UAEU College of Business and Economics

جامعة الإمارات العربية المتحدة
United Arab Emirates University

STAT 230 - Principles of Probability
3 Credit Hours
Department of Analytics in the Digital Era
College of Business and Economics
Spring 2022

Class Location and Meeting Time:

Instructor Information:

- Name: Othmane Kortbi
- Office Location:
- Office Hours: Online
- Email: okortbi@uaeu.ac.ae
- Telephone:

Course Description:

This course is an introduction to the principles and laws of probability. It gives the student a thorough understanding of the concepts of probability, conditional probability, random variables and probability distributions, moment generating functions, bivariate and marginal distribution functions, conditional distributions and expectations. While the primary focus of the course is on a mathematical development of the subject, it also includes a variety of illustrative examples and exercises, and statistical computations that are oriented towards applications in social and physical sciences, and business.

Pre-requisite(s): MATH 110 Calculus II or equivalent, STAT 202 Statistics II

Textbook(s):

Required:

Horgan, J. M. (2020). *Probability with R: An Introduction with Computer Science Applications*. 2nd Edition. Wiley.

Recommended:

Ross, S. (2014). *A first course in probability*. 9th Edition, Pearson.

Course Learning Outcomes (CLOs)

Upon Successful completion of this course, students will be able to:

1. Describe the concepts of probability and its basic properties and laws.
2. Apply a variety of counting techniques to compute probabilities.
3. Define conditional probability and compute posterior probabilities.
4. Model real-world data using statistical distributions and develop solutions through analytical techniques and computation.
5. Generate pseudo-random variables and simulate probability distributions to compute probabilities, percentiles and moments.

I Instructional Material & Learning Resources:

- Lecture Notes
- Textbook/Handouts
- Digital Media
- Case Studies / Illustrations
- Visualizations
- Statistics/Analytics Software
- Software Tutorials
- Other Online Resources

Course Teaching & Learning Methods:

a. Explaining and discussing concepts from lecture notes, textbook, and/or handouts, enhanced with digital media and examples. [a]
b. Presenting and/or assigning case studies/illustrations to demonstrate the application of concepts in the practical real-world context. [b]
c. Giving assignments and/or conducting quizzes for the discussed topics. [c]
d. Applying problem-based learning, where students are presented with a real-life problem or scenario and asked to work in teams to investigate potential solutions, while identifying required knowledge and skills. [d]

Course Policies:

Attendance: Student who misses 15% of classes will be awarded an "FA" Grade. Academic integrity is a cornerstone of the intellectual life at Universities and of any true learning program. Plagiarism is academic offenses in which a person takes an idea, language, or creative product from another person and submits it as if it were his/her own work. If a student submits a research paper written by somebody else to an instructor, that is plagiarism. If someone "cuts and pastes" a sentence or even a few words from another source without giving credit to the original source, that is plagiarism. Students must always cite the original author. At UAEU,

penalties for student misconduct, which includes plagiarism, are explained in the university bylaws (Nos. 136-146) and include such sanctions as a formal letter of warning kept on file; suspension from a course or from the university; exclusion from taking the final examination; dismissal from the university; and the withdrawal of a degree.

Course Evaluation and Grading:

Assessment Methods	**Weight %**
Assignments	10
Quizzes	20
Midterm Exam	30
Final Exam	40
Total	**100**

Rubrics:
Rubrics will be provided to students for grading their direct assessment works such as case analysis reports, oral presentations, performances, problem-solving activities, and group activities.

Feedback:
Feedback on progress in the course will be regularly provided to students to give them opportunities to improve their performance.

Course Outline:

Week	**Topics**	**CLOs**	**Course Activities/ Teaching & Learning Methods**	**Assessment Tools** (e.g., assignments, quizzes, etc.)
1	**Topic 1:** Set theory, basic concept	1	Handout [a]	
2-3	**Topic 2:** Counting Techniques	1, 2	Chapter 1 [a, c]	Quiz/Assignment
4-5	**Topic 3:** Definition and properties of Probability	1, 2	Chapter 2 [a]	
5-6	**Topic 4:** Conditional probability and independence	1-3	Chapter 3 [a, c]	Quiz/Assignment
6-9	**Topic 5:** Discrete Random variables and expectations – including Simulation and computation of discrete probability	4, 5	Review, Chapter 4 [a]	Midterm

	distributions and the expectations.			
10-11	**Topic 6:** Continuous random variables - including Simulation and computation of continuous probability distributions and the expectations.	4, 5	Chapter 5 [a, c]	Quiz/Assignment
12-15	**Topic 7:** Bivariate Distributions - including Simulation and computation of bivariate distributions.	4, 5	Chapter 6 [a, c]	Quiz/Assignment
16	Final exam.			Final

Academic Integrity:

Academic integrity is of central importance to education at UAEU. Students have the responsibility to know and observe the requirements of the UAEU Code of Academic Honesty available: https://www.uaeu.ac.ae/en/catalog/plagiarism_and_academic_integrity.shtml and the penalties resulting from violation of this code. This code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty. Cheating in any form and on any academic work results in serious penalties that include dissmissal from the university.

Students with Special Needs:
Students with special needs are encouraged to discuss their needs with the course instructor. You need to contact the Special Needs Services Center at +971 3 7134264 or email (disabilityservices@uaeu.ac.ae). All academic accommodations must be arranged through that office: http://www.uaeu.ac.ae/en/student_services/special_needs/

Student Support Services:

If you need more support please go to the Student Academic Success Program: http://www.uaeu.ac.ae/en/university_college/sasp/. This program provides students with academic support services such as Independent Learning Centers (ILCs), Tutorials, Writing & Speaking Centers. All students are encouraged to use these Centers.

Appendix

Mapping Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)

	Bachelor of Science in Statistics and Data Analytics (STAT) Program Learning Outcomes (PLO)				
	PLO 1	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**
CLO1	X				
CLO2	X				
CLO3	X				
CLO4	X	X			
CLO5		X			

PLOs for the Bachelor of Science in Statistics and Data Analytics:

PLO 1. Demonstrate a comprehensive knowledge of concepts of statistics and data analytics, and the application of the concepts for problem solving using real-world data.

PLO 2. Integrate modeling and computational skills in statistical and data analytics, for developing comprehensive solutions to data-driven problems.

PLO 3. Effectively communicate to specialized and non-specialized audiences, orally, visually, and in writing, the results and interpretation of statistical and computational analyses.

PLO 4. Apply teamwork skills and creativity, and demonstrate autonomy and responsibility, in undertaken tasks and projects.

PLO 5. Demonstrate independence and ethical awareness towards issues in statistics and data analytics, such as data ownership, security and sensitivity of data, privacy concerns in data

CLOs Assessment Tools

Check mark "✓"specifies the assessment tools for each CLOs.

	Direct Assessment Tools		**Indirect Assessment Tools**	
	Assignments/ Quizzes	Exams	Instructor Opinions	Student Surveys
CLO-1	✓	✓	✓	✓
CLO-2	✓	✓	✓	✓
CLO-3	✓	✓	✓	✓
CLO-4	✓	✓	✓	✓
CLO-5	✓	✓	✓	✓

Aligning Course Contents with CLOs

	CLO1	CLO2	CLO3	CLO4	CLO5
Topic 01	√				
Topic 02	√	√			
Topic 03	√				
Topic 04	√	√	√		
Topic 05				√	√
Topic 06				√	√
Topic 07				√	√