

**CS 789**  
**INTELLIGENT SYSTEMS AND MACHINE LEARNING**  
**Spring 2018**  
**MW 2:30pm to 3:45pm in CBC C226**

**Instructor**

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**Course Description**

Intelligent Systems are computer systems that autonomously perceive and respond to the changes in their environments and Machine Learning provides the computers the ability to learn without being explicitly programmed. The main objective of this course is to give an overview of various Machine Learning methods and algorithms with focus on statistical learning approaches.

**Prerequisites**

Understanding of data structures, algorithms and basic concepts of linear algebra, probability and statistics, and multivariate calculus.

**Required Text**

- ✓ Murphy, K. P. (2012). *Machine Learning: A Probabilistic Perspective*. (ISBN-13: 978-0262018029)  
MATLAB software package at <https://github.com/probml/pmtk3>

**Supplemental Text**

- ✓ Hastie, T., Tibshirani, R., & Friedman, J. (2009). *Elements of Statistical Learning: Data Mining, Inference, and Prediction*. (2<sup>nd</sup> Ed.). (ISBN-13: 978-0387848570)  
<https://web.stanford.edu/~hastie/ElemStatLearn/>
- ✓ Bishop, C. (2006) *Pattern Recognition and Machine Learning*. (ISBN-13: 978-0387310732)

**MATLAB**

You will complete the programming assignments in MATLAB.

- ✓ List of student computer labs with MATLAB:  
<https://oit.unlv.edu/software/matlab>
- ✓ Octave is a free alternative to MATLAB and supports **most** of the functionality of MATLAB: <https://www.gnu.org/software/octave/>

## **Tentative Weekly Schedule**

<b>Jan 15 – 19</b>	Introduction <b>Reading:</b> 1.1 – 1.3, 1.4 – 1.4.3, 1.4.7 – 1.4.9
<b>Jan 22 – 26</b>	Probability <b>Reading:</b> 2.1 – 2.5
<b>Jan 29 – Feb 2</b>	Generative Models for Discrete Data <b>Reading:</b> 3.1 – 3.2, 3.5
<b>Feb 5 – 9</b>	Gaussian Discriminant Analysis <b>Reading:</b> 4.1, 4.2.1 – 4.2.5
<b>Feb 12 – 16</b>	Linear Regression <b>Reading:</b> 1.4.5, 7.1 – 7.3, 7.5 – 7.5.1, 7.5.4
<b>Feb 19 – 23</b>	Logistic Regression <b>Reading:</b> 1.4.6, 8.1 – 8.3
<b>Feb 26 – Mar 2</b>	Online Learning and Stochastic Optimization <b>Reading:</b> 8.5 – 8.5.4
<b>Mar 5 – 9</b>	Kernels <b>Reading:</b> 14.1, 14.2 – 14.2.4, 14.4.1
<b>Mar 12 – 16</b>	<b>Midterm Exam: Wednesday, March 14<sup>th</sup>, 2:30 PM – 3:45 PM</b>
<b>Mar 19 – 23</b>	Support Vector Machines <b>Reading:</b> 14.5 – 14.5.4
<b>Mar 26 – 30</b>	<b>Spring Break Recess</b>
<b>Apr 2 – 6</b>	Classification and Regression Trees <b>Reading:</b> 16.2
<b>Apr 9 – 13</b>	Boosting <b>Reading:</b> 16.4 – 16.4.5
<b>Apr 16 – 20</b>	Neural Networks <b>Reading:</b> 16.5 – 16.5.6
<b>Apr 23 – 27</b>	Ensemble Learning <b>Reading:</b> 16.6

**Apr 30 – May 4**      Deep Learning  
**Reading:** 28.1 – 28.4

**May 7 – 11**              ***Final Exam: Wednesday, May 9<sup>th</sup>, 3:10 PM – 5:10 PM***

### **Exam Policy**

- ✓ All exams are closed book and notes. The midterm exam will be given during regular class hours and the final will be given at the time allocated by the university.
- ✓ There won't be any make-up exams except as indicated by UNLV policies.
- ✓ The contents of the exams will be from the textbook, class presentations, and class discussions. The final exam will not be comprehensive.
- ✓ Cheating during an exam won't be tolerated. It will be penalized with a zero (0) grade for that exam and the misconduct will be handled per UNLV's Student Academic Misconduct Policy, which can be found at:  
<https://www.unlv.edu/studentconduct>

### **Assignment Policy**

- ✓ All assignment descriptions will be posted on WebCampus. Related questions will be discussed in class. All submissions must be made through WebCampus.
- ✓ All assignments must be submitted by 11:59PM on the date they are due. No late submissions will be accepted.
- ✓ Cheating or plagiarism with an assignment won't be tolerated. It will be penalized with a zero (0) grade for that assignment and the misconduct will be handled per UNLV's Student Academic Misconduct Policy, which can be found at: <https://www.unlv.edu/studentconduct>

### **Grading Policy**

Midterm:      25%

Final:          25%

Assignments: 50%

A: [93 – 100]   A-: [90 – 93]   B+: [86 – 90]  
B: [83 – 86]   B-: [80 – 83]   C+: [76 – 80]  
C: [73 – 76]   C-: [70 – 73]   D+: [66 – 70]  
D: [63 – 66]   D-: [60 – 63]   F:   [0 – 60]

The instructor reserves the right to change the grading policy at any time, but will not make the requirements more stringent than those stated here.

**All announcements, assignment descriptions, grades, and changes to the syllabus will be posted on WebCampus. It is the students' responsibility to check WebCampus regularly.**

**ACM Code of Ethics** – Students must also agree to abide by the Association for Computing Machinery’s “Code of Ethics and Professional Conduct” for computing professionals <http://www.acm.org/constitution/code.html>

### **Selected UNLV Policies:**

**Academic Misconduct**—Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility, and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling at UNLV assume the obligation to conduct themselves in a manner compatible with UNLV’s function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: <https://www.unlv.edu/studentconduct/student-conduct>

**Classroom Conduct**—Students have a responsibility to conduct themselves in class and in the libraries in ways that do not interfere with the rights of other students to learn or of instructors to teach. Use of electronic devices such as pagers, cellular phones, or recording devices, or potentially disruptive devices or activities, are permitted only with the prior explicit consent of the instructor. The instructor may rescind permission at any time during the class. If a student does not comply with established requirements or obstructs the functioning of the class, the instructor may initiate an administrative drop.

**Classroom Surveillance**—Nevada Revised Statutes (State Law) 396.970 Surreptitious electronic surveillance on campus; exceptions. [Effective January 1, 2017.]

1. Except as otherwise provided in subsection 2, it is unlawful for a person to engage in any kind of surreptitious electronic surveillance on a campus of the System without the knowledge of the person being observed.
2. Subsection 1 does not apply to any electronic surveillance:
  - (a) Authorized by a court order issued to a public officer, based upon a showing of probable cause to believe that criminal activity is occurring on the property under surveillance;
  - (b) By a law enforcement agency pursuant to a criminal investigation;
  - (c) By a peace officer pursuant to NRS 289.830;
  - (d) By a uniformed peace officer of the Nevada Highway Patrol Division of the Department of Public Safety pursuant to NRS 480.365;
  - (e) Which is necessary as part of a system of security used to protect and ensure the safety of persons on the campus; or
  - (f) Of a class or laboratory when authorized by the teacher of the class or laboratory.

(Added to NRS by 1993, 2138; A 2015, 575, 3668, effective January 1, 2017)

**Copyright**—The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you, nor assume any responsibility for employee or student violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

**Disability Resource Center (DRC)**—The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

**Final Examinations**—The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

**Incomplete Grades**—The grade of I—Incomplete—can be granted when a student has satisfactorily completed three fourths of course work for that semester/session but for reason(s) beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving "I" grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

**Library Resources**—Students may consult with a librarian on research needs. Subject librarians for various classes can be found here: [https://www.library.unlv.edu/contact/librarians\\_by\\_subject](https://www.library.unlv.edu/contact/librarians_by_subject). UNLV Libraries provides resources to support students' access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

**Rebelmail**—By policy, faculty and staff should e-mail students' Rebelmail accounts only. Rebelmail is UNLV's official email system for students. It is one of the primary ways students receive official university communication such as information about

deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu. Emailing within WebCampus is acceptable.

**Religious Holidays Policy**—Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

**Transparency in Learning and Teaching**—The University encourages students to use a transparency template to discuss with their instructors how assignments and course activities benefit student success: [https://www.unlv.edu/sites/default/files/page\\_files/27/TILT-Framework-Students.pdf](https://www.unlv.edu/sites/default/files/page_files/27/TILT-Framework-Students.pdf).

**Tutoring and Coaching**—The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895-3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TBE second floor.

**UNLV Writing Center**—One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>.