Course Specification

(Postgraduate Programs)

Course Title:	**Actuarial Statistics**
Course Code:	**STA 6101**
Program:	**Executive Master of Science in Actuaries and Financial Mathematics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**None**

Table of Contents

A. General information about the course: 3

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods 4

C. Course Content 5

D. Students Assessment Activities 6

E. Learning Resources and Facilities 6

F. Assessment of Course Quality 7

G. Specification Approval 8

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	☐ Department	☐Track	☒ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: Level 1 / Year 1					
4. Course general Description:					
This course describes the most important ideas, theoretical results, and examples of bivariate probability distributions, sampling distributions and the CLT, functions of random variables, parameter estimations and hypothesis testing. The course includes the essential fundamentals of these topics. The emphasis is on calculations, and some applications are mentioned.					
5. Pre-requirements for this course (if any):					
None.					
6. Co-requisites for this course (if any):					
None.					
7. Course Main Objective(s):					
The main objective of this course is to: - To teach students some important scientific concepts of statistics. - To let students be familiar with distributions of random vectors. - To expose students to concepts of Expectation and moments. - To let students know limit theorems and some of their applications. - To teach students techniques of estimations. - To let students learn and use some tests of hypothesis.					

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**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify)**	0
Total		**60**

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Define the moment generating function, the joint probability mass functions, and joint probability density functions.**	**K1**	**2 lecture hours\week**	**Direct: Regular Exams**
1.2	**Produce the confidence intervals on the mean, variance, standard deviation and on a population proportion.**	**K2**	• **2 tutorial hours\week** • **Self-study**	**Direct: Short Quizzes**
2.0	**Skills**			
2.1	**Explain the importance of central limit theorem.**	**S1**	**Self-study**	**Direct:** • **Participations** • **Short Quizzes**
2.2	**Evaluate means and variances for linear combinations of random variables.**	**S3**	**Real-life problems**	**Direct: Simulation Mini-projects**
2.3	**Construct confidence intervals on the appropriate case.**	**S2**	**Real-life problems**	**Direct: Cases study**
2.4	**Discuss important properties of point estimators, including bias, variance, and mean square error.**	**S2, S3**	**Self-study**	**Direct:** **Oral questions** **Final Exam**
3.0	**Values, autonomy, and responsibility**			

3.1	**Perform individually.**	**V1, V2**	**Teamwork and class discussions.**	**Direct:** **-Oral questions** **- All exams**
3.2	**Relate well to others and maintain good relationships.**	**V1, V2**	**Teamwork and class discussions.**	**Direct:** **-Teamwork** **- All exams**

C. Course Content

No	List of Topics	Contact Hours
1.	**Bivariate Probability Distribution:** Two Discrete Random Variables, Two Continuous Random Variables, Covariance and Correlation, Bivariate Normal Distribution, Linear Combinations of Random Variables.	6

2.	**Functions of Random Variables:** Finding the probability distribution of a function of random variable. The method of distribution function, The method of transformations, Using the Moment-Generating Functions	9
3.	**The Central Limit Theorem:** Sampling Distributions related to the Normal Distribution; The Central Limit Theorem; A proof of the Central Limit Theorem.	9
4.	**Sampling distributions:** Sampling distributions, Sampling Distributions of the Means, The chi-square distribution, The t distribution, The F distribution.	9
5.	**Estimation: Point estimation:** The Bias and Mean Square Error of Point Estimation; Some Common Point Estimators; Evaluating The goodness of a Point Estimator.	9
6.	**Properties of Point Estimators and Methods of Estimation:** Relative Efficiency. Consistency. Sufficiency. Rao-Blackwell Theorem and Minimum Variance Estimation. The Method of Moments. The Method of Maximum Likelihood.	9
7	**Confidence Interval Estimation:** Confidence interval for the Mean when σ is Known: Confidence interval for the Mean when σ is Unknown. Confidence Interval and Sample Sizes for Proportions. Confidence Intervals for Variance And standard Deviations.	9
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, & Homework	During the semester	30%
2.	Midterm	Week 8-9	30%
3.	Final Exam	Week 15	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***, 9th Edition, R. Walpole, R. Myers, S. Myers, K. Ye, Pearson Education International, 2012. ISBN 9780321629111. **(Main Reference).**
Supportive References	▪ ***Introduction to Mathematical Statistics***, 6th Edition, Robert V. Hogg, Joseph McKean, Allen T. Craig, Prentice Hall, 2005. ▪ ***Mathematical Statistics with Applications***, 7th

	Edition, D. Wackerly, W. Mendenhall, R.L. Scheaffer, Brooks/Cole-Cengage Learning, 2008. ISBN-13: 9780495385080. ▪ ***Probability and Statistics in Engineering***, 4th Edition, William W. Hines, Douglas C. Montgomery, David M. Goldsman, Connie M. Borror, John Wiley & Sons Inc, 2003. ISBN: 9780471240877. ▪ ***Introduction to Mathematical Statistics***, 6th Edition, Robert V. Hogg, Joseph McKean, Allen T. Craig, Prentice Hall, 2005.
Electronic Materials	**None**
Other Learning Materials	**None**

2. Educational and Research Facilities and Equipment Required:

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.**
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**During the semester and at the end of the course each student will complete two evaluation forms.**
Effectiveness of Students assessment	**Instructor**	**At the end of each semester the course instructor should complete the course report, including a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Quality of learning resources	**Students**	**During the semester and at the end of the course each student will complete two evaluation forms.**
The extent to which CLOs have been achieved	**Instructor**	**At the end of each semester the course instructor should complete the course report,**

Assessment Areas/Issues	Assessor	Assessment Methods
		including a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.
Other	None	

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL
REFERENCE NO.	20/1446
DATE	11/08/1446 (10/02/2025)