# Course Specifications

| | |
|---|---|
| **Course Title:** | **Theory of Probability** |
| **Course Code:** | **30113302-3** |
| **Program:** | **BSc. Mathematics 301100** |
| **Department:** | Mathematical Science |
| **College:** | Applied Sciences |
| **Institution:** | **Umm Al-Qura, University** |

## Table of Contents

# A. Course Identification

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|---|
| **1. Credit hours: 3 hours** |
| **2. Course type** |
| **a.** University ☐  College ☐  Department ☒  Others ☐ |
| **b.** Required ☒  Elective ☐ |
| **3. Level/year at which this course is offered:** Fifth Level / Third Year |
| **4. Pre-requisites for this course** (if any)**:**<br><br>Introduction to Statistics and Probability (30112301-3) |
| **5. Co-requisites for this course** (if any)**:**<br><br>None. |

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

| No | Mode of Instruction | Contact Hours | Percentage |
|----|---------------------|---------------|------------|
| 1 | **Traditional classroom** | 3 hours/ week | 100% |
| 2 | **Blended** | 0 | 0% |
| 3 | **E-learning** | 0 | 0% |
| 4 | **Correspondence** | 0 | 0% |
| 5 | **Other** | 0 | 0% |

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

| No | Activity | Learning Hours |
|----|----------|----------------|
| **Contact Hours** | | |
| 1 | **Lecture** | (3 hour)×(15 weeks) |
| 2 | **Laboratory/Studio** | 0 |
| 3 | **Tutorial** | (1 hour)×(15 weeks) |
| 4 | **Others** (specify) | 0 |
| | **Total** | 60 hours |
| **Other Learning Hours\*** | | |
| 1 | **Study** | (1 hour)×(15 weeks) |
| 2 | **Assignments** | (1 hour)×(15 weeks) |
| 3 | **Library** | (1 hour)×(15 weeks) |
| 4 | **Projects/Research Essays/Theses** | (1 hour)×(15 weeks) |
| 5 | **Others**(specify) | 0 |
| | **Total** | 60 hours |

**\***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

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|---|
| **1. Course Description**<br>Theory of probability is the study of random variables, their probability distributions and some popular probability distributions. Key topics of the course include Random Variable, Cumulative distribution function and probability distribution. |

## 2. Course Main Objective

The primary objective of the course is to provide the students by the basic knowledge and concepts of theory of probability concerning random variables, their characteristics and different types of their probability distributions.

## 3. Course Learning Outcomes

| | CLOs | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge:** | |
| 1.1 | State the importance of random variable characteristics and distributions | |
| 1.2 | Describe the assumptions for each of the discrete and continuous probability distributions. | |
| 1.3 | Outline the properties of random variables. | |
| **2** | **Skills:** | |
| 2.1 | Establish the different characteristics of random variables from basic definition. | |
| 2.2 | Diagram some of the popular probability distribution functions. | |
| 2.3 | Apply scientific models and tools effectively. | |
| **3** | **Competence:** | |
| 3.1 | Use variety of resources to write reports about basic statistical principles. | |
| 3.2 | Utilize computer packages to apply statistical knowledge which gained during the course | |
| 3.3 | Develop problems solutions using a range of formats and approaches. | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | The Random Variable<br>Probability distribution of random variable | 6 |
| 2 | Cumulative distribution function | 6 |
| 3 | Mathematical expectation | 6 |
| 4 | Moments and Moments generating | 6 |
| 5 | Feature of probability distribution | 6 |
| 6 | Some popular probability distribution | 6 |
| 7 | Popular continuous probability distribution | 9 |
| **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** | | |
| 1.1 | State the importance of random variable characteristics and distributions | Lecture<br>Tutorials | Exams (Quizzes, Midterm and Final). |
| 1.2 | Describe the assumptions for each of the discrete and continuous probability distributions. | Lecture<br>Tutorials | |

| | | | | |
|---|---|---|---|---|
| 1.3 | Outline the properties of random variables. | Lecture Tutorials | |
| **2.0** | **Skills** | | |
| 2.1 | Establish the different characteristics of random variables from basic definition. | Lecture Individual or group work | Exams (Quizzes, Midterm and Final). Homework |
| 2.2 | Diagram some of the popular probability distribution functions. | Lecture Individual or group work | |
| 2.3 | Apply scientific models and tools effectively. | Lecture Individual or group work | |
| **3.0** | **Competence** | | |
| 3.1 | Use variety of resources to write reports about basic statistical principles. | Lecture Individual or group work | Exams (Quizzes, Midterm and Final). Research Essays |
| 3.2 | Use computer packages to apply statistical knowledge which gained during the course | Lecture Individual or group work | |
| 3.3 | Solve problems using a range of formats and approaches. | Lecture Individual or group work | |

## 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | Midterm 1 | 6th week | 20 % |
| 2 | Midterm 2 | 12th week | 20% |
| 3 | Homework + reports + Quizzes | During the semester | 10% |
| 4 | Final exam | End of semester | 50 % |

**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:**

Each group of students is assigned to a faculty member where he or she will provide academic advising. All faculty members are required to be in their offices outside teaching hours. Each faculty member allocates at least 4 hours per week to give academic advice and to answer to the questions of students about concepts studied during the lectures.

## F. Learning Resources and Facilities

### 1.Learning Resources

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|---|---|
| **Required Textbooks** | Introduction to mathematical statistics (fifth edition), Prentice Hall (1995). |
| **Essential References Materials** | Probability and statistics for engineers and scientists. Ronald E. Walpole, Prentice Hall (2012). |
| **Electronic Materials** | None. |
| **Other Learning Materials** | None. |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation** (Classrooms, laboratories, demonstration rooms/labs, etc.) | Large classrooms that can accommodate more than 50 students. |
| **Technology Resources** (AV, data show, Smart Board, software, etc.) | Data show |
| **Other Resources** (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | None |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of teaching and assessment. | Students | Direct |
| Quality of learning resources. | Students | Direct |
| Extent of achievement of course learning outcomes. | Faculty member | Direct |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes,Quality oflearning resources, etc.)
**Evaluators** (Students,Faculty, Program Leaders,Peer Reviewer, Others (specify)
**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

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|---|---|
| **Council / Committee** | Council of the Mathematics Department |
| **Reference No.** | |
| **Date** | |