**NIIT University, Neemrana**

**CS 4131 { Machine Learning }**

**COURSE HAND OUT(2017-18)**

1. **General Information.**

Course Title/Number: CS 4131, Machine Learning

Course In-charge: Gaurav Sharma

LTPC: 3 1 0 4

E-Mail: [gaurav.sharma@niituniversity.in](mailto:%20gaurav.sharma@niituniversity.in)

Office Hours:

Text Book(s):

1. A First Course in Machine Learning (Chapman & Hall/Crc Machine Learning & Pattern Recognition) Hardcover – Import, 18 Nov 2011 by Simon Rogers (Author), Mark Girolami (Author) Publisher: Chapman and Hall/CRC (18 November 2011)
2. Machine Learning Paperback – 1 May 2013 by Tom M. Mitchell (Author) Publisher: McGraw Hill Education (India) Private Limited; First edition (1 May 2013)

Reference Book(s):

1. Introduction to Machine Learning 2e (OISC) (Adaptive Computation and Machine Learning Series) Hardcover – Import, 22 Jan 2010 by Ethem Alpaydin (Author) Publisher: MIT Press; 2nd Revised edition edition (22 January 2010)
2. Machine Learning: An Algorithmic Perspective, Second Edition (Chapman & Hall/Crc Machine Learning & Pattern Recognition) Hardcover – Import, 17 Nov 2014 by Stephen Marsland (Author)
3. Bayesian Reasoning and Machine Learning Paperback – 2014 by Prof David Barber (Author) Publisher: Cambridge University Press (2014)
4. **Course Objectives and Topics to be covered.** 
   1. Description: Machine Learning is concerned with computer programs that automatically improve their performance through experience. Topics such as Bayesian networks, decision tree learning, Support Vector Machines, statistical learning methods, unsupervised learning and reinforcement learning would be discuss in this course. Theoretical concepts such as inductive bias, the PAC (probably approximately correct) learning framework, Bayesian learning methods and margin-based learning would be discuss in the course.
   2. Topics to be covered/Lecture Plan

**Prerequisites: P**robability, linear algebra, statistics and algorithms.

**Topics to be covered:**

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| 1. Introduction to Machine Learning (1 Lecture) 2. Decision Trees learning (2 Lectures) 3. Review of Probability, Probability and Estimation (3 Lectures) 4. Naive Bayes, Gaussian Naive Bayes ( 2 Lectures) 5. Logistic Regression, (2 Lectures) 6. Linear Regression, (2 Lectures) 7. Graphical models, (4 lectures) 8. Computational Learning Theory, (3 Lectures) 9. Semi-Supervised Learning, (3 Lectures) 10. Hidden Markov Models, (5 Lectures) 11. Neural Networks, (3 Lectures) 12. Learning Representations, (3 Lectures) 13. Kernel Methods and SVM's, (3 Lectures) 14. Active Learning, (4 Lectures) 15. Reinforcement Learning, (4 Lectures) |

**Course Evaluation policy:**

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| **Evaluation Component** | **When** | **Evaluation Time** | **Mode of Examination** | **Weightage** |
| **Mid Semester Exam-1** | **TBA(To be announced)** | **1 Hour** | **Offline** | **20%** |
| **Mid Semester Exam-2** | **TBA(To be announced)** | **1 Hour** | **Offline** | **20%** |
| **Comprehensive Exam** | **TBA** | **2 Hour** | **Offline** | **30%** |
| **Project** | **TBA** | **During the Semester** | **-** | **20%** |
| **Attendance/Class Participation** | **TBA** | **During the Semester** |  | **10%** |

* **Make-up Policy:** Make ups for tests will be given to only genuine cases. The decision of the Course Instructor-in-charge in all these matters shall be important. However Instructor will abide by the rules of University and the Office of Dean Academics.
* **Grading Policy:** The Marks obtained in all the components of Evaluation shall be totaled and the final marks shall be converted in the letter grades, namely, A, B, C, D, E etc. The grading is relative and normally it is centered on the average in a class.
* **Plagiarism:** Plagiarism **in** assignments/Lab Experiments/Project or anywhere else will be dealt strongly. It may result in to disqualification of the assignment from evaluation. Repeated incidences may attract very severe action from University/Course Instructor. Please mind it carefully. ***IT IS TOTALLY UNACCEPTABLE.***
* **Mid Semester Grading:** Students will be graded based on the mid-sem exams. Grades will be shared with the students. Students may know their current performance and decide to put more efforts in the course for improvement in the course. Mid Semester Grading policy would be similar as specified above i.e. similar policy (as is followed for final grading of the course) will be followed for the mid semester grading also.
* **Attendance Policy:** All the students must abide by attendance policy of the University. This time none will be entertained for any said discrepancy in attendance after the class. It is Student’s responsibility to verify that his/her attendance is marked correctly at the respective class time itself.

**Note on Project Evaluation:**

The project will be evaluated based on following points:

1. **Applicability of the project Problem.**
2. **Novelty of the Project Problem.**
3. **Difficulty involved to solve the project problem.**
4. **Quality of the Data Set used for the project problem(Standard, openly availability, size)**
5. **Evaluation Methodology used for the evaluation of the Solution.**
6. **Coverage of the concept(s)/Tools/techniques used to solve the project problem.**

**It is highly encouraged to use Standard and openly available datasets( KDD cups, UCI datasets etc. ) for Validation of the solution framework.**