CS 491/691 Section 1002: Machine Learning
FALL 2019

Course Information

Instructor Information:

Instructor: Emily Hand
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Office Hours: Mondays 10:30-11:30am (Walking on Quad) 11:30am-1:30pm (Office)

Course Description:

Topics course introducing the field of machine learning. Machine Learning studies representations and algorithms that allow machines to improve their performance on a task from experience. This is a broad overview of existing methods for machine learning. Emphasis is given to practical aspects of machine learning and data mining.

Course Pre/Co-requisites:

Pre-requisite: CS 302 with a 'C' or better.

Recommended background: Calculus, Linear Algebra, Probability and Statistics

Required texts, course materials:

There is one required text for this course, listed below. Throughout the semester, I will provide links to other materials available online for reading material. **NO PHYSICAL TEXTBOOK IS REQUIRED. YOU DO NOT NEED TO PURCHASE A TEXTBOOK FOR THIS COURSE.**

You must have access to the ECC or a personal computer with Linux capabilities. Projects will be tested in a Linux environment in the ECC. Students must have access to WebCampus and Piazza (piazza.com/unr/fall2019/cs491691). Students must have note-taking materials in class.

Required Texts:

A Course in Machine Learning, Hal Daume III available online: http://ciml.info/

Supplementary Texts:

Understanding Machine Learning: From Theory to Algorithms, Shalev-Shwartz and Ben-David available online: https://www.cs.huji.ac.il/~shais/UnderstandingMachineLearning

Unique class procedures /structures:

There will be **NO REQUIRED HOMEWORK** for this course. Practice problems will be provided along with solutions for students to practice topics at home. As a replacement for homework assignments, there will be **short in-class quizzes** throughout the semester.

All content for the course will be posted on WebCampus. All emails to the instructor MUST go through Piazza. Questions about the course material must be posted as discussion in Piazza allowing other students the opportunity to respond.

TOP HAT We will be using the Top Hat (www.tophat.com) classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.
You can visit the Top Hat Overview (https://success.tophat.com/s/article/Student-Top-Hat-Overview-and-Getting-Started-Guide) within the Top Hat Success Center which outlines how you will register for a Top Hat account, as well as providing a brief overview to get you up and running on the system.
An email invitation will be sent to you by email, but if don't receive this email, you can register by simply visiting our course website: https://app.tophat.com/e/557355
Note: our Course Join Code is 557355
Top Hat may require a paid subscription, and a full breakdown of all subscription options available can be found here: www.tophat.com/pricing.
Should you require assistance with Top Hat at any time, due to the fact that they require specific user information to troubleshoot these issues, please contact their Support Team directly by way of email (support@tophat.com), the in app support button, or by calling 1-888-663-5491.

BULLYING WILL NOT BE TOLERATED. No question is a not worth asking. If bullying occurs on WebCampus, Piazza, or in class, the instructor reserves the right to fail students as she sees fit.

Student Learning Outcomes:

Graduate Students will have:

- An ability to apply engineering and computer science research and theory to advance the art, science, and practice of the discipline.

Undergraduate Student Learning Outcomes:

- SLO1: Students will have an ability to identify, formulate, and solve complex computing or engineering problems by applying principles of engineering, science, and mathematics.

Course Requirements:

Midterm 1: 20%
Midterm 2: 20%
Final Exam: 20%
Quizzes: 20%
Projects: 20%

There will be roughly 12 quizzes throughout the semester. Your two-lowest quiz scores will be dropped. **EXCEPTION:** Missed quizzes will not be dropped without an allowed university excuse/advanced notice.

Grading Criteria, Scale, and Standards:

A: [90% - 100%]
B: [80% - 90%)
C: [70% - 80)
D: [60% - 70)
F: <60%

Late Work or Make-up Exams Policies:

No late work will be accepted. The two quizzes with the lowest scores will be dropped. No make-up quizzes will be given. You must be present for exams (Midterm 1, Midterm 2, and the final exam). Make-up exams will only be administered for an allowable university excuse.

Extra Credit:

You may earn extra credit by answering questions on Piazza. An answer endorsed by the instructor will earn extra credit toward your next exam grade (up to 5/100 points).

Course Calendar or Topics Outline:

	Date	Topics, Readings	Assignments/Due Dates
M	8/26	Intro/Math for ML/Python	
W	8/28	Decision Trees	Quiz 1: Math for ML & Syllabus
M	9/02	Labor Day: No Class	
W	9/04	Decision Trees	
M	9/09	Limits of Learning Geometry and Nearest Neighbors	Quiz 2: Decision Trees Project 1 Assigned
W	9/11	Clustering	
M	9/16	Perceptron	
W	9/18	Perceptron Continued	Quiz 3: NN & Clustering
M	9/23	Linear Classifiers	
W	9/25	Linear Classifiers/Gradient Descent	Project 1 Due Quiz 4: Perceptron
M	9/30	Exam Review/Catch Up	Quiz 5: Linear Classifiers & GD
W	10/2	Midterm 1	Project 2 Assigned: KNN, KMeans, Perceptron
M	10/7	Practicalities of ML Beyond Binary Classification	
W	10/09	Ensembles & Boosting	
M	10/14	Neural Networks	
W	10/16	Neural Networks Continued	Quiz 6: Ensembles & Boosting Project 2 Due
M	10/21	Deep Learning	
W	10/23	CNNs & Deep Learning	Quiz 7: Neural Networks Project 3 Assigned: GD & NN
M	10/28	Deep Learning Continued	
W	10/30	PCA	Quiz 8: CNNs
M	11/4	Exam Review/Catch Up	
W	11/6	Midterm 2	
M	11/11	Veteran's Day: No Class	Project 3 Due
W	11/13	PCA & Exam Review	
M	11/18	SVMs	Quiz 9: PCA Project 4 Assigned: PCA & Scikit
W	11/20	Kernel Methods	Quiz 10: Practicalities of ML

M	11/25	Reinforcement Learning	
W	11/27	Imitation Learning	Quiz 11: SVM/Kernel Methods
M	12/2	Transfer Learning	Project 4 Due
W	12/4	Learning Theory/Practicalities of Machine Learning	Quiz 12: RL/IL
M	12/09	Wrap Up/Review	

Topics are subject to change, and updates may be made to this portion of the syllabus. The number of quizzes may decrease depending on material, but they will not increase.

University Policies

Statement on Academic Dishonesty:

"Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include filing a final grade of "F"; reducing the student's final course grade one or two full grade points; awarding a failing mark on the coursework in question; or requiring the student to retake or resubmit the coursework. For more details, see the University of Nevada, Reno General Catalog."

Statement of Disability Services:

"Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations."

This course may leverage 3rd party web/multimedia content, if you experience any issues accessing this content, please notify your instructor.

Statement on Audio and Video Recording:

"Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded."

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the Equal Opportunity and Title IX page.

In addition to the required information listed above, it is strongly recommended that the syllabus include:

- Methods for communicating with students outside the classroom regarding matters such as class cancellations, meeting times, or room changes

- More detail about what constitutes academic dishonesty, with a concrete list or examples of "dos and don'ts" in the context of the class
- **Statement for Academic Success Services**: "Your student fees cover usage of the Math Center (775) 784-4433, Tutoring Center (775) 784-6801, and University Writing Center (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student."