Course Number and Title: **CSE445** (Machine Learning)

Credits: 3 Credits

Type: Optional

Prerequisites:

Contact Hours: Lecture – 3 Hours/Week

**Course Description:**

Introduction to Machine learning algorithms. In this course, we will focus on major machine learning algorithms. The goal is to make the students capable of using popular machine learning algorithms for their problems at hand. After taking this course students will be able to find the most appropriate algorithms for a problem, compare alternative methods, and select the best one based on statistical measurements.

**Course Outcomes (COs):**

Upon successful completion of this course, students will be able to,

CO1: Use statistical measurements to find best solution for a problem - (Project Mid + Final)

CO2: Strategically find the best solution for a problem - (Project Mid+Final)

CO3: Build solutions using python-based machine learning programming tools (Project)

**Tentative week plan (may change later):**

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| Week | Topics |
| 1 | General Introduction |
| 2 | Machine learning overview & pipeline |
| 3 | Python Introduction |
| 4 | ML Programming tools |
| 5 | Basic Statistics |
| 6 | Statistical Tests |
| 7 | Class test 1 & discussion |
| 8 | Linear & Logistic regression |
| 9 | SVM |
| 10 | Project idea |
| 11 | Project idea |
| 12 | Model selection |
| 13 | Midterm |
| 14 | Neural Networks |
| 15 | Dimensionality reduction - PCA |
| 16 | Decision tree |
| 17 | Class test 2 & discussion |
| 18 | Ensemble Methods |
| 19 | Random Forest |
| 20 | Convolutional Neural Network |
| 21 | Class test 3 & discussion |
| 22 | Project presentation |
| 23 | Project presentation |
| 24 | General discussion |

**Grading points distribution:**

1. Attendance - 10%
2. Class test – 15%
   1. Best 2 out of 3
3. Project - 15% (Individual)
   1. Problem formulation - 5%
   2. Presentation - 5%
   3. Report - 5%
4. Midterm - 30%
5. Final - 30%

**Grading:**

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| **Numerical**  **Scores** | **Letter Grade** | **Grade Points**  **Per Credit** |
| 93+ | A | 4.0 |
| 90 - 92 | A- | 3.7 |
| 87 - 89 | B+ | 3.3 |
| 83-86 | B | 3.0 |
| 80 - 82 | B- | 2.7 |
| 77 - 79 | C+ | 2.3 |
| 73 - 76 | C | 2.0 |
| 70 - 72 | C- | 1.7 |
| 67 - 69 | D+ | 1.3 |
| 60 - 66 | D | 1.0 |
| 0 - 59 | F\* | 0.0 |
|  | I\*\* Incomplete | 0.0 |
|  | W\*\* Withdrawal | 0.0 |
|  | R\*\* Retaken | 0.0 |

**Policy:**

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| **Exams and Quizzes:** Exams and quizzes will be closed book and closed notes. No electronic devices except non-programmable calculators will be allowed during exams. Calculators cannot be shared with friends. **There will be no makeup quizzes or exams.** If you miss a quiz or exam, you will get zero for that. The final exam will be comprehensive. |
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| **Assignments:** There will be two home works/ Assignments throughout the semester. **No late submission will be accepted.** To be successful in the exam, you should solve homework problems independently, although you may discuss with your friends to understand a more comprehensive picture of the problems. |
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| **Class etiquette:** Distracting others in class is violating other's rights to be attentive. **So, laptops, tablets, cell phones or any other devices cannot be turned on during the class time.** You have to share any talk with the whole class. Attendance will be counted at the beginning of the class and if you are late then **no late attendance will be counted.** |
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| **Grade dispute:** If you dispute your grade on any homework, quiz or exam, you have one week time from the date that the graded paper was returned to you to request a change in the grade. After this time, no further change in grade will be considered. |
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| **General course administration:** The class presentations will be interactive lectures. The instructor will provide lecture slides after the lecture sessions. |
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| **Academic Honesty:** Any means of unauthorized assistance in preparing materials which a student submits as original work is deemed to be cheating and constitutes grounds for disciplinary action. Instructors are expected to use reasonably practical means of preventing and detecting cheating. Any student judged to have engaged in cheating might receive a reduced grade for the work in question, a failing grade in the course, or such other lesser penalty, as the instructor deems appropriate. Serious instances may be referred to the Disciplinary Committee in the Office of the Vice-Chancellor. |