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| 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 | |
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| | Number of Pages | 08 |

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| 1. | Course Title | Biostatistics |
| 2. | Course Number | 0341737 |
| 3. | Credit Hours (Theory, Practical) | 3 |
| | Contact Hours (Theory, Practical) | 3 |
| 4. | Prerequisites/ Corequisites | None |
| 5. | Program Title | M.Sc. Mathematics |
| 6. | Program Code | |
| 7. | School/ Center | Science |
| 8. | Department | Mathematics |
| 9. | Course Level | Compulsory (Non-Mathematics majors) |
| 10. | Year of Study and Semester (s) | Master |
| 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 | 29-10- 2024 |
| 16. | Revision Date | |

17. Course Coordinator:

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|-------------------------|---|
| Name: Dr. Osama Alkam | Contact hours: 2:30 Sun., Tues. and 4:00 Mon., Wed. |
| Office number: Math 309 | Phone number: 0096265355000 Ext. 22101 |
| Email: oalkam@ju.edu.jo | |



18. Other Instructors:

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

19. Course Description:

Organizing and summarizing sample data (qualitative / quantitative), Probability concepts and Probability Laws, Conditional probability, statistical distributions of random variables (Binomial, Poisson and Normal), Central Limit Theorem and the Sampling distributions (χ^2 , t and F), estimation (point /interval) and hypotheses tests about population means, proportions and variances using large and small samples, Statistical errors and the p-value, analysis of variance, regression analysis and Correlations.

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)

3. Communicates with mathematical and statistical ideas clearly and consistently, in writing and verbally.
4. formulate efficiently mathematical and statistical problems, model real-life problems and then solve them in theory or digitally using technology tools.
6. Apply knowledge and mathematical tools and think creatively to solve real life problems and then verify and interpret the results correctly.



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. Understand the basic concepts and terminology of Biostatistics including the various kinds of variables and also the various techniques of sampling and measurement scales.
2. Understand the steps of the scientific method for solving problems including the design of the experiments (or surveys) to properly collect and analyze data from real-life problems.
3. Know how raw sample data can be organized and displayed in frequency tables and numerically summarized using statistical summary measures of location, dispersion, and otherwise.
4. Utilize probability theory to describe the likelihood of events from random phenomena employing counting rules and probability laws.
5. Apply Bayes Rule for calculating screening test results including: test's sensitivity, specificity, error probabilities of false positive and false negative and also test's predictive value positive/negative.
6. Understand random variables (discrete or continuous) and their probability distributions for describing quantitative randomness of random phenomena in the field of Biostatistics.
7. Understand discrete/continuous probability distributions (Binomial, Poisson and Normal) for describing and modeling random phenomena then calculating various probabilities from these distributions.
8. Understand sampling distributions for the sample statistics (mean, proportion, standard deviation) and the sampling distributions for the difference between two sample means/proportions and two variances.
9. Make good use of the sampling distributions of (Z, Student t, Chi-square and F) for statistical inference of (1) interval estimation of population unknown parameters (2) hypothesis testing about population parameters.
10. Distinguish between statistical inferences based on paired comparisons and those based on unpaired comparisons.
11. Understand how to correctly state null and alternative hypotheses, how to carry out hypotheses tests for parameters of a single population and how to compute the observed level of significance (i.e. p-value) and how to make statistical comparisons of parameters for double, and multiple populations.
12. Know and apply the concepts of correlation and simple linear regression and make inference about them.

| Course CLOs | The learning levels to be achieved | | | | | |
|-------------|------------------------------------|---------------|----------|-----------|------------|----------|
| | Remembering | Understanding | Applying | Analyzing | evaluating | Creating |
| 1 | | • | • | | | |
| 2 | | • | • | | | |
| 3 | | • | • | • | • | • |
| 4 | • | • | • | • | • | |
| 5 | • | • | • | • | • | |
| 6 | | • | • | | | |



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|----|---|---|---|---|---|---|
| 7 | • | • | • | • | • | |
| 8 | • | • | • | • | | |
| 9 | | • | • | • | • | |
| 10 | | • | • | | | |
| 11 | | • | • | | | |
| 12 | • | • | • | • | • | • |

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) |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | | | • | • | | • | | |
| 2 | | | • | • | | • | | |
| 3 | | | • | • | | • | | |
| 4 | | | • | • | | • | | |
| 5 | | | • | • | | • | | |
| 6 | | | • | • | | • | | |
| 7 | | | • | • | | • | | |
| 8 | | | • | • | | • | | |
| 9 | | | • | • | | • | | |
| 10 | | | • | • | | • | | |
| 11 | | | • | • | | • | | |
| 12 | | | • | • | | • | | |



23. Topic Outline and Schedule:

The following is a rough plan based on *Mathematica*. As the course progresses, new topics may be included and/or some of the ones listed here may be deleted.

| Week | Lecture | Topic | CLO/s Linked to the Topic | Learning Types (Face to Face (FF)/ Blended (BL)/ Fully Online (FO)) | Platform Used | Synchronous / Asynchronous Lecturing | Evaluation Methods | Learning Resources |
|------|---------|---|---------------------------|--|------------------|--------------------------------------|--------------------|------------------------------------|
| 1 | 1.1 | Chapter 1. Introduction | 1,2 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 1.2 | Chapter 2. Descriptive Statistics. | 3 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 2 | 2.1 | Chapter 2. Descriptive Statistics. | 3 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 2.2 | Chapter 2. Descriptive Statistics. | 3 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 3 | 3.1 | Chapter 3. Some Basic Probability Concepts | 4 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 3.2 | Chapter 3. Some Basic Probability Concepts | 4 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 4 | 4.1 | Chapter 3. Some Basic Probability Concepts. | 5 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 4.2 | Chapter 4. Probability Distributions. | 6 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 5 | 5.1 | Chapter 4. Probability Distributions. | 6 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 5.2 | Chapter 4. Probability Distributions. | 7 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 6 | 6.1 | Chapter 4. Probability Distributions. | 7 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 6.2 | Chapter 5. | 8 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |



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| | | Some Important Sampling Distributions. | | | | | | |
| 7 | 7.1 | Chapter 5. Some Important Sampling Distributions. | 8 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 7.2 | Chapter 5. Some Important Sampling Distributions. | 8 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 8 | 8.1 | Chapter 6. Estimation. | 9 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 8.2 | Chapter 6. Estimation. | 9 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 9 | 9.1 | Chapter 6. Estimation. | 9 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 9.2 | Chapter 6. Estimation. | 9,10 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 10 | 10.1 | Chapter 6. Estimation. | 9,10 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 10.2 | Chapter 7. Hypothesis Testing. | 11 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 11 | 11.1 | Chapter 7. Hypothesis Testing. | 11 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 11.2 | Chapter 7. Hypothesis Testing. | 11 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 12 | 12.1 | Chapter 7. Hypothesis Testing. | 11 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 12.2 | Chapter 7. Hypothesis Testing. | 11 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 13 | 13.1 | Chapter 8. Analysis of Variance. | 11 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 13.2 | Chapter 8. Analysis of Variance. | 11 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| 14 | 14.1 | Chapter 9. Simple Linear Regression and Correlation. | 12 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 14.2 | Chapter 9. Simple Linear Regression and Correlation. | 9, 11, 12 | Face to Face | Moodle and | | Exam | Lecture notes slides and textbook. |
| 15 | 15.1 | Revision. | 1-12 | Face to Face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |
| | 15.2 | Revision | A1 to D2 | Face-to-face | Moodle and Teams | | Exam | Lecture notes slides and textbook. |

**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 |
|---------------------|------|----------------------|---|---------------|-----------|
| Exam #1 | 30 | Chapters 1,2, and 3. | 1,2,3,4, and 5 | 7 | On Campus |
| Midterm | 30 | Chapters 4,5, and 6. | 6,7,8,9, and 10 | 12 | On Campus |
| Final Exam | 40 | | 1 to 12 with emphasis on 11 and 12 | | On Campus |

25. Course Requirements:

Each student must have:

- Account on Microsoft Teams

26. Course Policies:

1. Attendance of the lectures is compulsory. Any student unable to attend is required to notify the instructor in advance. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. Students who are absent for more than 10% of the lectures without an excuse of sickness or due to other insurmountable difficulty, will be barred from the final examination also will get a failing grade in this course.
3. Student who are absent for more than 20% of the lectures with an excuse of sickness or due to other insurmountable difficulty, will be dropped from the course.
4. Medical certificates should be approved by an authorized University physician to be accepted. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.
5. Students are allowed to bring a single A4 paper (double-faced) with formulas and equations written on it.
6. Students are asked to bring a clean copy of all relevant statistical tables to the midterm and final exam.
7. Cheating by any means, electronic or otherwise is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats on exams or on homework.



27. References:

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

1. Lecture notes: slides by Dr. Osama Alkam.
2. Biostatistics: a foundation for analysis in the health sciences, 10th edition, Daniel and Cross, John Wiley and Sons 2014.

B- Recommended books, materials, and media:

1. Fundamentals of Biostatistics, Rosner 8th edition, Cengage.
2. Biostatistics, 2nd edition by Gerald van Belle and others. Wiley Interscience 2004.
3. Introductory Biostatistics for the Health Sciences, Michael R. Chernick and Robert H. Friis, Wiley Interscience.

28. Additional information:

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| Name of the Instructor or the Course Coordinator: Dr. Osama Alkam | Signature: | Date: 29 – 10–2024 |
| 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: |