



UNITED STATES INTERNATIONAL UNIVERSITY

## SCHOOL OF SCIENCE & TECHNOLOGY

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**COURSE:** MTH2010A: PROBABILITY AND STATISTICS  
**LECTURER :** DR. F. NJUI  
**CREDIT UNIT:** 3 UNITS

### **Course Rationale:**

Probability and Statistics are directly or indirectly used by everybody in society. It is therefore important to expose learners to this very practical subject. By the end of the course, student should have acquired good understanding of applications of probability and statistics that are so useful in life.

### **Course Description:**

This course is aimed at equipping students with basic but strong statistical base that is useful in various academic fields. The course comprises the following topics: Review of set theory, Combinations and Permutations; Probability; Conditional probability and independence;; Random Variables, Expectations of random variables; Bernoulli Trials, Binomial and Poisson density functions; The normal density function; Uniform distribution and other special density functions; Role of Statistics; Methods of data collection; Planning of a statistical survey; Presentation of statistical data using various diagrams and graphs; Frequency distributions; Measures of central tendency; Measures of dispersion; Linear and non linear correlation; Regression.

### **Link to University Mission:**

The unit will expose students to statistical knowledge and its applications, the acquisition of skills and the development of intellect and character in a manner that prepares them to contribute effectively and ethically as citizen of a changing and increasingly technological world. This will be achieved through development of high level thinking by developing and demonstrating the ability to think critically and analytically and eventual application of what has been learned.

### **Link to the School:**

This course is designed to:

- a) Develop competence in independent critical thinking; create skills, creativity and good communication skills through logical and meaningful statistical arguments.
- b) Acquire practical working experience by applying what has been learned.
- c) Demonstrate preparedness for career and life-long learning in their chosen disciplines as well as understanding of the interdisciplinary nature of knowledge.

### **Program Learning Outcomes:**

- a) Correct application of statistical skills
- b) Understand interdisciplinary nature of knowledge
- c) Problem solving ability

### **Course Learning Outcomes:**

At the end of the course every learner should be able to,

- a. Demonstrate the ability to think critically, logically analytically and creatively in solving problems using statistical and probability techniques in an inter-disciplinary context.
- b. Identify the relevant probability distribution in solving probability related problems
- c. Collect data, make it homogeneous and then compute relevant significant figures to be used in data analysis.
- d. Analyze statistical data and make valid conclusions
- e. Demonstrate competence in the understanding of the subject both in oral and written cases.
- f. Forecast and predict any phenomenon by making use of available data.

**Course Content:**

WEEK	TOPIC	Learning Outcomes	Activity/Ass	Aids/References	Remarks
<i>Week 1</i>	PROBABILITY Review of set theory, permutations and combinations	Ability to solve questions relevant to the topic	Take notes. Solve in-class questions	Notes given in class. Revision questions	The objective for that week is achieved
<i>Week 2</i>	PROBABILITY Axiomatic and Classical approach. Conditional probability and independence.	As above.	Lecturer gives many examples, solves some and asks learners to solve others.	In-class notes given. Practice questions provided	As above
<i>Week 3</i>	RANDOM VARIABLES Introduction, Discrete and Continuous random variables and their p.d.fs	The learners should be able to identify a discrete and a continuous random variable and work out various probabilities.	As above	As above Take-home assignment	As above
<i>Week 4</i>	EXPECTATIONS OF RANDOM VARIABLES Introduction, mean and standard deviation.	The learners should be able work out questions on this topic.	Comment on take-home away assignment.  Worked out examples	Class-notes and revision questions  QUIZ ONE	As above
<i>Week 5</i>	BINOMIAL, NORMAL AND POISSON DENSITY FUNCTIONS	Be able to identify relevant p.d.f to use in any probability question. Know how to use probability tables.	Solve examples assisted by lecturer	Class notes and revision questions	As above
<i>Week 6</i>	Cont. of week 5 topics	As week 5	As week 5	As week 5	As week 5
<i>Week 7</i>	<b>Mid – Semester Exam</b>				

<i>Week 8</i>	STATISTICS Introduction, Types and sources of data, Data collection, Data presentation,	The learners should be able define statistics, collect and summarize data, present it using diagrams.	Write summary notes	Hand-out on the topic	As above
<i>Week 9</i>	FREQUENCY DISTRIBUTIONS Definitions, graphical representation of a frequency distribution.	Learners should know how to summarize data and present it using various graphs	Solve examples assisted by lecturer	Revision questions provided  Take-home Assignment two	As above
<i>Week 10</i>	MEASURES OF CENTRAL TENDENCY (mean, mode, median, quartiles, deciles, percentiles)	The learners to know how to work out these measures, where and how to apply them.	As above	Summary notes, revision questions	As above
<i>Week 11</i>	MEASURES OF DISPERSION (range, quartile deviation, mean deviation, standard deviation)	Use of relevant formulae to work out these measures. Be able to interpret results. Know how and where to apply these measures.	Worked-out examples are given. <b>QUIZ TWO</b>	Lecture notes, revision questions	As above
<i>Week 12</i>	CORRELATION Scatter diagrams, Product-moment and rank correlation	Know how to compute correlation coefficients and make conclusions.	Illustrative examples and participation by the students.	As above	As above
<i>Week 13</i>	REGRESSION (Linear and Non-linear)  Applications	At the end of the topic, students should know how to determine the best estimate of an unknown value using regression equations.	As above	As above	As above
<i>Week 14</i>	<b>Final Exam</b>				

## Teaching methodology:

The methods that will be used to present the course will include

- Lectures and class discussions and solved examples
- Individual assignments, quizzes and in-class group work.
- Exams: mid-semester and the final exam.
- Consultations.
- Use of the calculator in solving questions.

Each student will be required to adhere to the following requirements.

- Own a scientific calculator.
- Avoid plagiarism. Plagiarism will result to an instant grade F.
- Avoid absenteeism from the course. Five absences will lead to an F.
- Attend all the semester examinations and hand in all take-home assignments as instructed. There are no make-up assignments/exams.

## COURSE LEARNING EVIDENCES

The learning out comes evidences include direct and indirect types as follows:

### **A. Direct**

Individual assignments

Quizzes

Exams

### **B. Indirect**

Class discussions

Consultations on the weak areas

Course students' evaluation forms

## RECOMMENDED REFERENCE BOOKS

The text books recommended for this course are:

- Gupta C. P., *Fundamentals of Mathematical Statistics*
- Gupta S.P., *Statistical Methods*
- Wonnacott J. J. and Wonnacott T.H., *Introduction to Statistics for Business and Economics*
- Allen Webster. *Applied Statistics for Business and Economics*

**Class Policy:**

- Mobile phones should be switched **OFF** during class session.
- Students who attend classes late will be penalized
- A student who misses at least 7 classes will get an **F grade** for the course
- Borrowing of writing material or calculators during exams is prohibited.

**Course Evaluation:**

There will be two take-away assignments, two Quizzes, Mid-term exam and final exam. Discussions and participation will be used in the evaluation

**Distribution of Marks:**

The course evaluation for each student will be as follows.

Attendance and participation	5%
Assignments	20%
Quizzes	25%
Mid-semester exam	25%
Final exam	<u>25%</u>
Total score	<u>100%</u>

**GRADING SYSTEM**

The grading system used applies to all the programs offered in USIU. It is as tabulated below.

90 – 100	A	80 – 83	B	70 – 73	C	62 – 63	D
87 – 89	A-	77 – 79	B-	67 – 69	C-	60 – 61	D-
84 – 86	B+	74 – 76	C+	64 – 66	D+	59 –	F