**COURSE DESCRIPTION FORM**

**NUCES**

**INSTITUTION**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

MS (Data Science)

**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** | DS503 | | | |
| **Course Title** | Machine Learning for Data Science | | | |
| **Credit Hours** | 3 | | | |
| **Prerequisites by Course(s) and Topics** | DS501 Math/ Stat tools for Data Science | | | |
| **Assessment Instruments with Weights** (homework, quizzes, midterms, final, programming assignments, lab work, etc.) | 25% Mid term  25% Continuous assessment (quiz, assignment/ project)  50% Final Exam | | | |
| **Course Coordinator** | M. Shahzad | | | |
| **URL (if any)** | NA | | | |
| **Current Catalog Description** | NA | | | |
| **Textbook** (or **Laboratory Manual** for Laboratory Courses) | Introduction to Data Mining, by Tan, Steinbach, Kumar  Data Mining A Knowledge Discovery Approach by Cios, Pedrycz, Swiniarski, Kurgan  Machine Learning A Probabilistic Perspective by Kevin P. Murphy  The Elements of Statistical Learning Data Mining, Inference, and Prediction by Hastie, Tibshirani, Friedman. | | | |
| **Reference Material** | Same as above (recommended textbooks) | | | |
| **Course Goals** | The students should have a thorough knowledge of the working and steps of various important algorithms used in machine learning. After successfully completing this course the student would be able to design and analyze his own ML algorithm. | | | |
| **Topics Covered in the Course, with Number of Lectures on Each Topic** (assume 15-week instruction and one-hour lectures) | Introduction to machine learning, KNN algorithm, Cross Validation, Confusion Matrix (3 hours, 1 Week)  Decision Tree & Naïve Bayes classification (6 hours, 2 weeks)  Support vector machines, kernel tricks (3 hours, 1 week)  Neural Network (backpropagation) & Deep Learning (6 hours, 2 weeks)  Clustering (6 hours, 2 weeks)  Ensemble learning (6 hours, 2 weeks)  Regression techniques (6 hours, 2 weeks)  Association rule, aprior, FP-Tree algorithm(3 hours, 1 week)  Feature Selection, Class-imbalance (3 hours, 1 week)  Presentations (3 Hours, 1 week) | | | |
| **Laboratory Projects/Experiments Done in the Course** | None | | | |
| **Programming Assignments Done in the Course** | Students were given assignment which they had to complete using software tool of their choice (MATLAB, Python) | | | |
| **Class Time Spent on** (in credit hours) | **Theory** | **Problem Analysis** | **Solution Design** | **Social and Ethical Issues** |
| 25 | 7 | 7 | None |
| **Oral and Written Communications** | Every student is required to submit at least 1 written reports of typically 15-20 pages and to make 1 oral presentations of typically 20 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: M. Shahzad**

**Instructor Signature:**

**Date: 07/09/2020**