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**DEPARTMENT OF ELECTRICAL ENGINEERING**

**Course Descriptive File**

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| 1 | Course Title | **Probability Methods in Engineering** |
| 2 | Course Code | EE-309 |
| 3 | Credit Hours | 3.0 |
| 4 | Pre-requisites | Calculus and Analytical Geometry |
| 5 | Co-requisites | N/A |
| 6 | Semester | 4th |
| 7 | Resource Person | Asima Kiran |
| 8 | Contact Hours (Theory) | 48 |
| 9 | Contact Hours (Lab) | 0 |
| 10 | Office Hours | 8-10 am |
| 11 | Email | raani.sweeto@gmail.com |
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| 12 | Course Outline as per Scheme of Studies ( SoS) | |
| * Basic probability concepts, conditional probability, Bayes' theorem * Random variable, probability density function, cumulative distribution function * Specific random variable discrete as well as continuous * Moments and moment generating function * Law of large numbers * Basic statistical concepts, samples and sampling distributions * Parameter estimation, hypothesis testing and curve fitting | | |
| 13 | Course Objectives as per SoS | |
| After completion of the course students will be able to achieve axiomatic foundations of probability theory, random variables, distributions, and densities, functions of one and several random variables, moment generating functions, random vectors, sequences, convergence, random process, stationarity and second moment theory. | | |
| 14 | Books | |
| * 1. Alberto Leon-Garcia: Probability and Random Processes for Electrical Engineering. Prentice Hall, Inc. New Jersey, 3rd ed. 2008.   2. Peyton Z. Peeble Jr.: Probability and Random Variables and Random Signal Principles. McGraw Hill, 4th ed. 2001.   3. Richard L. Scheaffer and James T. McClave: Probability and Statistics for Engineers. Brooks/Cole, 5th ed. 2011. | | |
| 15 | Course Learning Outcomes (CLOs) | |
| 1. EXPLAIN basic probability concepts and their use in different problems 2. COMPARE different types of random variables and their usage in science and engineering 3. APPLY basic statistical techniques such as regression, curve fitting to engineering data | | |
| 16 | Marks Breakup | |
| |  |  |  |  | | --- | --- | --- | --- | | Quizzes | | 10% | | | Homework/assignments | | 10% | | | Midterm exam | | 30% | | | Terminal exam (3 hours) | | 50% | | | Total (theory) | 100% | |   Theory | | |

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| 16 | Weekly Lecture Plan | | | |
| **Week**  **(Lec)** | **Topics** | **CLOs** | **PLOs** | **Taxonomy Level** |
| **1** | Axiomatic Probability Theory  Independent Events | **1** | **2** | **2** |
| **2** | Total Probability Theorem and Bayes’ Theorem  Conditional Probability | **1** | **2** | **2** |
| **3** | Random Variables  Distribution and Density Functions of a single random  variable | **1,2** | **2** | **4** |
| **4** | Distribution and Density Functions of two or more random  Variables  Conditional distribution/density functions & Independence | **1,2** | **2** | **4** |
| **5** | Moments of a single random variable  Inequalities | **1,2** | **2** | **4** |
| **6** | Moments of two or more random variables  Moments of sum of random variables | **1,2** | **2** | **4** |
| **7** | Characteristic functions | **1,2** | **2** | **4** |
| **8** | Important discrete and continuous distributions | **1,2** | **2** | **4** |
| **9** | Mid-semester examination | **1,2** |  |  |
| **10** | Functions of one random variable, Y=g(X) | **3** | **4** | **3** |
| **11** | Functions of one random variable, Y=g(X) | **3** | **4** | **3** |
| **12** | Functions of two random variables, Z=g(X,Y) | **3** | **4** | **3** |
| **13** | Functions of two random variables, Z=g(X,Y) | **3** | **4** | **3** |
| **14** | Sum, Product  Random Vector  Correlation and Covariance Matrices | **3** | **4** | **3** |
| **15** | Mean square estimation | **3** | **4** | **3** |
| **16** | Introduction  Strict Sense Stationary  Wide Sense Stationary | **3** | **4** | **3** |
| **17** | Second Moment Theory | **3** | **4** | **3** |
|  | Final-semester examination | **2,3** | **4** | **3** |

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| **18** | **Course Learning Outcomes (CLOs) and Assessment Plan** |
| |  |  |  |  | | --- | --- | --- | --- | | CLO  Activity | CLO 1 | CLO2 | CLO3 | | | Quiz 1 | × | × |  | | Assignment 1 | × | × |  | | MID TERM EXAM | × | × |  | | Quiz 2 |  | × | × | | Assignment 2 |  | × | × | | FINAL TERM EXAM |  | × | × | | |