|  |  |
| --- | --- |
| **Course Title:** | **Probability Theory (2)** |
| **Course Code:** | **STAT312** |
| **Program:** | **Mathematics** |
| **Department:** | **Mathematics** |
| **College:** | **Sciences & Arts** |
| **Institution:** | **Shaqra University** |

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# A. Course Identification

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1. Credit hours:** | | | |  | | | | | | | | | | | | |
| **2. Course type** | | | | | | | | | | | | | | | | |
| **a.** | University | |  | | College | | |  | Department | | | | **✓** | Others |  |  |
| **b.** | | Required | | | | **✓** | Elective | | |  |  | | | | | |
| **3. Level/year at which this course is offered: 6th** | | | | | | | | | | | |  | | | | |
| **4. Pre-requisites for this course** (if any)**: Probability Theory (1)** | | | | | | | | | | | | | | | | |
| **5. Co-requisites for this course** (if any)**:,** | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | |

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

| **No** | **Mode of Instruction** | **Contact Hours** | **Percentage** |
| --- | --- | --- | --- |
| **1** | **Traditional classroom** | **-** | **-** |
| **2** | **Blended** | **-** | **-** |
| **3** | **E-learning** | **-** | **-** |
| **4** | **Distance learning** | **56** | **100** |
| **5** | **Other** | **-** | **-** |

**7. Contact Hours** (based on academic semester)

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Contact Hours** |
| **1** | **Lecture** | **28** |
| **2** | **Laboratory/Studio** | **-** |
| **3** | **Tutorial class** | **28** |
| **4** | **Others** (specify) | **-** |
|  | **Total** | **56** |

# B. Course Objectives and Learning Outcomes

|  |  |  |
| --- | --- | --- |
| 1. Course Description   |  |  | | --- | --- | | |  | | --- | | This course explains the fundamentals of multivariate distribution theory (with more concentration on bivariate distributions), related distributional properties, and functions of random variables. After completing this course, students can solve problems related to multivariate probability distributions (especially bivariate distributions) and functions of random variables. | | |
|  |
| 2. Course Main Objective |
| |  |  | | --- | --- | | Students can discuss advance principles of probability theory.   |  | | --- | | Students can define key concepts of multivariate distribution theory and functions of random variables. | | |

## 3. Course Learning Outcomes

| **CLOs** | | **Aligned****PLOs** |
| --- | --- | --- |
| 1 | **Knowledge and Understanding** |  |
| 1.1 | |  | | --- | | **Students can evaluate advance problems related to probability distributions.** | |  |
| **2** | **Skills :** |  |
| 2.1 | |  | | --- | | **Students can solve advance problems related to multivariate distribution theory.** | |  |
| 2.2 | |  | | --- | | **Students can solve problems related to functions of random variables.** | |  |
| **3** | **Values:** |  |
| 3.1 | |  | | --- | | **Students can analytically formulate solutions for advance probability-based and distribution-based problems.** | |  |

# C. Course Content

|  |  |  |
| --- | --- | --- |
| **No** | **List of Topics** | **Contact Hours** |
| 1 | **Introduction to bivariate and multivariate random variables: discrete and continuous** | **16** |
| 2 | **Joint probability and joint cumulative functions and marginal Distributions.** | **3** |
| 3 | **Conditional probability and density functions.** | **3** |
| 4 | **Dependence of variables.** | **3** |
| 5 | **Introduction to functions of random variables: discrete and continuous.** | **12** |
| 6 | **Random Variables Transformation methods.** | **9** |
| 7 | **Distribution of finite number of random variables and corresponding applications.** | **10** |
| **Total** | | **56** |

# 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** | | |
| 1.1 | **Students can evaluate problems of multivariate probability distributions**. | **regular lectures in the class room; Students are encouraged to ask questions during learning process.** | **Quizzes, home works, two mid-semester exams, a final exam.** |
| 1.2 | **Students can define key topics of multivariate distribution theory.** |
| **2.0** | **Skills** | | |
| 2.1 | **Mental skills-Knowledge, Analysis, Comprehension, Applications and Evaluation of multivariate probability distributions.** | **Assigning homework.**  **Asking questions in class.**  **Giving short quizzes in class** | **Marking homework.** |
| **3.0** | **Values** | | |
| 3.1 | **We assign homework and try to ask each student in class to explain and present his solutions to his colleagues** | **Encourage working on homework in groups.** | **Grading student’s presentation.** |

## 2. Assessment Tasks for Students

| **#** | **Assessment task\*** | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | **Assignment # 1** | **3** | **4** |
| **2** | **Assignment # 2** | **8** | **3** |
| **3** | **Assignment # 3** | **12** | **3** |
| **4** | **Quiz #1** | **4** | **10** |
| **5** | **Quiz #2** | **7** | **10** |
| **6** | **Quiz #3** | **10** | **10** |
| **7** | **Exam. #1** | **5** | **20** |
| **9** | **Final Exam.** | **15** | **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:** |
| **There will be three online office hours: one hour on Saturday, one hour on Monday and one hour on Wednesday. Students are free to communicate and ask questions during these hours.** |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | **Bluman, A. (2018). Elementary Statistics: a Step by Step Approach. McGraw-Hill Education, 10th Edition.** |
| **Essential References Materials** | |  | | --- | | **Bain, L. J. and Engelhardt, M. (1991). Introduction to Probability and Mathematical Statistics. Cengage Learning, Inc.** | |
| **Electronic Materials** | **Allan G. Bluman, Elementary Statistics, 2007.** |
| **Other Learning Materials** | |  | | --- | | **El-Sayyad, G. M. (2017). Theory of probability. Dar Hafiz, 7th Edition.** | |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**  (Classrooms, laboratories, demonstration rooms/labs, etc.) | **N/A** |
| **Technology Resources**  (AV, data show, Smart Board, software, etc.) | **N/A** |
| **Other Resources**  (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | **N/A** |

# G. Course Quality Evaluation

| **Evaluation**  **Areas/Issues** | **Evaluators** | **Evaluation Methods** |
| --- | --- | --- |
| **At the end of the term before getting the final result, each student has to complete an evaluation for course.** | **At the end of each term, the head of the department meets with the department’s member to review course effectiveness and plan for improvements.** | **Faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)**  **When writing the portfolio of the course, samples of exams and assignments for best, average and weak students are provided.** |
| **We usually ask students to freely evaluate our teaching and give their opinions about the course.** |

**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

|  |  |
| --- | --- |
| **Council / Committee** |  |
| **Reference No.** |  |
| **Date** | January 1, 2021 |