**COURSE DESCRIPTION FORM**

**INSTITUTION** National University of Computer and Emerging Sciences (NUCES-FAST)

BS(CS)

**PROGRAM (S) TO BE**

**EVALUATED**

1. **Course Description**

(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | MT-205 | | | |
| **Course Title** | Probability & Statistics | | | |
| **Credit Hours** | 3 | | | |
| **Prerequisites by Course(s) and Topics** | Calculus-I | | | |
| **Assessment Instruments with Weights** (homework, quizzes, midterms, final, programming assignments, lab work, etc.) | Mid-I: 15  Mid-II: 15  Assignments/Quizzes: 20  Final: 50 | | | |
| **Course Coordinator** | Mr. Osama Bin Ajaz | | | |
| **URL (if any)** |  | | | |
| **Current Catalog Description** | This course gives an introduction to Probability and Statistics from a computer science perspective, including many of the fundamental concepts and techniques that are most relevant to current research areas. Research in CS is fast-paced, and researchers often need to be proficient at manipulating data to draw insights and probe research questions. It will include the rudiments of probability and random variables, estimation, special distributions, sampling, hypothesis testing and regression analysis. | | | |
| **Textbook** (or **Laboratory Manual** for Laboratory Courses) | “Probability & Statistics for Engineers & Scientists”, Walpole, Myers, Myers YE, 9th Edition, Prentice Hall. | | | |
| **Reference Material** | 1. **Probability & Statistics for Engineering and The Sciences**, Jay L Devore 8th Edition 2. Introductory statistics , Neil A.Weiss , 9rd Edition | | | |
| **Course Goals** | |  | | --- | | **A. Course Learning Outcomes (CLOs)** | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **CLO** | **Course Learning Outcome (CLO) Statements** | **Domain** | **Taxonomy Level** | **PLO** | **Tools** | | 01 | **Describe** the fundamental concepts in Probability & Statistics | Cognitive | 02 | 02 | A1, M1, F | | 02 | **Analyze** the data and produce probabilistic models for different problems | Cognitive | 04 | 02 | A1, M1, F, M2, A2 | | 03 | **Apply** the rules and algorithms of Probability & Statistics to their relevant problems | Cognitive | 03 | 02 | A3, F | | |  | | --- | | *Tools: A = Assignment, M = Midterm, F=Final* | | | | | | |   **B. Program Learning Outcomes**   |  |  |  |  | | --- | --- | --- | --- | | **PLO 2** | Problem Analysis | Identify, formulate, research literature, and analyze complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences. | ✔ | |  |  |  |  | |  |  |  |  | |  |  |  |  | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C. Relation between CLOs and PLOs**  (CLO: Course Learning Outcome, PLOs: Program Learning Outcomes) | | | | | | | | | | | |  |  | |  | | **PLOs** | | | | | | | | | |  |  | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | | **CLOs** | 1 |  | ✔ |  |  |  |  |  |  |  |  |  |  | | 2 |  | ✔ |  |  |  |  |  |  |  |  |  |  | | 3 |  | ✔ |  |  |  |  |  |  |  |  |  |  | | 4 |  |  |  |  |  |  |  |  |  |  |  |  | |  | 5 |  |  |  |  |  |  |  |  |  |  |  |  | |  | 6 |  |  |  |  |  |  |  |  |  |  |  |  | |  | 7 |  |  |  |  |  |  |  |  |  |  |  |  | |  | 8 |  |  |  |  |  |  |  |  |  |  |  |  | | | | | |
| **Topics Covered in the Course, with Number of Lectures on Each Topic** (assume 15-week instruction and one-hour lectures) | |  |  |  |  | | --- | --- | --- | --- | | **1. Topics to be covered:** | | | | | List of Topics | No. of Weeks | Contact Hours | CLO | | **Descriptive statistics:**  Basic definition, Types of variables, Mean, Median, Mode, Variance, Standard Deviation, Quartiles, Deciles, Percentiles, IQ Range  **Graphical representation of data:**  Construction of bar chart, histograms, Stem-leaf plots, box plot, ogive, frequency curve, Skewness and Kurtosis.  **Sample Space and Event:**  Sample point, tree diagram, set theory, Venn diagram.  Counting techniques, Probability of an event, Additive rules | **4** | **12** | **1** | | Conditional Probability, Independence and Multiplicative rules. Bayes’ Rules | **1** | **3** | **2** | |  |  |  |  | | *========== MID 1 ==========* | | | | | Concept of random variable | **0.5** | **2** | **1** | | Discrete distribution, Continuous distribution, Joint distributions, marginal distributions, Mathematical Expectation, Correlation, binomial, Poisson, Normal and standard normal distributions | **3.5** | **10** | **2** | | Estimation, point estimate, interval estimate, confidence intervals, z and t distributions | **1** | **3** | **3** | | *========== MID 2 ==========* | | | | | Hypothesis testing, one sample z-test, two sample z-test, one sample t-test, two sample t-tests, p-value method | **2** | **6** | **3** | | Scattered diagram, correlation, coefficient of determination | **0.5** | **2** | **2** | | Simple and multiple regression analysis | **2.5** | **4** | **3** | | ANOVA | **1** | **3** | **3** | |  |  |  |  | | Total | **15** | **45** |  | | | | |
| **Laboratory Projects/Experiments Done in the Course** |  | | | |
| **Programming Assignments Done in the Course** |  | | | |
| **Class Time Spent on** (in credit hours) | **Theory** | **Problem Analysis** | **Solution Design** | **Social and Ethical Issues** |
| 30 | 10 | 5 | 0 |
| **Oral and Written Communications** | Every student is required to submit at least \_\_0\_\_ written report of typically \_0\_\_ pages and to make \_0\_\_ oral presentations of typically \_\_0\_\_ minute’s duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy. | | | |

**Instructor Name \_ Osama Bin Ajaz**

**Instructor Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**