The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

Course Name: Probability Theory
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

B.Sc.

6. Program code

7. Awarding institution

The University of Jordan

8. Faculty

Science

9. Department

Mathematics

10. Level of course

College requirement

11. Year of study and semester (s)

all Semesters

12. Final Qualification

B.Sc. in Mathematics

13. Other department (s) involved in teaching the course

None

14. Language of Instruction

English

15. Date of production/revision

1.11.2017

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Morad Ahmad

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. 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.
# 19. Course aims and outcomes:

## A- Aims:

1. Identify the stochastic experiments and choose the proper model.
2. Handle different probability distributions: p.d.f., m.g.f., moments.
3. Find the distributions of functions of random variables.
4. Find limiting distributions (central limit theorem and convergence of random variables).

## B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to ...

Successful completion of the course should lead to the following outcomes:

### A. Knowledge and Understanding Skills: Student is expected to

A1. Define a probability set function and be able to:
   - (a) Verify whether a given set function is a probability set function or not.
   - (b) Find the values of summations or integrals related to some probability set function.
   - (c) Prove some important properties of probability set functions.

A2. Define the random variable and its probability distribution and characterize the distribution by the probability density function and the distribution functions.

A3. Know the definitions and the properties of some special distributions like:
   - (a) Discrete Distributions: Binomial and multinomial, Poisson, geometric, and negative binomial.
   - (b) Continuous. Normal, gamma, chi-square, t-dist’n, F-distribution, and Beta-distribution.

A4. Know the different types of convergence of random variables (convergence almost surely, convergence in $L^p$, convergence in probability and convergence in distribution) and the relations between these types of convergence.

A5. Know the central limit theorem (statement and proof) and know when and how to use it to approximate the distribution of some functions of random variables.

### B. Intellectual Analytical and Cognitive Skills: Student is expected to

B1. Understand the concept of “laws of large number” and prove the strong and the weak laws of large numbers.

### C. Subject- Specific Skills: Student is expected to

C1. Construct the probability model for random experiments.
C2. Use the properties of distributions to find moments and probability distribution of functions of random variables.

### D. Creativity /Transferable Key Skills/Evaluation: Student is expected to

D1. Find some mathematical terms related to random variable like, the $k^{th}$ moment, the mean and the variance, and the moment generating function and how to use it to find the moments of a given random variable.
20. Topic Outline and Schedule:

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<th>Topic</th>
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<th>Instructor</th>
<th>Achieved ILOs</th>
<th>Evaluation Methods</th>
<th>Reference</th>
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<td>A1</td>
<td>Exam</td>
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<tr>
<td>Random variables.</td>
<td>2-3</td>
<td>A2, D1</td>
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<td>Special distributions.</td>
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<td>A3, C1, D1</td>
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<td>Properties of random variables.</td>
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<td>D1</td>
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<tr>
<td>Distributions of functions of random variables.</td>
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<td>A4, A5, B1</td>
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21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.
- The instructor will spend most of the class time on presenting the new material as well as on discussing homework problems.
- Group work in this class is encouraged.
- To actively participate in class, you need to prepare by reading the textbook and to do all assigned problems before class. (Problems will be assigned each class period, then to be discussed the following period).
- You should be prepared to discuss your homework at each class meeting.
- You are encouraged to work together with other students and to ask questions and seek help from your professor, both in and out of class.
- Students are also encouraged to use graphing calculators extensively and to use computer software supplements.

22. Evaluation Methods and Course Requirements:

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

<table>
<thead>
<tr>
<th>ILO/s</th>
<th>Learning Methods</th>
<th>Evaluation Methods</th>
<th>Related ILO/s to the program</th>
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<tr>
<td>Lectures</td>
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<td>Exam</td>
<td>A1,A2,A3,B1,D2</td>
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</table>
23. Course Policies:

1. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to 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.

2. If a student is absent for more than 10% of the lectures without an excuse (of sickness or due to other insurmountable difficulty), then the student shall be barred from sitting for the final examination. Also he/she will get a failing grade in this course.

3. Medical certificates for excuses of exam absences should be introduced to the University Physician for authorization. These authorized certificates should also be presented to the Dean of the Faculty within two weeks of the student’s ceasing to attend classes.

4. Test papers shall be returned to students after correction, where the student mark is considered final after a lapse of one week following their return.

5. Cheating is prohibited, where University cheating regulations will be applied on any student who cheats in exams or on home works.

24. Required equipment:

Data Shows

25. References:

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

B- Recommended books, materials, and media:
26. Additional information:

Name of Course Coordinator: Dr. Morad Ahmad  Signature:  ----------------------- Date: 1/11/2017

Head of curriculum committee/Department: Dr. Emad Abu Osba Signature:  -----------------------

Head of Department: Dr. Baha Alzalg Signature:  -----------------------

Head of curriculum committee/Faculty: Dr. Amal Al-Aboudi Signature:  -----------------------

Dean: Dr. Sami Mahmoud Signature:  -----------------------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File