1. **Basic Information**

**Course Title**: Modern Topics in Statistics and Probability **Code**: **EMM 703 Units: 3**

**Lecture**: 3 **Tutorial**: - **Practical**: - **Total:** 3

**Program on which the course is given:**  Doctor of Philosophy Courses in Engineering Mathematics

**Major or minor element of program:** Major

**Department offering the program:** Department of Engineering Mathematics and Physics

**Department offering the course:** Department of Engineering Mathematics and Physics

**Academic year / level:** Academic year2014 / 2015 First Semester

**Date of specifications approval:**  December 2015

1. **Professional Information**
2. **Overall aims of course**

By the end of the course the students will be able to:

* Recognize the work of Kolmogorov and Wiener, probability theory after WW II.
* Identify its connections with PDEs and harmonic analysis with great success.
* Deal with Statistics as a mathematical field with many important scientific and engineering applications.

1. **Intended Learning outcomes of Course (ILOs)**
2. **Knowledge and Understanding:**

2.1.1 Identify theories, fundamentals of. probability theory

2.1.2 Define the probability distributions and the work of Kolmogorov.

2.1.4 List the principles and fundamentals of harmonic analysis.

2.1.5 Explain the engineering applications related to probability studies.

1. **Intellectual Skills**

2.2.1 Analyze Statistics as a mathematical field

2.2.4 Write scientific reports on probability theories.

2.2.9 Interpret with discussion related to the applications of the Statistical field in engineering

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1. **Professional and Practical Skills**

2.3.1 Apply professional skills in probability theory.

1. **General and Transferable Skills**

2.4.1 Communicate effectively with continuous researches to the topics related with the subject

2.4.5 Use various probability distributions related to applications in our life

2.4.6 Work in a group and lead work teams.

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1. **Contents**

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| **No** | **Topic** | **No. of hours** | **Teaching / learning methods and strategies** | **Assessment method** |
| 1 | work of Kolmogorov 1 | 3 | Lectures | Assignments |
| 2 | work of Kolmogorov 2 | 3 | Lectures | Assignments |
| 3 | work of Wiener 1 | 3 | Lectures | Mid-term exam, Final exam |
| 4 | work of Wiener 2 | 3 | Lectures | Quiz  Mid-term exam, Final exam |
| 5 | probability theory after WW II | 3 | Class activity, Tutorial | Assignments  Mid-term exam, Final exam |
| 6 | Probability theory after WW II concentrated on its connections with PDEs and harmonic analysis with great success. | 3 | Lectures, Tutorial | Mid-term exam, Final exam |
| 7 | some of the most delicate results in modern harmonic analysis | 3 | Lectures | Assignments  Mid-term exam, Final exam |
| 8 | Mid-term Exam |  | -- | Mid-Term exam |
| 9 | foundation on which signal processing and filtering theory are built in engineering | 3 | Lectures | Quiz, Final exam |
| 10 | Combinatorial branches of probability theory were overshadowed during that period but are now returning to the fore. | 3 | Lectures | Assignments, Final exam |
| 11 | Statistics is a mathematical field with many important scientific and engineering applications.1 | 3 | Lectures | Quiz, Final exam |
| 12 | Statistics is a mathematical field with many important scientific and engineering applications.2 | 3 | Lectures, Tutorial | Assignments, Final exam |
| 13 | Statistics is a mathematical field with many important scientific and engineering applications.3 | 3 | Lectures, Tutorial | Quiz, Final exam |
| 14 | Review of Statistics and Probability in the last 10 years. | 3 | Class activity, Tutorial | Assignments, Final exam |
| 15 | Final Exam |  |  |  |

1. **Teaching and Learning Methods**
   1. Lectures
   2. Class activity
   3. Self study
   4. Research assignments and the use of internet. 
2. **Student Assessment Methods**
   1. Homework assignments and others
   2. Quiz to assess student’s creativity and problem assessments.
   3. Final exam to assess understanding and scientific knowledge. 

Assignments to assess 2.1.1, 2.1.2, 2.1.4, 2.1.5, 2.2.1, 2.2.4, 2.2.7, 2.3.1, 2.4.1, 2.4.5, 2.4.6

Quiz to assess 2.1.2, 2.1.4, 2.1.5, 2.2.1, 2.2.4, 2.2.7

Mid-Year exam to assess 2.1.1, 2.1.2, 2.1.4, 2.1.5, 2.2.1, 2.2.4, 2.3.1

Final exam to assess 2.1.1, 2.1.2, 2.1.4, 2.1.5, 2.2.1, 2.2.4, 2.2.7, 2.3.1

1. **Assessment schedule**

Assessment 1 All weeks 

Assessment 2 Quizzes

Assessment 3 Final exam on the 15thweek

1. **Weighting of Assessments**

Final- Term Examination 67 %

Oral Examination 00 %

Practical Examination 00 %

Year Work 33 %

Other 00 %

Total 100 %

1. **List of References**
   1. Course Notes

* Lecture material and training sheets
  1. Essential Books (Text Books)
* A Course In Probability Theory - Chung K L
* Applied Probability - Lange K.
* Applied Probability and Stochastic Processes - Bryc
* Applied Statistics And Probability For Engineers - Montgomery && Runger
  1. Recommended Books

Recent Advances in Applied Probability - Springer

* 1. Periodicals Web sites, etc
* [www.Google.com](http://www.Google.com)

1. **Facilities Required for Teaching and learning**

White board, prepared notes, Sheets and solving problems.

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| **Course coordinator:** Prof. Dr. Mohamed Abd El Wahab Mahmoud |  |
| **Course instructor** Prof. Dr. Mohamed Abd El Wahab Mahmoud |

**Head of department: Prof. Dr.** Said Abdallah **Date: 28 / 7 / 2015**