



# Course Specifications

<b>Course Title:</b>	Statistics and probability 1
<b>Course Code:</b>	SAT 101
<b>Program:</b>	B. Sc in Mathematics
<b>Department:</b>	Mathematics Department
<b>College:</b>	College of Science
<b>Institution:</b>	Majmaah University

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## A. Course Identification

<b>1. Credit hours:</b> 3(2+1)
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> Second Level/First year
<b>4. Pre-requisites for this course (if any):</b>
<b>5. Co-requisites for this course (if any):</b> N/A

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	32	70 %
2	Blended	9	20 %
3	E-learning	4	10 %
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	25
2	Laboratory/Studio	
3	Tutorial	15
4	Others (specify) Seminars and presentations	5
	<b>Total</b>	45
<b>Other Learning Hours*</b>		
1	Study	25
2	Assignments	20
3	Library	15
4	Projects/Research Essays/Theses	10
5	Others (specify)	
	<b>Total</b>	70

\* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

### 1. Course Description

This course covers the basic concepts of statistics and probability. So the topics to will be covered are:

- Have the basic statistical methodology of data analysis including; graphs, descriptive statistics
- Understand and describe sample spaces and events for random experiments with graphs, tables, lists, or tree diagrams
- Calculate the probabilities of joint events such as unions and intersections from the probabilities of individual events
- Studying and calculate the conditional probabilities of events
- Determine the independence of events and use independence to calculate probabilities
- Use Bayes' theorem to calculate conditional probabilities
- Understand random variables and its distributions
- Studying the Expected value of the random variable
- Have Some special probability distributions (The Normal distribution).

### 2. Course Main Objective

- Describe discrete data graphically and compute of location and dispersions (mean and variance)
- Compute probabilities by modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws and conditional probability
- Introducing basic statistical methodology of data analysis including; graphs, descriptive statistics
- Interpret probabilities and use probabilities of outcomes to calculate probabilities of events in discrete sample spaces- exclusive and independent events
- The purpose of the random variable, some discrete and continuous distributions

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Display, analyze, and interpret sample data using the techniques of exploratory descriptive data analysis.	K1
1.2	Recognize some special distributions and apply their specific formulas.	K3
1.3	Calculate probabilities and conditional probabilities.	K1
1.4	Describe discrete data graphically and compute measures of centrality and dispersion.	K3
2	<b>Skills :</b>	
2.1	The students will be able to calculate probabilities using modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws, and conditional probability.	S3
2.2	The students will explain and interpret a general knowledge of statistics and random samples, sampling experiments, the sampling distribution for a sample mean, and the sampling distribution of a sample proportion.	S3
3	<b>Competence:</b>	
3.1	The students should be able to formulate and solve mathematical problems such as:	C2

CLOs		Aligned PLOs
	<ul style="list-style-type: none"> <li>- Develop problem solving skills that require basic probabilistic modelling, including the use of discrete and continuous distributions and the use of random variables.</li> <li>- Be familiar with statistics and random samples, sampling experiments, the sampling distribution for a sample mean, and the sampling distribution of a sample proportion.</li> </ul>	

### C. Course Content

No	List of Topics	Contact Hours
1	Introduction and overview of statistics - Organization and presentation of statistical data - Measures of central tendency (Mean, Median, Mode, ...) of the simple data and the frequency distribution	6
2	Measures of dispersion (The Range – The Variance and the standard deviation - Coefficient of variation of the simple data and the frequency distribution	9
3	Sample space and Events - Counting Techniques (Fundamental basics, Addition Rule – Multiplication Rule- Permutation and Combinations)	9
4	Definition of the probability and its applications- Conditional probability - Independence of events and Bayes theorem and its applications	6
5	Definition of the random variable- The probability distribution	9
6	Some special probability distributions -The Normal distribution.	6
<b>Total</b>		<b>45</b>

### 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	<b>Knowledge</b>		
1.1	<ul style="list-style-type: none"> <li>- Define statistics, population and sample.</li> <li>- Introduce basic statistical methodology of data analysis including; graphs, descriptive statistics.</li> <li>- List the addition and the multiplication rules of probability</li> </ul>	<p><b>Direct teaching:</b> Inquiry-based instruction PowerPoints and discussions</p> <p><b>Aimed teaching:</b> Discovery and oral questions</p>	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Midterms</li> <li>• Final Exams</li> <li>• E-exam</li> <li>• Oral Exam</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	-The importance of counting methods in probability theory -State the purpose of the random variable.		
<b>2.0</b>	<b>Skills</b>		
2.1	The students will be able to display, analyze, and interpret sample data using the techniques of exploratory descriptive data analysis	<b>Direct teaching:</b> Lectures Differentiation <b>Aimed teaching:</b> Discovery and oral questions <b>Indirect teaching:</b> Peer Learning	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Midterms</li> <li>• Final Exams</li> </ul>
2.2	- The students will explain and interpret the counting rules. - Find statistical problem, data analysis and interpret the results - Student's ability to write the conditional probability rule and bayes theorem. Draw the tree diagram and prepare the sample space .	<b>Direct teaching:</b> Lectures <b>Aimed teaching:</b> Discovery and oral questions <b>Indirect teaching:</b> Peer Learning	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Midterms</li> <li>• Final Exams</li> </ul>
<b>3.0</b>	<b>Competence</b>		
3.1	The students should be able to formulate and solve mathematical problems such as: - Describe basic concepts of data analysis - Be familiar with statistics and random samples, sampling experiments, the sampling distribution for a sample mean, and the sampling distribution of a sample proportion. - Find statistical problem, data analysis and interpret the results	<b>Direct teaching:</b> Lectures <b>Aimed teaching:</b> Discovery and oral questions <b>Indirect teaching:</b> Cooperative Learning	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Midterms</li> <li>• Final Exams</li> </ul>

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm 1	7th week	15 %
2	Midterm 2	11th week	15 %
3	Homework	Through of semester	5 %
4	Quizzes	Through of semester	10%
5	Electronic Test	13th week	10 %

#	Assessment task*	Week Due	Percentage of Total Assessment Score
6	Presentation	Through of semester	5%
7	Final exam	End of semester	40 %

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:**

- 1- 4-office hours per week in the lecturer schedule.
  - Sunday 13-15.
  - Wednesday 10-12.
- 2- The contact with students by e-mail and website.
- 3- Activation of the virtual classrooms and academic guidance via Black Board LMS.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	A Modern Introduction to Probability and Statistics, Frederik Michel Dekking Cornelis Kraaikamp Hendrik Paul Lopuhaa Ludolf Erwin Meester. Springer-Verlag London Limited. 2005. ISBN 13: 978-1-85233-896-1
<b>Essential References Materials</b>	<ol style="list-style-type: none"> <li>1. Applied Statistics and Probability for Engineers. D.C. Montgomery &amp; G. C. Runger. John Wiley &amp; Sons. 2003.</li> <li>2. Introductory Statistics. Wonnacott, T. H., and Wonnacott, R. J. John Wiley &amp; Sons. 1969</li> </ol>
<b>Through of semester Electronic Materials</b>	<a href="http://ocw.mit.edu/courses/electrical">http://ocw.mit.edu/courses/electrical</a>
<b>Other Learning Materials</b>	

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>- Classroom with capacity of 30-students.</li> <li>- Computer Lab of Mathematics Department</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Mathematical software packages like SPSS

Item	Resources
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<a href="https://www.khanacademy.org/math/statistics-probability">https://www.khanacademy.org/math/statistics-probability</a>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Extent of achievement of course learning outcomes	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources.	Staff members (course coordinators)	Direct (Meeting between course coordinators and the tutors)

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	Mathematics Department
<b>Reference No.</b>	27
<b>Date</b>	8/8/1442 H-21/3/2021 G

Head of Department

Dr. Muqrin Almuqrin


