



Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	07

1.	Course Title	Probability Theory
2.	Course Number	0301333
3.	Credit Hours (Theory, Practical)	3
	Contact Hours (Theory, Practical)	3
4.	Prerequisites/ Corequisites	0301201
5.	Program Title	BSc. Mathematics
6.	Program Code	
7.	School/ Center	Science
8.	Department	Mathematics
9.	Course Level	Compulsory Specialization Requirement
10.	Year of Study and Semester (s)	all Semesters
11.	Other Department(s) Involved in Teaching the Course	none
12.	Main Learning Language	English
13.	Learning Types	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online
14.	Online Platforms(s)	<input checked="" type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams
15.	Issuing Date	October 31, 2022
16.	Revision Date	October 8, 2024

17. Course Coordinator:

Name: Amal Helu	Contact hours: 10:30-11:30 am
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18. Other Instructors:

Name:

Office number:

Phone number:

Email:

Contact hours:

Name:

Office number:

Phone number:

Email:

Contact hours:

19. Course Description:

Distributions of random variables; conditional probability and stochastic independence; some special distributions (discrete and continuous distributions); univariate, bivariate, and multivariate distributions; distributions of functions of random variables (distribution function method, moment generating function method, and the Jacobian transformation method); limiting distributions.

20. Program Student Outcomes (SO's):

(To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

- SO1)** Identify, formulate, and solve broadly-defined technical or scientific problems by applying knowledge of Mathematics and Science and/or technical topics to areas relevant to the discipline.
- SO2)** Formulate or design a system, process, procedure or program to meet desired needs

**21. Course Intended Learning Outcomes (CLO's):**

(Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

1. **Define Probability Set Functions:** Verify and analyze probability set functions through summations, integrals, and proofs to determine their validity and properties.
2. **Identify and Characterize Random Variables:** Define random variables and determine their probability distributions, using probability density and cumulative distribution functions.
3. **Handle Special Probability Distributions:** Understand and apply the properties of discrete (Binomial, Poisson, Geometric) and continuous (Normal, Gamma, Chi-Square) probability distributions.
4. **Find Distributions of Functions of Random Variables:** Use methods such as distribution function method, moment generating function, and the Jacobian transformation to find distributions of functions of random variables.
5. **Analyze Convergence and Limiting Distributions:** Explain different types of convergence (almost surely, in probability, in distribution) and apply the central limit theorem.
6. **Prove the Laws of Large Numbers:** Understand and prove the weak and strong laws of large numbers.
7. **Compute Moments and Use Generating Functions:** Find moments, the moment generating function, and use them to analyze properties of random variables.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
CLO (1): Define Probability Set Functions.	✓	✓				
CLO (2): Identify and Characterize Random Variables.		✓	✓			
CLO (3): Handle Special Probability Distributions.			✓			
CLO (4): Find Distributions of Functions of Random Variables.			✓	✓		
CLO (5): Analyze Convergence and Limiting Distributions.		✓	✓	✓		
CLO (6): Prove the Laws of Large Numbers.			✓	✓		
CLO (7): Compute Moments and Use Generating Functions.		✓	✓	✓	✓	



22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Course CLO's	Program SO's							
	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)	SO (8)
CLO (1)	✓	✓						
CLO (2)	✓	✓						
CLO (3)	✓	✓						
CLO (4)	✓							
CLO (5)	✓	✓						
CLO (6)	✓							
CLO (7)	✓							

23. Topic Outline and Schedule:

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1-3	1.1	Probability Set Functions (Chapter 1)	CLO 1	Face-to-Face	None	Synchronous	Quiz	Textbook (Chapter 1)
	1.2	Random Variables and Their Distributions (Chapter 2)	CLO 2	Face-to-Face	None	Synchronous	Class Participation	Textbook (Chapter 2)
	1.3	Special Probability Distributions (Chapter 3)	CLO 3	Face-to-Face	None	Synchronous	Quiz	Textbook (Chapter 3)
4-6	2.1	Joint Distributions (Chapter 4)	CLO 2	Face-to-Face	None	Synchronous	First Midterm Exam (10%)	Textbook (Chapter 4)
	2.2	Properties of Random Variables (Chapter 5)	CLO 3	Face-to-Face	None	Synchronous	Quiz	Textbook (Chapter 5)



	2.3	Transformations of Random Variables (Chapter 6)	CLO 4	Face-to-Face	None	Synchronous	Assignment	Textbook (Chapter 6)
7-11	3.1	Functions of Random Variables (Chapter 6)	CLO 4	Face-to-Face	None	Synchronous	Second Midterm Exam (15%)	Textbook (Chapter 6)
	3.2	Limiting Distributions (Chapter 7)	CLO 5	Face-to-Face	None	Synchronous	Class Participation	Textbook (Chapter 7)
12-13	3.3	Laws of Large Numbers (Chapter 8)	CLO 6	Face-to-Face	None	Synchronous	Third Midterm Exam (15%)	Textbook (Chapter 8)
14	4.1	Central Limit Theorem (Chapter 9)	CLO 5	Face-to-Face	None	Synchronous	In-Class Activity	Textbook (Chapter 9)
15	4.2	Review of Key Concepts	All CLOs	Face-to-Face	None	Synchronous	In-Class Activity	Textbook (comprehensive)

24. Evaluation Methods:

Opportunities to demonstrate achievement of the CLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topics Covered	Linked CLOs	Evaluation Date (Period)	Type of Platform Used
First Midterm Exam	10%	Chapter 1 & 2 (Probability and Random Variables)	CLO 1, CLO 2	Week 5 - 31/10/24	Classroom Exam
Second Midterm Exam	15%	Chapter 3 & 4 (Special & Joint Distributions)	CLO 2, CLO 3	Week 8 - 24/11/24	Classroom Exam
Third Midterm Exam	15%	Chapter 5 (Properties of Random Variables)	CLO 3, CLO 4	Week 12 - 22/12/24	Classroom Exam
Quizzes	10%	Probability, Distributions, Properties of RVs	All CLOs	Random Weeks (Unannounced)	Classroom (Pop-Quizzes)
Final Exam	50%	Comprehensive Coverage of All Chapters	All CLOs	Last Week of Semester	Face-to-Face



25. Course Requirements:

Whiteboard, Data Show, Microsoft Teams (each student must have Account on Microsoft Teams)

26. Course Policies:

Attendance is essential to succeeding in this course. You are expected to attend every class; please notify your instructor if you know you will be absent. All exams must be taken at the scheduled times. Exceptions will be made only in extreme circumstances by prior arrangement with the instructor.

If a student is absent for more than 15% of the lectures without a valid excuse (such as sickness or other unavoidable circumstances), they will not be allowed to take the final examination and will receive a failing grade in the course.

Students who need to be excused from exams due to medical reasons should provide a medical certificate to the University Physician for approval. The approved certificates should then be submitted to the Dean of the Faculty within two weeks of the student no longer attending classes.

After grading, test papers will be returned to the students. One week after the papers are returned, the student's mark will be considered final.

Cheating is strictly prohibited in this course. Any student found cheating in exams or homework will be subject to the University's cheating regulations, which will be enforced without exception.

27. References:

A- Required book (s), assigned reading and audio-visuals: Bain, L. J. and Engelhard, Introduction to Probability and Mathematical Statistics.

B- Recommended books, materials, and media: Hog, R. V. and Craig, A. T., Introduction to Mathematical Statistics, 5th edition, Prentice-Hall 1995.



28. Additional information:

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Name of the Instructor or the Course Coordinator: Prof. Amal Helu	Signature:	Date: 08/10/2025
Name of the Head of Quality Assurance Committee/ Department: Prof. Manal Ghanem	Signature:	Date:
Name of the Head of Department: Prof. Baha Alzalg.	Signature:	Date:
Name of the Head of Quality Assurance Committee/ School of Science: Prof. Emad A. Abuosba	Signature:	Date:
Name of the Dean or the Director: Prof. Mahmoud I. Jaghoub	Signature:	Date: