STAD68: Advanced Machine Learning and Data Mining

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Winter, 2026

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Class Hours: Wed 14:00-15:00 @ IA2160, Fri 13:00-15:00 @ IA3120 Office Hours: TBD

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Course Description

Artificial intelligence is transforming the world, enabling organizations of all sizes to innovate, scale, and make better decisions. Recent breakthroughs in large language models have accelerated progress in AI and machine learning, and frontier research is increasingly focused on native multimodal generative models that integrate text, vision, and other modalities. This course introduces the core concepts and practical methods of deep learning, with an emphasis on modern large language and vision models.

Computing

Python Programming Language.

Reference Textbooks

Lecture slides will be provided on Quercus. Other references will be provided when the courses progresses.

Prerequisites/Corequisites

This course assumes that the audience has basic training in linear algebra, probability theory, and statistical inference. Specifically, we require CSCC11, STAC58, and STAC67 as prerequisites.

Topics

The followings are potential topics and might change subject to the instructor's view on the progress of the course:

- Introduction
- ANN
- Optimization
- CNN
- LSTM
- Reinforcement Learning
- Large Language Models
- Flow matching models

Grading Policy

1. Participation: 10%. For more details, see here.
2. Assignments: 40%.
3. Final Project Proposal: 10%.
4. Final Project: 40% (Presentation + Report).

Assignment Policy

- We will only take .tex and .pdf (along with related materials), python notebook for assignments. Associated and reproducible code, if any, must be attached. Late submissions will NOT be accepted.
- If plagiarisms are found, they will be reported. Both (or multiple) copies of the assignments will be given zero grades.

Exam details and dates

- Final Project: TBD.