APPLIED COMPUTER SCIENCE DEPARTMENT

GACS-7206-001 Advanced Machine Learning

Instructor Information

Instructor: Dr. Sheela Ramanna   **Office:** 3D15
E-mail: s.ramanna@uwinnipeg.ca   **Office Hours**: Thursday 2:30-3:30
Class Meeting Time: T, Th 11:30- 12:45   **Room No:** 3D03
Course Web page: http://www.acs.uwinnipeg.ca/7206

Important Dates

- First Class: January 7
- Final Withdrawal Date w/o academic penalty: March 13 (A minimum of 20% of the work
- on which the final grade is based will be evaluated and available to the student before the voluntary withdrawal date).
- Reading Week Break: Feb. 16-22 (No classes)
- Quiz 1: January 30
- Quiz 2: Feb 27
- Quiz 3: March 26
- Final Project Presentations: Second week of April
- Last Class: April 2
- The university will be closed on September 2 (Labour Day), Thanksgiving Day (October 14), May 20 (Victoria Day), November 11 (Remembrance Day), February 17 (Louis Riel Day), April 10 (Good Friday), May 18 (Victoria Day), July 1 (Canada Day), August 3 (Terry Fox Day).

Additional Course Related Information

- When it is necessary to cancel a class due to exceptional circumstances, instructors will make every effort to inform you via uwinnipeg email, as well as the departmental assistant and Chair/Dean so that class cancellation forms can be posted outside classrooms.
- Your uwinnipeg email address will normally be used for course related correspondence.
- Please note that withdrawing before the VW date does not result in a fee refund.
- Class make-up days are scheduled at the end of term for courses that conflict with holidays.

Course Objectives

This course discusses methods used in practical machine learning. Emphasis is placed on the foundations of well-known machine learning algorithms.   Uncovering patterns in web content, structure and usage will also be discussed.   Applications of these algorithms are also explored via the Weka machine learning workbench. Evaluating predictive quality of the algorithms and assessing credibility of learned patterns with statistical methods will be also covered.

Tentative List of Topics

- **Supervised Learning**
  - Tree-based Classifiers, Rule-Based Classifiers, Bayesian Classifiers, k-nearest neighbour, logistic regression
- **Unsupervised Learning**
  - K-means clustering, hierarchical clustering
- **Association rules** and Market-basket Analysis (basis for mining large data sets)
- **Numeric prediction**
  - Linear regression, regression trees, model trees
- **Learning with neural networks** (with an overview of deep learning)
- **Web Mining**
  - Text Processing basics, Natural Language Processing basics, Link analysis
- **Other Topics**
  - Dimensionality reduction, Discretization, Ensemble methods

Evaluation Criteria

Quizzes (3) -25 % each	75%
Final Project	22%
Final Project Presentation	3%

Final Letter Grade Assignment

Historically, numerical percentages have been converted to letter grades using the following scale. However, instructors can deviate from these values based on pedagogical nuances of a particular class, and final grades are subject to approval by the Department Review Committee.

A+	90+ - 100%	B	70 - 74%	F	below 50%
A	85 - 90%	C+	65 - 69%		
A-	80 - 84%	C	60 - 64%		
B+	75 - 79%	D	50 - 59%		

Final Project will involve:
- Preparing a project proposal (max. 5 pages)
- Reading a few papers related to the proposal topic
- Implementing a solution
- Preparing a project report (max 20 pages)

The Final Project will be evaluated on the basis of i) working software ii) innovative solution iii) technical soundness and completeness iv) readability of the technical report v) presentation. The report must be prepared using a standard template which will be provided in class. LaTeX typesetting software is preferred for the final project report.

NO LATE WORK will be accepted. Class work must be typed and submitted in an 8.5x11 folder with your name and course number on the outside.

Quizzes will test both factual knowledge and the ability to apply course material to real life situations and problems. Answers must be meaningful to achieve potential credit. English dictionary aids will be allowed as appropriate.

Please contact us as soon as possible if extenuating circumstances require you to miss a class, deadline, quizzes/tests/examination. Should illness prevent participation in a test or examination, a medical certificate from a certified physician must be supplied before any adjustments are considered.

Keep a copy of all class work (e.g., assignment, quiz) handed back in case there is an error in recording of marks by the instructor.

Exam/Test Requirements
- A Photo Id *IS NOT* required for taking a test or an exam.
- Cell phones are not permitted in the classroom.

Email Communication
Emails from accounts at uwinnipeg.ca are usually not filtered by the UofW email filter. Thereby it is recommended electronic communication used for the course utilize a UofW email account to minimize the risk of filtering.

Services for Students
Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams (e.g., private space) or during lectures/laboratories (e.g., note-takers) are encouraged to contact Accessibility Services (AS) at 786-9771 or accessibilityservices@uwinnipeg.ca to discuss appropriate options. All information about a student's disability or medical condition remains confidential http://www.uwinnipeg.ca/accessibility .

Students may choose not to attend classes or write examinations on holy days of their religion, but they must notify their instructors at least two weeks in advance. Instructors will then provide opportunity for students to make up work examinations without penalty. A list of religious holidays can be found in the 2019-20 Undergraduate Academic Calendar.

All students, faculty and staff have the right to participate, learn, and work in an environment that is free of harassment and discrimination. The UW Respectful Working and Learning Environment Policy may be found online at www.uwinnipeg.ca/respect .

Required Text Book(s)/Reading List*
- WEKA Book (freely downloadable)
- Hal Daume, III A course in machine learning (freely downloadable)
- Z.Markov and D.T. Larose, Data Mining the Web, Wiley 2007 (notes will be provided)
- Course notes

Prerequisite Information (This information can be found in the UW Graduate calendar)

Consent of the Department Graduate Program Committee Chair or Instructor.

Misuse of Computer Facilities, Plagiarism, and Cheating

Academic dishonesty is a very serious offense and will be dealt in accordance with the University's policies.

Avoiding Academic and Non-academic Misconduct. Students are encouraged to familiarize themselves with the Academic Regulations and Policies found in the University Academic Calendar at: https://uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf . Particular attention should be given to subsections 8 (Student Discipline), 9 (Senate Appeals), and 10 (Grade Appeals). Please note, in particular, the subsection of Student Discipline pertaining to plagiarism and other forms of cheating.

Detailed information can be found at the following:

- Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-procedures.pdf
- Non-Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-procedures.pdf

Misuse of Filesharing Sites. Uploading essays and other assignments to essay vendor or trader sites (filesharing sites that are known providers of essays for use by others who submit them to instructors as their own work) involves "aiding and abetting" plagiarism. Students who do this can be charged with Academic Misconduct.

Avoiding Copyright Violation. Course materials are owned by the instructor who developed them. Examples of such materials are course outlines, assignment descriptions, lecture notes, test questions, and presentation slides. Students who upload these materials to filesharing sites, or in any other way share these materials with others outside the class without prior permission of the instructor/presenter, are in violation of copyright law and University policy. Students must also seek prior permission of the instructor /presenter before photographing or recording slides, presentations, lectures, and notes on the board.

Research Ethics. Students conducting research interviews, focus groups, surveys, or any other method of collecting data from any person, including a family member, must obtain research ethics approval before commencing data collection. Exceptions are research activities done in class as a learning exercise. For submission requirements and deadlines, see http://www.uwinnipeg.ca/research/human-ethics.html.