Course Title:	**Applied Probabilities and Statistics**
Course Code:	CSE112
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Issam DHAHRI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

A. Course Identification

1. Credit hours: 3 (2-1-0)

2. Course type

a. College ☐ Department ■ Others ☐

b. Fundamental ■ Transversal ☐ Optional ☐

3. Level/year at which this course is offered: 1.1/3

4. Pre-requisites for this course (if any): Basic Probability and Mathematics

1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	**Traditional classroom**	…..	35	80
2	**Blended**	45		
3	**E-learning**	.....		
4	**Distance learning**	.....		
5	**Other ()**	.....		

2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	
3	**Tutorial**	15
4	**Others** (specify)	-
	Total	45

B. Course Objectives and Learning Outcomes

Course Description

This course introduces students to probability and statistical analysis, focusing on data interpretation and decision-making. It covers descriptive statistics, including data collection, visualization, measures of central tendency, dispersion, correlation, and regression analysis.
Students will also learn probability theory, exploring sample spaces, probability rules, conditional probability, independence, and probability distributions. The course concludes with inferential statistics, covering estimation theory, confidence intervals, hypothesis testing, and statistical decision-making.
By the end of the course, students will be able to apply statistical reasoning and probability models to solve real-world problems in engineering and applied sciences.

Course Main Objective

This course aims to:

- ✓ Introduce fundamental statistical concepts, including types of data, measures of central tendency, and dispersion to describe and analyze datasets.
- ✓ Develop skills in bivariate data analysis, covering correlation, covariance, and linear regression for understanding relationships between variables.
- ✓ Teach probability theory, including sample spaces, probability rules, conditional probability, and independence to model uncertainty in real-world scenarios.
- ✓ Explain random variables and probability distributions, focusing on discrete and continuous models used in statistical analysis.
- ✓ Provide an understanding of inferential statistics, including estimation theory, confidence intervals, and hypothesis testing for making data-driven decisions.

1. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and understanding**	
1.1	✓ Understand fundamental statistical concepts, including data types, measures of central tendency, and dispersion. ✓ Analyze relationships between variables using correlation, covariance, and regression analysis.	PLO.K1
2	**Skills**	
2.1	✓ Interpret statistical results effectively and communicate findings through reports, presentations, and discussions. ✓ Use statistical reasoning to support decision-making, ensuring clarity and collaboration in multidisciplinary environments.	PLO.S2
2.2	✓ Apply probabilistic and statistical models in solving engineering problems, considering constraints and changing requirements.	PLO.S7
2.3	✓ Apply probability theory, including sample spaces, probability rules, and independence, to solve engineering problems.	PLO.S7

C. Course Content

No	List of Topics	Contact Hours
01	**Part 1: Descriptive Statistics** ✓ 1.1 .Chapter 1: Vocabulary of Statistics o Definitions of Key Terms o Types of Data: Qualitative vs. Quantitative o Levels of Measurement: Nominal, Ordinal, Interval, Ratio ✓ 1.2 .Chapter 2: One-Dimensional Numerical Series o Data Collection Methods o Measures of Central Tendency o Measures of Dispersion o Data Visualization Techniques ✓ 1.3. Chapter 3: Two-Dimensional Numerical Series o Bivariate Data Analysis o Scatter Plots and Correlation o Covariance and Correlation Coefficient o Simple Linear Regression Analysis	21
02	**Part 2: Probability Calculus** ✓ 2.1. Chapter 1: The Probability Model o Introduction to Probability Theory o Sample Spaces and Events o Rules of Probability ✓ 2.2. Chapter 2: Conditional Probability, Independence o Introduction to Probability Theory o Sample Spaces and Events o Rules of Probability ✓ 2.3. Chapter 3: Random Variables o Introduction to Probability Theory o Sample Spaces and Events o Rules of Probability ✓ 2.4. Chapter 4: Probability Distribution o Introduction to Probability Theory o Sample Spaces and Events o Rules of Probability	14
03	**Part 3: Inferential Statistics** ✓ 3.1 .Chapter 1: Estimation Theory o Point Estimation vs. Interval Estimation o Confidence Intervals for Means and Proportions o Margin of Error and Sample Size Determination ✓ 3.2. Chapter 2: Statistical Test o Introduction to Hypothesis Testing	10

	○ Types of Errors (Type I and Type II) ○ Common Statistical Tests: ○ Interpreting p-values and Test Results	
Total		45

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
PLO.K1	✓ Understand fundamental statistical concepts, including data types, measures of central tendency, and dispersion. ✓ Analyze relationships between variables using correlation, covariance, and regression analysis.	- Lecturing - Class discussions	- Assignments, - Exams
2.0	**Skills**		
PLO.S2	✓ Interpret statistical results effectively and communicate findings through reports, presentations, and discussions. ✓ Use statistical reasoning to support decision-making, ensuring clarity and collaboration in multidisciplinary environments.	- Lecturing - Class discussions - Work in small groups	- Assignments, - Exams
PLO.S7	✓ Apply probabilistic and statistical models in solving engineering problems, considering constraints and changing requirements.	- Lecturing - Class discussions - Work in small groups	- Assignments, - Exams
PLO.K1, PLO.S7	✓ Apply probability theory, including sample spaces, probability rules, and independence, to solve engineering problems.		

2. Assessment Tasks for Students

	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	00 %
2	Quizzes, Homework assignments	Random	00 %
3	First mid Term	8	35%
4	Final Exam	16	65%

E. Student Academic Counselling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:
1- Office hours 2- Blackboard interface

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	1. Montgomery, D. C., & Runger, G. C. – *Applied Statistics and Probability for Engineers*, Wiley, 2018. 2. Ross, S. M. – *Introduction to Probability and Statistics for Engineers and Scientists*, Academic Press, 2020. 3. Devore, J. L. – *Probability and Statistics for Engineering and the Sciences*, Cengage Learning, 2016.
Essential References Materials	▪ NA
Electronic Materials	MIT OpenCourseWare – *Probability and Statistics Courses* (https://ocw.mit.edu)
Other Learning Materials	NA

2. Facilities Required

Item	**Resources**
Accommodation	**Classroom board**
Technology Resources	**Data projector**

G. Course Quality Evaluation

Evaluation Areas/Issues	**Evaluators**	**Evaluation Methods**
Effectiveness of teaching and assessment.	Students, course coordinator, Alumni, Employers	Direct/Indirect
Extent of achievement of course learning outcomes.	Faculty, Program Leaders, quality department	Direct
Quality of Learning resources	Faculty, Program Leaders,	Direct, Indirect
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders,	Direct, Indirect

H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	11/9/2023