assessments Regular Exams Homework assignments
2.3	To evaluate critically the results and methodologies	S3, S4	Group discussions and debates on the interpretation	**Direct:** Practical assessments Homework assignments
3.0	Values, autonomy, and responsibility			
3.1	To operate effectively in team-based assignments involving descriptive statistics and probability.	V1, V2, V3	Group discussions and debates on the interpretation	**Direct:** Homework assignments Mini-projects

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.2	**To illustrate statistical concepts and results in written and oral formats**		2 tutorial hours per week Self-study Real-life problems	**Direct:** Homework assignments Mini-projects

C. Course Content

No	List of Topics	Contact Hours
1.	**Descriptive Statistics:** Definitions, Need of Statistics & Statistical Problem-Solving Methodology & Introduction to Data Collection, Data Organization and Frequency Distributions, Graphic Presentations of Frequency Distributions, Computing Measures of Central Tendency, Computing Measures of Dispersion and Relative Position. ***Applications using Microsoft Excel***.	**10**
2.	**Simple Linear Regression and Correlation:** Correlation, Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model. ***Applications using Microsoft Excel***.	**8**
3.	**Probability:** Some Basic Considerations, Events, Counting Sample Point, Interpretations of Probability, Addition Rules, Conditional Probability, Multiplication and Total Probability Rules, Independence, Bayes' Theorem.	**10**
4.	**Random Variables and Probability Distribution:** Concept of Random Variable, Discrete Random Variables and Probability Distributions, Continuous Random Variables and Probability Distributions, Mean of Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear combinations of Random Variables.	**12**
5.	**Some Discrete Probability Distributions:** Bernoulli & Binomial Distribution, Hypergeometric Distribution, Geometric and Negative Binomial Distributions, Poisson Distribution.	**10**
6.	**Some Continuous Probability Distributions:** Continuous Uniform Distribution, Gamma and Exponential Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial.	**10**
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**HomeWorks, Quizzes, Mini projects**	**During the term**	**10%**
2.	**First Midterm**	**Week 5-6**	**25%**
3.	**Second Midterm**	**Week 10-11**	**25%**
4.	**Final Exam**	**Week 16-17**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	***Probability & Statistics for Engineers & Scientists***, 8th Edition, R. Walpole, R. Myers, S. Myers, K. Ye, Pearson Education International, 2007. **(Main Reference)**
Supportive References	▪ ***Introduction to Probability and Statistics***; 14th Edition, W. Mendenhall, R. J. Beaver, Barbara M. Beaver, Duxbury Press, 2013. ▪ ***Probability and Statistics in Engineering***, 4th Edition, William W. Hines, Douglas C. Montgomery, David M. Goldsman, Connie M. Borror, John Wiley & Sons Inc, 2003. ▪ ***Data Analysis with Microsoft Excel***, 3rd Edition, Kenneth N. Berk, Patrick Carey, Duxbury Press, 2010.
Electronic Materials	**Course Website: Learning Management Systems (Blackboard)**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each class room should be equipped with a whiteboard and a projector.** ▪ **Laboratories should be equipped with computers and an internet connection.**
Technology equipment (projector, smart board, software)	**The rooms should be equipped with data show and Smart Board.** **All computers should be equipped with the following software:** ▪ **Microsoft Excel** ▪ **IBM SPSS** ▪ **R-Project**
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Student and teaching staff**	**Surveys and Questionnaires**
Effectiveness of Students assessment	**Course Coordinator**	**Peer Reviews**
Quality of learning resources	**Students and teaching staff**	**Classroom Observations**
The extent to which CLOs have been achieved	**Student Representatives**	**Student Performance Evaluations (exams, projects)** **CLOs Excel sheet.**
Other	**None**	

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL
REFERENCE NO.	8/1446
DATE	(08/10/2024) 05/04/1446