Idaho State University

Advanced Machine Learning (3 credits)
Spring Semester 2026

CS 6678

Tuesdays and Thursdays

2:30pm - 3:45pm MT

ISU: TAB 282 (IF) / BA 302 (Pocatello) / Zoom

Instructor: Dr. Leslie Kerby
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T/A: Aney Paul
Email: AneyPaul@isu.edu

Syllabus

COURSE DESCRIPTION

This course reviews and engages students in research on advanced concepts and models in machine learning and neural networks. Emphasis is placed on the principled application of machine learning to real-world problems, including data acquisition, model selection, evaluation, and interpretation.

Rather than focusing exclusively on neural architectures, the course emphasizes foundational and non-neural machine learning methods as a vehicle for developing strong modeling judgment, statistical reasoning, and research skills. Students will complete a semester-long research project, culminating in a conference-style paper and presentation, with the goal of producing work suitable for submission to a peer-reviewed venue.

INSTRUCTIONAL MODEL

This course uses a hybrid instructional approach:

1. **Asynchronous Core Content**
   Core technical material is delivered via *The AI School*. This ensures consistent, high-quality coverage of foundational and advanced topics while allowing class time to focus on synthesis and research.
2. **Tuesday Lectures (Instructor-Led)**
   - Conceptual integration of material
   - Common failure modes and misconceptions
   - Research design and evaluation
   - Discussion of relevant literature
3. **Thursday Sessions (TA-Led Workshops)**
   - Homework and lab support
   - Project workshopping
   - Debugging and methodological discussion

   Instructor attendance may vary.
4. **Student Research Presentations**
   Students will present project proposals, progress updates, and final results throughout the semester.

LEARNING OBJECTIVES

By the end of the course, students will be able to:

1. Formulate real-world problems as machine learning tasks
2. Acquire, clean, and validate data under realistic constraints
3. Select and justify appropriate machine learning models
4. Design sound evaluation strategies and detect data leakage
5. Interpret results critically and communicate limitations
6. Conduct and present an ML research project at a professional level

ASSIGNMENTS

Homework assignments will be given regularly and there will be a final research project. This final project should be a substantial machine learning research project, with the explicit goal of producing a submission-ready paper suitable for a peer-reviewed conference.

Students will provide brief research updates every two weeks, focusing on:

- Progress since last update
- Challenges or failures encountered
- Next steps

These updates are designed to support iterative feedback and prevent end-of-semester bottlenecks.

ACCOMMODATION

ISU is committed to providing an accessible learning environment for students with documented disabilities. If there are aspects of the instruction or design of this course that result in disability-related barriers to your participation, please contact Disability Services to engage in a confidential conversation about the process for requesting accommodations.

Students are encouraged to register with Disability Services as soon as they begin this course, or in the timeliest manner possible, as accommodations are not provided retroactively. More information can be found on the Disability Services website.

- Hours: 8:00 – 5:00, Monday through Friday
- Phone: (208) 282-3599
- Fax: (208) 282-4617
- Email: disabilityservices@isu.edu

Location: Rendezvous Complex, Room 125 (Pocatello Campus) ISU also offers Services in Idaho Falls, Meridian, and Twin Falls

STUDENT RESOURCES

ISU Student Resources
ISU Counseling Center

COMFORTABLE LEARNING ENVIRONMENT

We are all committed to maintaining an inoffensive, non-threatening learning environment for every student. Class members (including the instructor) are thus to treat each other respectfully—both in word and deed. Offensive humor and aggressive personal advances are specifically forbidden. If you feel uncomfortable with a personal interaction in class, see your instructor for help in solving the problem.

GRADING

Topic	Value
AI School Module Completion	20%
Homework Assignments	30%
Biweekly Research Updates	20%
Project Proposal	10%
Project Presentation	10%
Project Paper	10%

USE OF AI TOOLS

This course explicitly permits and encourages the use of artificial intelligence (AI) tools, including large language models (e.g., ChatGPT, coding assistants, and related systems), as part of the learning and research process.

Machine learning research and practice increasingly rely on AI-assisted workflows for:

- Code development and debugging
- Literature exploration and summarization
- Idea refinement and experimentation
- Writing support and revision

Accordingly, students in this course may use AI tools to support their work.

Expectations and Boundaries: While AI tools are permitted, students remain fully responsible for the intellectual content of all submitted work. Specifically:

- You must understand and be able to explain any code, analysis, or written material you submit.
- AI tools should be used as assistants, not as replacements for thinking or decision-making.
- Submissions should reflect your own judgment, reasoning, and critical evaluation.
- Blindly copying AI-generated content without understanding or verification is unacceptable.

Academic Integrity: Using AI tools does not exempt students from academic integrity policies. Misrepresentation of AI-generated work as understanding, fabrication of results, or submission of work you cannot explain will be treated as violations of academic honesty.
In this course, understanding and accountability matter more than the source of assistance.

Required statements by ISU:

Statement on Idaho Code 67-5909D

Idaho Code 67-5909D was passed by the State of Idaho Legislature during the 2025 legislative session. This law places certain requirements and restrictions on state sponsored institutions of higher education as it relates to activities, instruction, and support services that may intersect with what the law refers to as "diversity, equity, and inclusion." The university has worked to meet its legal requirements under this law, including seeking lawful exemptions for academic programming that would otherwise be subject to the restrictions created under 67-5909D. If you have any concerns about the content of this course and its relationship to the concepts identified by this law, you are responsible for meeting with the Office of Academic Advising (askanadvisor@isu.edu) to raise those concerns prior to the close of the add/drop period and discuss the possibility of other appropriate enrollment options. By maintaining your enrollment in this class beyond the add/drop period you are acknowledging your choice to engage in the full educational experience outlined in the syllabus, which may include assignments, discussion, readings, grading, etc., related to concepts identified under this law.

Academic Integrity Policy

See the ISU Academic Integrity Council website for sample statements regarding dishonesty, plagiarism and use of AI.

Academic Integrity

It is important that students submit their own, original (never previously used) work throughout the class. Submitting previously used work and/or work that is not your own original work is considered a violation in academic integrity. Academic Integrity is something that all students should know about and take measures to uphold – it ensures the value of your degree. The credibility of the university as a whole is diminished if academic integrity is not upheld.

Types of Violations
There are four types of academic dishonesty: (1) Plagiarism; (2) Fabrication; (3) Cheating; and (4) Aiding and Abetting Dishonesty.

- Plagiarism. Plagiarism, in effect, means “stealing.” The American College Dictionary defines it as “copying or imitating the language, ideas, and thoughts of another author and passing off the same as one’s original work.” Students are required to give proper credit to all sources of information, whether in their written materials or in oral presentations.
- Fabrication. Fabrication includes making up sources or information, omitting sources, distorting sources or information, and misrepresenting sources or information.
- Cheating. Cheating includes but is not limited to the following:
    - using forbidden items during a test or exam (phones, files, books, notes, etc.)
    - obtaining tests from previous classes
    - collaborating with another on individual assignments when you are expected to work alone
    - using another's assignment, ideas, or sources
    - using your own previously submitted work from another class
    - obstructing or changing grades received
    - submitting assignments that you did not write (as with contract cheating or AI-generated material). Relying on generative Artificial Intelligence (AI) platforms to create or edit work that is then submitted for an assignment when an Instructor has expressly prohibited use of such AI platforms constitutes a violation of academic integrity. If an Instructor allows students to use generative AI platforms, that policy should be made explicit for the assignment or course.
- Aiding and Abetting Dishonesty. Helping another plagiarize, fabricate, or cheat is academically dishonest. Failing to report any of these instances violates the Code of Academic Dishonesty.

Rarely does anyone set out to violate standards of academic integrity; plagiarism and cheating usually occur because students are in a hurry and take some short cuts to submit the required assignment. The best remedies to ensure academic integrity are thus to keep up with the class and to ask questions along the way. It is important that you know that intentionality (“I didn’t know” or “I didn’t mean it”) Is not a valid excuse for violating standards of academic integrity. Penalties for violating Academic Integrity may include receiving an "F" on the assignment, an "F" in the course, and notification of the Registrar. Multiple instances of Academic Dishonesty at ISU may result in suspension or expulsion. You should thus talk with your instructor before submitting your work if you have any questions about your use of sources or other information.