Philadelphia University
Department of Basic Sciences and Mathematics

First Semester | Course Syllabus | 2014/2015

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| **Course Title** | Mathematical Statistics |
| **Course Code** | 0250332 |
| **Lecturer** | Ahmad Hamdan |
| **Office Room** | 1019 S (Ext. 2466) |
| **Office Hours** | Sun. Tue. Thu. 9:00-10:00, Mon. Wed. 10:00-11:00 |
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**Course Description**

This is an introductory course in mathematical statistics. Topics will include Functions of Random Variables, Basic Concepts and Examples, The Expected Value and Moments, Random Vectors, Joint and Marginal Distributions, Independence, Transforms and Sums, Probability Generating Function, Moment Generating Function, Linear Combination of Normal Random variables, and Point Estimation, Unbiased Estimators, Method of The Maximum Likelihood.

**Topics by the Week**

| Week | Topics |
|---|---|
| 1-4 | **Functions of random variables:** Basic concepts, some examples, of discrete and continuous cases, Invertible functions of continuous random variables, expected values for functions of random variables, the $k^{th}$ moment of X, variance, the Normal distribution. |
| 5-8 | **Random Vectors:** Basic concepts, definition, joint distributions, discrete and continuous distributions, marginal distributions, functions of random vectors, independent random variables, expectation and random vectors, conditional distributions. |
| 9-12 | **Transforms and Sums:** Notation, probability generating function ($p.g.f$), moment generating function ($m.g.f.$), linear combination of normal random variable, the distribution of sample mean. |
| 13-14 | **Estimation:** Basic concepts, random samples, statistics, point estimation, unbiased estimators, finding estimators, the method of maximum likelihood. |
| 15 | **Problem solving.** |
| 16 | Review & Final Exams. |

**Course Objectives** Upon completion of the course, the student will be able to:

- find pdf's of discrete and continuous random variables,
- understand and apply the concepts of transformation of random variables,
- deal with order statistics and find their distributions,
- learn the methods of moments and maximum likelihood for estimation,
- understand point and interval estimation for population parameter,

- test hypotheses about population parameters,
- understand the mathematics needed in statistical methods.

**Learning Outcomes**

- Knowledge and understanding: The student will have the knowledge and understanding of how to apply statistical concepts and theorems into real world problems. The course also serves as a prerequisite to other statistics courses.

**Assessment Distribution**

Students will be assessed based on a 100 total marks, which are distributed as follows.

| Exam Type | Expected Time | Points Allocated |
|---|---|---|
| First | 19/11/2014 - 27/11/2014 | 20% |
| Second | 28/12/2014 - 6/1/2015 | 20% |
| Quizzes | quizzes & homeworks | 20% |
| Final | 1/2/2015 - 9/2/2015 | 40% |

**Textbook and Supporting Materials**

– Robert Bartoszynski, and Magdalena Niewiadomska-Bugai, **Probability and Statistical Inference, 2nd Edition**, John Wiley & Sons, Inc. 2008.

– Dr. Jaffar Almousawi, **Lecture Notes in Mathematical Statistics**.

– Paul G. Hoel, **Introduction to Mathematical Statistics, 5th Edition**, John Wiley & Sons, Inc. 1984.

**Class Attendance**

Attendance is expected of every student. Being absent is not an excuse for not knowing about any important information that may have been given in class. Under the University's regulations, a student whose absence record exceeds 15% of total class hours will automatically fail the course. Students who in any way disrupt the class will be expelled from the classroom and will not be allowed to return until the problem has been resolved.

**Late Exams**

Late (make-up) exams will be given only to students who have a valid excuse and are able to provide a written document for its verification. The level of difficulty of a late exam is about 50% higher than that of the corresponding regular exam. All late exams will be conducted during the last week of the semester. Each student is allowed only one make-up in a semester, either for the first exam or the second, but not both. There is no make-up for a late exam.

AHMAD HAMDAN
SEPTEMBER 24, 2014