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**	**Mathematical Statistics**
2.	**Course Number**	0331431
3.	**Credit Hours (Theory, Practical)**	3
	Contact Hours (Theory, Practical)	3
4.	**Prerequisites/ Corequisites**	0301333
5.	**Program Title**	B.Sc. Mathematics
6.	**Program Code**	
7.	**School/ Center**	Science
8.	**Department**	Mathematics
9.	**Course Level**	Mandatory Specialization Requirements
10.	**Year of Study and Semester (s)**	3rd or 4th year, 1st and 2nd or summer semester
11.	**Other Department(s) Involved in Teaching the Course**	None
12.	**Main Learning Language**	English
13.	**Learning Types**	■ Face to face learning ☐Blended ☐Fully online
14.	**Online Platforms(s)**	■ Moodle ■ Microsoft Teams
15.	**Issuing Date**	15/10/2024
16.	**Revision Date**	

17. Course Coordinator:

Name: Dr. Maalee Almheidat Contact hours: 10:00-11:30 AM (Mon, Wed)

Office number: Math. Dpt. 328 Phone number:

Email: m.almheidat@ju.edu.jo

18. Other Instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
Office number:
Phone number:
Email:
Contact hours:

19. Course Description:

As stated in the approved study plan. Estimation: point estimation, confidence interval; statistical test: Neyman-Pearson Theorem, UMP test; likelihood ratio tests, chi-square tests, SPRT; non -parametric methods; Sufficient statistics and its properties; complete statistics exponential family; Fisher Information and the Rao-Cramer inequality.

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)

1. 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.
2. Formulate or design a system, process, procedure or program to meet desired needs.
3. Develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions.

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. Find the Sampling distributions of some statistics.
2. Understand the main idea of estimation theory (interval and point estimate) and compute some types of estimators for a parameter like the maximum likelihood estimators, the method of moment estimators and the Bayes estimators. Construct a confidence interval using the pivotal quantity method and the general method.
3. Verify if a given estimator is unbiased, consistent, and efficient or not.

4. Know the concepts of sufficiency and completeness. And how to check these properties for a given estimator. Use sufficiency and completeness concepts to construct the uniformly Minimum Variance Unbiased Estimator for an unknown parameter and for a function of the unknown parameter.
5. Understand the concept of testing hypotheses problem and known the types of errors that can be committed in such problems, besides concept of the power function of a statistical test.
6. Carryout the following tests: The most powerful test, the likelihood ratio test, the Goodness of fittest, and some non-parametric tests.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
CLO (1)	●		●			
CLO (2)		●	●			●
CLO (3)		●			●	
CLO (4)	●	●	●		●	
CLO (5)		●	●	●		●
CLO (6)	●		●	●	●	

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

Program SO's / Course CLO'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)	●	●	●					

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	1.1	Welcoming students. Discussing the Syllabus. Review of the main ideas of the prerequisite course.	1	F	Teams	S	Exam	Text Book
	1.2	Review of the main ideas of the prerequisite course	1	F	Teams	S	Exam	Text Book
2	2.1	**8. Statistics and Sampling Distributions** 8.1 Introduction	1	F	Teams	S	Exam	Text Book
	2.2	8.2 Statistics 8.3 Sampling distributions	1	F	Teams	S	Exam	Text Book
3	3.1	8.3 Sampling distributions 8.4 The t, F, and beta distributions	1	F	Teams	S	Exam	Text Book
	3.2	8.5 Large-sample approximations	1	F	Teams	S	Exam	Text Book
4	4.1	**9. Point Estimation** 9.2 Some method of estimation	2	F	Teams	S	Exam	Text Book
	4.2	9.2 Some method of estimation	2	F	Teams	S	Exam	Text Book
5	5.1	9.3 Criteria for evaluating estimators	2	F	Teams	S	Exam	Text Book
	5.2	9.3 Criteria for evaluating estimators	3	F	Teams	S	Exam	Text Book
6	6.1	9.4 Large-sample properties	3	F	Teams	S	Exam	Text Book
	6.2	9.5 Bayes and minimax estimators	3	F	Teams	S	Exam	Text Book
7	7.1	**First Exam**		F				
	7.2	**10. Sufficiency and Completeness** 10.2 Sufficient statistics	4	F	Teams	S	Exam	Text Book

8	8.1	10.3 Further properties of sufficient statistics	4	F	Teams	S	Exam	Text Book
	8.2	10.3 Further properties of sufficient statistics	4	F	Teams	S	Exam	Text Book
9	9.1	10.4 Completeness and exponential class	4	F	Teams	S	Exam	Text Book
	9.2	10.4 Completeness and exponential class	4	F	Teams	S	Exam	Text Book
10	10.1	**11. Interval Estimation** 11.2 Confidence intervals	2	F	Teams	S	Exam	Text Book
	10.2	11.2 Confidence intervals	2	F	Teams	S	Exam	Text Book
11	11.1	11.3 Pivotal quantity method	2	F	Teams	S	Exam	Text Book
	11.2	11.4 General method	2	F	Teams	S	Exam	Text Book
12	12.1	11.6 Bayesian interval estimation	2	F	Teams	S	Exam	Text Book
	12.2	**Second Exam**		F				
13	13.1	**12. Tests of Hypotheses** 12.2 Composite hypotheses	5	F	Teams	S	Exam	Text Book
	13.2	12.2 Composite hypotheses	5	F	Teams	S	Exam	Text Book
14	14.1	12.3 Tests for normal distribution	5,6	F	Teams	S	Exam	Text Book
	14.2	12.4 Binomial tests 12.5 Poisson tests	6	F	Teams	S	Exam	Text Book
15	15.1	12.6 Most powerful tests	6	F	Teams	S	Exam	Text Book
	15.2	12.7 Uniformly most powerful tests 12.8 Generalized likelihood ratio tests	6	F	Teams	S	Exam	Text Book

24. Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
First Exam	20%		1, 2, 3	6-8	On Campus
Second Exam	30%		2,4	11	On Campus
Final Exam	50%		5,6	Final Exam period	On Campus

25. Course Requirements:

Each student must have:

- Account on Microsoft Teams
- Access to E-learning

26. Course Policies:

General Course Policies:

Attendance Policy:

Attendance is expected. Arrival on time is expected. Students who miss more than three class sessions with or without excuse will be dismissed from the course automatically. (See the university policies regarding absence).

Cell Phone Policy:

Cell phones should be turned off during class time. Disruption of class by ringing cell phones and cell phone conversations is inconsiderate of fellow students and faculty.

Examination Policy:

Students unable to take a scheduled exam are expected to inform the instructor within 3 days and make arrangements for a make-up one. Make ups will be given only to students who have notified the instructor and set up an alternate time. Any missed exam will result in a grade of zero for that particular examination type.

Academic Integrity:

Work submitted to the course instructor is assumed to be an expression of original ideas by the student. All students in this course are expected to adhere to university standards of academic integrity. Appropriate citation of the intellectual property of other authors is expected. Cheating, plagiarism, and

other forms of academic dishonesty will neither be accepted nor tolerated. This includes, but is not limited to, consulting with another person during an exam, turning in written work that was prepared by someone other than you, and making minor modifications to the work of someone else and turning it in as your own. Ignorance will not be permitted as an excuse. If you are not sure whether something you plan to submit would be considered either cheating or plagiarism, it is your responsibility to ask for clarification.

Communications:

Contact by an email is highly encouraged and preferred. Other than contacts by an email, contacts should take place during announced office hours and/or ONLY by appointment. Contact on phones, preferably office number, also is welcomed during working hours.

27. References:

A- Required book (s), assigned reading and audio-visuals:

Bain, L. J. and Engelhardt, M. Introduction to Probability and Mathematical Statistics.

B- Recommended books, materials, and media:

Hogg, R.V. and Craig, A.T., Introduction to Math. Statistics, Fifth Edition, Printice-Hall 1995.

Irwin Miller, I., Miller, M. *John E. Freund's Mathematical Statistics with Applications*, 8th Edition, Pearson, 2014.

28. Additional information:

Name of the Instructor or the Course Coordinator: **Dr. Maalee Almheidat**	Signature: ……	Date: ……
Name of the Head of Quality Assurance Committee/ Department: **Dr. 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: ……