CS 479/679 Pattern Recognition
Spring 2019 – Dr. George Bebis

Prerequisites: CS 202 with a "C" or better; MATH/STAT 352. Credit hours: 3.0

Meets: TR 12:00pm-1:15pm (SEM 261)

Instructor: Dr. George Bebis

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- Phone: (775) 784-6463
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- Course Webpage: http://www.cse.unr.edu/~bebis/CS479
- Office Hours: TR 9:00am - 10:30am

Assistant: Ebrahim Emami (for coding questions)

- Office: 314 LME
- E-mail: ebrahim.emamig@gmail.com
- Office Hours: MW 9:00am - 10:30am

Required Text


Optional Texts


Objectives

This course will introduce the fundamentals of pattern recognition. First, we will focus on *generative* methods such as those based on Bayes decision theory and related techniques of parameter estimation and density estimation. Next, we will discuss *discriminative* methods such as support vector machines (SVMs). Methods of pattern recognition are useful in many applications such as information retrieval, data mining, document image analysis and recognition, computational linguistics, forensics, biometrics and bioinformatics.
In this course, we will emphasize computer vision applications.

Course Outline (tentative)

- Introduction
- Bayesian Decision Theory
- Bayesian Networks
- Maximum Likelihood Estimation
- Dimensionality Reduction
- Feature Selection
- Bayesian Estimation
- Linear Discriminant Functions
- Support Vector Machines (SVMs)
- Expectation-Maximization (EM) Algorithm
- Non-parametric Estimation
- Selected Topics

Student learning Outcomes

- **(SLO1)** Identify, formulate, analyze, and solve complex computing or engineering problems by applying principles of computing, engineering, science, and mathematics.
- **(SLO3)** Communicate effectively in a variety of professional contexts, with a range of audiences.
- **(SLO8)** Acquire and apply new knowledge as needed, using appropriate learning strategies.

Exams and Assignments

Grading will be based on quizzes, exams, programming assignments. Graduate students would also have to do a paper presentation.

- Homework problems will be assigned but will **NOT** be collected for grading. Homework solutions will be made available for each assignment.
- There will be two exams: a midterm and a final. The material covered in the exams will be drawn from the lectures and the homework.
- There will be several quizzes during the semester which will be announced at least one class period in advance.
- There will be 4-5 programming assignments which will be done in groups of two students. For each assignment, the group would need to turn in a report; details will be provided for each assignment.
Graduate students will be required to present a paper to the rest of the class. Each presentation should be 15-20 minutes long and professional as if it was presented in a formal conference (i.e., slides/projector). The instructor will provide potential topics for presentation but students are also welcome to propose their own topics (subject to instructor’s approval).

**Course Policies**

- Lecture slides, assignments, and other useful information will be posted on the course web page.
- Both exams will be closed books, closed notes. If you are unable to attend an exam you must inform me in advance. **Exams cannot be made up unless there is an extreme emergency.**
- Discussion of your work with others is allowed and encouraged. However, each student should do his/her own work. **Assignments which are too similar will receive a zero.**
- **No** late work will be accepted unless there is an extreme emergency. If you are unable to hand in your work by the deadline, you must discuss it with me **before** the deadline.
- **No incomplete grades** (INC) will be given in this course unless there is an **extreme emergency**.
- Students are expected to attend, and be on time, for every class. This demonstrates professionalism and consideration for your fellow students and your Instructor. Students who miss class and/or are late for class may experience an impact on their grade by missing classroom activities and/or quizzes. If you miss a class, you are responsible for all material covered or assigned in class.
- Students are expected to demonstrate professionalism and courtesy by either silencing or turning off all cell phones and/or other alarm or audible indicator devices.
- The Instructor reserves the right to add to, and/or modify any of the above policies as needed to maintain an appropriate and effective educational atmosphere in the classroom. If this happens, all students will be notified in advance of implementation of the new and/or modified policy.

**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 Academic Standards policy: UAM 6,502

**Disability Services**

Any student with a disability needing academic accommodations is requested to speak with me or contact the Disability Resource Center (Thompson Building, Suite 101), as soon as possible to arrange for appropriate accommodations.

**Academic Success Services**

Your student fees cover usage of the Math Center (784-443 or [www.unr.edu/mathcenter/](http://www.unr.edu/mathcenter/)), Tutoring Center (784-6801 or [www.unr.edu/tutoring/](http://www.unr.edu/tutoring/)), and University Writing Center (784-6030 or [http://www.unr.edu/writing_center/](http://www.unr.edu/writing_center/)). 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 a responsible and successful student.

Please note that the Math Center is focused on helping students with mathematical and statistical concepts. While mathematics is used extensively in engineering, the Math Center does not have the resources to help students with engineering courses. Engineering students are encouraged to use the Math Center for help in their math classes, and they are welcome to use its computer lab and study area any time—regardless of course. However, Math Center tutors cannot answer questions regarding engineering courses.

**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.

**Safe Learning Environment**

UNR 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: [http://www.unr.edu/equalopportunity-title-ix](http://www.unr.edu/equalopportunity-title-ix)
Grading Scheme

Midterm exam: 20%
Final exam: 20%
Quizzes: 20%
Programming Assignments: 40%
Paper presentation: 10%  \textit{(grad students only)}

  A 90 and above
  B 80-89
  C 70-79
  D 60-69
  F<59

Important dates

April 2, 2019 – Midterm exam
March 16-24, 2019 - Spring Break
May 8, 2019 – Prep Day
May 13, 2019 - Final exam (12:10pm – 2:10pm)