

# CS 791 Mass Detection in Mammograms (Section 1001)

## Fall 2026

## Course Information

### Instructor Information

**Instructor:** George Bebis  
**Office:** WPEB 411  
**Phone:** 775-784-6463  
**Email:** bebis@unr.edu  
**Office Hours:** MW 4:00—5:30 p.m. or by appointment

### Course Description

Special topics in computer science. May be repeated when course content differs.

### Course Prerequisites

CS 487/687 Deep Learning (or an equivalent course) and familiarity with Keras/Tensorflow or Pytorch. Background in the following areas would be very useful: image processing, computer vision, pattern, pattern recognition, and machine learning.

### Student Learning Outcomes

Upon completion of this course, students will be able to: (1) apply engineering research and theory to advance the art, science, and practice of the discipline, (2) design and conduct experiments as well as to analyze, interpret, apply, and disseminate the data, and (3) understand research methodology.

### Required Texts/Course Materials

There is no required textbook for this course. Most of the material will be drawn from research papers, which will be provided throughout the course.

### Optional Texts/Course Materials

- *Deep Learning*, by Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016. (available online at <https://www.deeplearningbook.org/>)
- *Dive into Deep Learning*, by Aston Zhang, Zachary C. Lipton, Mu Li, Alexander J. Smola, [arXiv:2106.11342](https://arxiv.org/abs/2106.11342) [cs.LG]
- *Introduction to Deep Learning: From Logical Calculus to Artificial Intelligence*, by Sandro Skansi, Springer, 2018 (available on Canvas, under “Pages”)
- *Neural Networks and Deep Learning: A Textbook*, by Charu Aggarwal, Springer, 2018 (available on Canvas, under “Pages”)
- *Deep Learning With Python (2<sup>nd</sup> edition)*, by Francois Chollet, Manning, 2021 (available on Canvas,

under “Pages”)

- *Computer Vision: Algorithms and Applications*, by Richard Szeliski, Springer, 2011 (available on Canvas, under “Pages”)
- *Probabilistic Machine Learning: An Introduction*, by K. Murphy, MIT Press, 2022.
- *Pattern Classification*, by Duda, Hart, and Stork, 2nd edition, John Wiley Inter-science, 2001.

## Class Policies

Lecture slides, assignments, and other useful information will be posted on the course’s webpage <https://www.cse.unr.edu/~bebis/CS791/Fall2026> (not on Canvas).

All reports should be submitted on **Canvas**.

Discussion of your work with others is allowed and encouraged. However, each student should do their own work.

## Course Requirements

There will be no exams. Grading will be based on paper presentations, class participation, and a semester-long project.

**Paper Presentations:** Each student will be required to present **2-3** papers to the rest of the class. A list of papers for possible presentation will be posted on the course’s webpage. Students who might be interested in presenting a **different** paper (i.e., not in the list to be provided) are encouraged to discuss this with the instructor. Each presentation should be **30-45 minutes** long with **15-30 minutes** left for questions and discussion. All presentations are expected to be delivered in a professional manner, similar to talks given at academic conferences. Students are required to email their slides to [bebis@unr.edu](mailto:bebis@unr.edu) on the day of their presentation.

**Class Participation:** The students who are responsible for presenting a paper are expected to have a **thorough understanding** of the ideas discussed in the paper. Everyone else should read the paper before class and **contribute** to the class discussion.

**Course Project:** see “Project Guidelines” for details (posted online).

## Grading Criteria

Grades will be posted on Canvas.

- Class Participation: 10%
- Paper Presentations: 30%
- Project Reports and Presentations: 60% (*Proposal: 10%, Interim Report: 20%, Final Report: 30%*)

|   |           |
|---|-----------|
| A | $\geq 90$ |
| B | [80-90)   |
| C | [70-80)   |
| D | [60-70)   |
| F | <60       |

## Late Work or Make-up Exams Policies

**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.

## Attendance Policies

As per the University Administrative Manual (3,020), students are expected to attend classes in which they are enrolled. Students who miss a class and/or are late for a class may experience an impact on their grade by missing course activities. If you miss a lecture, **you are responsible** for all the material covered or assigned.

## Topics Outline

The course will focus on the problem of mass detection and classification in mammograms and possibly other modalities such as Ultrasound, MRI, and PET. The goal is to expose students to some of the main problems involved in this research area and to recent methods developed by the research community to address these problems. The course is primarily intended for highly motivated students who are interested in applying pattern recognition, machine learning, and deep learning techniques to a practical problem of tremendous importance. It will provide opportunities for students to choose a topic for an MS thesis or PhD dissertation and can lead to a conference and/or a journal publication.

Outline will be posted on the course's webpage.

## Material is Subject to Change

Course material, topics, schedule, assignments, policies, and content are subject to change.

## Important dates

- 9/7 – Labor Day (no class)
- 10/27 – Final day to drop classes and receive a "W"
- 11/11 – Veterans Day (no class)
- 12/9 – Prep Day
- 12/14 - (3pm – 5pm) reserved for final presentations

# University Policies

## Statement on Academic Standards

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. The University Academic Standards Policy defines academic dishonesty, and mandates specific sanctions for violations. See the University Academic Standards policy: [UAM 6,502](#).

## Use of Generative AI

This course assumes that all work submitted by students will be generated by the students themselves, working individually or in groups as directed by course assignment instructions. This policy indicates the following constitute violations of academic honesty and “cheating”: any unauthorized use of generative AI tools (such as ChatGPT), as outlined in [UNR Academic Standards \(UAM 6,502\)](#).

Some assignments may allow for the use of the authorized use of such tools, but will be expressly described in the assignment instructions. For the purposes of those assignments, specific instructions will be provided on the use of generative AI tools regarding the type of work being allowed (i.e. brainstorming, drafts, final works, etc.). In general, the following actions are prohibited:

- Submitting any part or all of an assignment statement or test questions as part of a prompt to a large language model AI tool.
- Incorporating any part of an AI-written response into a submitted assignment or assignment component.
- Using AI to summarize or contextualize reading assignments or source materials.
- Submitting your own work for this class to a large language model AI tool for iteration or improvement.

Please email the instructor for any questions or concerns.

## Statement on Student Compliance with University Policies

In accordance with section 6,502 of the University Administrative Manual, a student may receive academic and disciplinary sanctions for failure to comply with policy, including this syllabus, for failure to comply with the directions of a University Official, for disruptive behavior in the classroom, or any other prohibited action. “Disruptive behavior” is defined in part as behavior, including but not limited to failure to follow course, laboratory or safety rules, or endangering the health of others. A student may be dropped from class at any time for misconduct or disruptive behavior in the classroom upon recommendation of the instructor and with approval of the college dean. A student may also receive disciplinary sanctions through the Office of Student Conduct for misconduct or disruptive behavior, including endangering the health of others, in the classroom. The student shall not receive a refund for course fees or tuition.

## 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 3<sup>rd</sup> party web/multimedia content, if you experience any issues accessing this content, please notify your instructor.

## Statement on Audio and Video Recording

### **Student-created Recordings**

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.

### **Instructor-created Recordings**

Class sessions may be audio-visually recorded for students in the class to review and for enrolled students who are unable to attend live to view. Students who participate with their camera on or who use a profile image are consenting to have their video or image recorded. If you do not consent to have your profile or video image recorded, keep your camera off and do not use a profile image. Students who un-mute during class and participate orally are consenting to have their voices recorded. If you do not consent to have your voice recorded during class, keep your mute button activated and only communicate by using the "chat" feature, which allows you to type questions and comments live.

## Statement on Maintaining a Safe Learning and Work Environment

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 Center for Civil Rights and Equal Access at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the [Center for Civil Rights & Equal Access](#) page.

## Statement on Campus Closures or Delays

In the event of class cancelations or delays caused by inclement weather conditions, fire/smoke conditions, or other unforeseen emergencies, the safety and well-being of students are the University's top priority. Official notifications will be disseminated through the University website and other official channels with details related to any campus delays or closures.

In the event of a campus closure, you will be informed as to whether the class will be offered remotely or if it will be canceled. If the class is cancelled, you will receive information on how to address any missed course content.

Students facing significant impacts due to these events are encouraged to communicate with their instructor for potential accommodations.

## Statement for Academic Success Services

Your student fees cover usage of the [University Math Center](#), (775) 784-4433; [University Tutoring Center](#), (775) 784-6801; and [University Writing & Speaking 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.

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.

## Mental Health Support Statement

There are times when you may experience difficulties in life, and you may benefit from seeking help. Mental health services are available to you as a student at no additional cost through Counseling Services at the Pennington Student Achievement Center. This includes same-day in-person and tele mental health initial consultations, brief individual counseling, and group counseling sessions. Limited same-day appointments can be scheduled online via Counseling Services or by calling 775-784-4648. Additional brief drop-in "Let's Talk" student consultations are also available in the Counseling Services Annex located at the southwest corner of Great Basin Hall.

## Veteran Statement

Veterans, Reservists, National Guard and military connected family members may wish to check the office of Veteran Services for benefits and support. Besides processing VA educational benefits, the department offers a variety of programs year-round to support student academic and personal success while transitioning to higher education and throughout your educational experience. They welcome inquiries regarding VA benefits and assist in navigating resources, the campus, and in the Reno community.