CIS 678 Machine Learning

Course Introduction

Course Introduction: CIS 678 (Machine Learning)

Communication Channels:

- **Blackbarod (primary choice)**: messages
- *Email*
- *In person/Online*

  By appointment (Booking Calendar):
  Mackinac Hall (MAK) D-2-216 (Allendale)

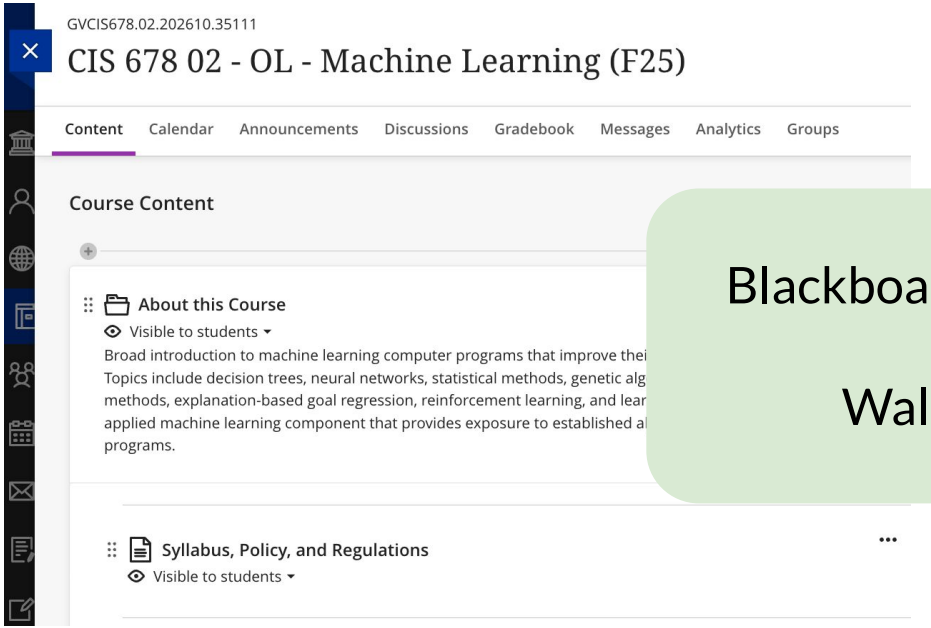
Course Faculty

Kamrul Hasan

INSTRUCTOR

Pronouns: he/him/his
Email: hasanka@gvsu.edu;
hasanka@mail.gvsu.edu

Week 1: CIS 678 Introduction



Blackboard Introduction
&
Walkthrough!

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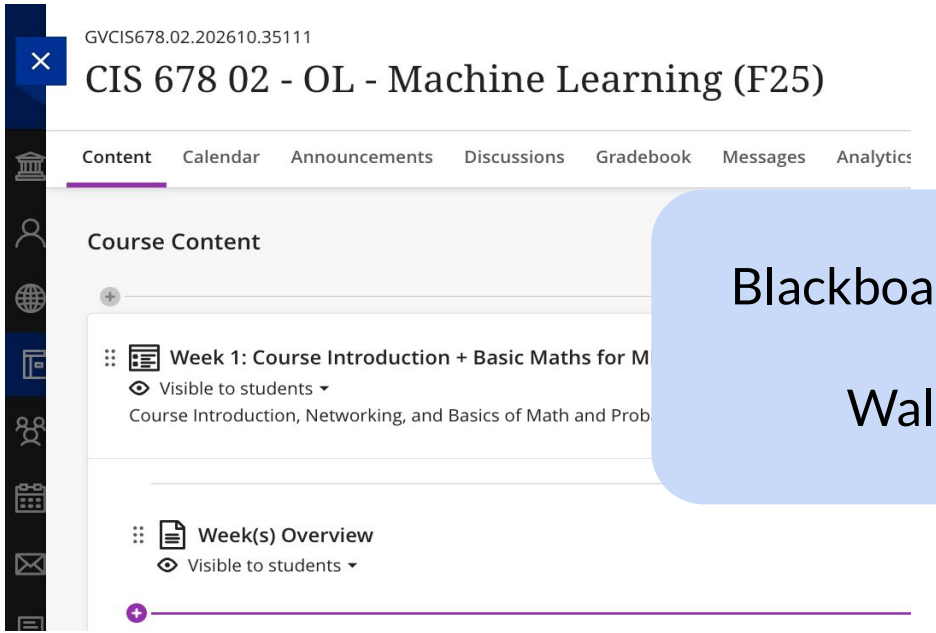

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Week 1 Plan

- **Get to know each other (networking)**
- Set up our course objective, guidelines, and evaluation procedure.
- Introduction to ML
- Set up our programming development environment(s), more specifically,
  - Google Colab(oratory) on your Google drive,
  - HPC cluster account (introduction)
- Basics of Math, Statistics, and Probability (Part 1)

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- **Probabilistic ML**
    - **Semi-supervised Learning**
    - **Generative AI** (example: LLMs ,ChatGPT)

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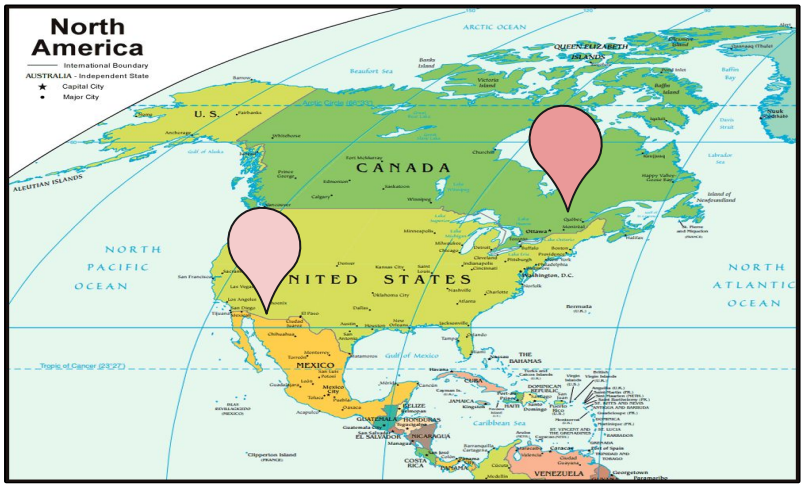
jda. BlueYonder IVADO LABS



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- **Gardening**

About you!

- I hope I would get to know each of you as we progress
- We will meet in person and/or virtually as per our availability
- You will collaborate as groups
  - For discussion different topics: course specific and beyond
  - Final project
- I will seek your suggestions

Blackboard messages!

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General information (about the course)

Description: Broad introduction to

- Machine learning
- Topics include decision trees, neural networks, statistical methods, genetic algorithms, Bayesian learning methods, explanation-based goal regression, reinforcement learning, and learning frameworks.
- Includes an applied machine learning component that provides exposure to established algorithms and machine learning programs.

Prerequisite: Admission to graduate programs

Objective: Completing this course, you should be able to:

- Explain the general idea of Machine Learning and connect to some practical applications,
- Exercise and apply some standard supervised and unsupervised ML techniques,
- Identify and build models using appropriate ML techniques including Deep Learning and Reinforcement Learning,
- Evaluate models for their effectiveness and appropriateness,
- Utilize some latest ML development tools and techniques in their projects,
- Communicate findings using effective visualization and documentation.

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Textbook(s): There are no required textbooks for this course.
Some good options include:

- Bishop: Pattern Recognition and Machine Learning.
- Murphy: Machine Learning: a Probabilistic Perspective.
- Deisenroth, Faisal, and Ong: Math for ML.
- Shalev-Shwartz and Ben-David: Understanding Machine Learning: From Theory to Algorithms.
- Deep Learning, Ian Good Fellow, Yoshua Bengio, and Aaron Courville
- Machine Learning with Python Cookbook: Practical Solutions from Preprocessing to Deep Learning Paperback – April 17 2018 by Chris Albon
- Practical Deep Learning for Coders, Fastai, (Jaremy Howard & Sylvain Gugger)

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Requirements:

- Computer/workstation terminal
- Blackboard and Google Drive access,
- Google colaboratory setup
- Ability to run Python (and install any requisite Python packages).
- If you have any trouble, talk to the instructor, and we will work out a solution together.

Tentative Schedule

General information:

- See **Blackboard** for detailed schedule
- Planning and **delivery per week**
- **Course materials** and **assignments** will be available on Blackboard **mostly** at the beginning of each week; sometimes as we progress.

Key dates:

- Aug 25:: Class begins (weekly planning & delivery)
- Oct 19-21: Fall Break
- Dec 06: Class Ends
- Dec 13: Semester ends

Update your Blackboard settings so you receive your emails, messages, and notifications in time.

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Week of	Topic (higher level)	Topic	Activity
Aug 25	Course introduction & Math and Probability Basics	Course introduction, regulations, and policies Math, Probability Basics (in brief; mainly directives)	Course introduction & networking Labor Day recess: Aug 31-Sept 1
Sept 01	General idea of ML (connection to Math and Probability)	Polynomial curve fitting, connection between method of least squares and maximum likelihood learning.	Labor Day recess: Aug 31-Sept 1
Sept 08	Supervised & unsupervised learning (general ML models)	Regression models	Assignment 1 Project starts (including group formation)
Sept 15		Classification models; Model selection, HP optimization;	
Sept 22		Unsupervised learning (clustering)	Assignment 1 due
Sept 29		Curse of dimensionality, Linear Dimensionality Reduction, PCA	Assignment 2
Oct 06	Deep learning	Neural Networks (NNs): Feed Forward NNs	
Oct 13		NNs: Feed Forward NNs (cont.)	Assignment 2 due Midterm exam Fall break: Oct 19-21
Oct 20		NNs: Convolutional NNs	Assignment 3 Fall break: Oct 19-21
Oct 27		NNs: Convolutional NNs (cont.)	
Nov 03		Non linear dimensionality reduction (Auto encoders, RBMs)	
Nov 10	Time-series/sequence modeling	ARIMA, Recurrent NNs (RNNs)	Assignment 3 due
Nov 17	Special topics	Transformers, Generative AI	Thanksgiving Day recess: Nov 26-30
Nov 24		Reinforcement learning ***Project presentation and wrapup***	Thanksgiving Day recess: Nov 26-30 Project wrap-up + presentation
Dec 01	Review and Exam	***Project presentation and wrapup***	Project wrap-up + presentation Final exam
Dec 08		**Exam week**	Final exam

Class ends: Dec 06, 2025;

Evaluation

Grading distribution:

- Weekly reflections: 5%
  - *Attendance & participation: 2%*
  - *Class & Project engagement: 3%*
- Homework assignments/tests: 75%
  - *Three (3) assignments: 3x10%*
  - *Midterm exam: 20%*
  - *Final exam: 25%*
- Final project: 20%
  - *Final Project: 10%*
  - *Documentation: 5%*
  - *Presentation: 5%*

Grade points:

A	93%	**C**	73%
A-	90%	**C-**	70%
B+	87%	**D+**	67%
B	83%	**D**	60%
B-	80%	**F**	Below 60%
C+	77%		

Note: Your final grade percentage will be rounded to the next integer percentage value. For example, an **89.1%** will round up to a **90%.**

Policy & expectation

Expectation: I expect the following to ensure your success in this course:

- check Blackboard on a regular basis for announcements, course material, and assignments
- stay up to date with required course materials.
- let me know how the class and my teaching can be improved
- adhere to the **GVSU policy of Academic Honesty** http://www.gvsu.edu/coursepolicies/

Course policy:

- Weekly reflections and homework assignments are to be completed **individually**.
- Due dates: All assignments will be due at 11:59pm Michigan time on the due date (unless otherwise stated).
- Late policy: You will lose 10% off of your maximum grade per day late, to a cap of 3 days (30% off), after which the assignment will not be accepted.

Policy & expectation

Academic Honesty:

- All students are expected to adhere to the academic honesty standards set forth by GVSU.
- In addition, students are expected to adhere to the academic guidelines as set forth by the CoC: https://www.gvsu.edu/computing/academic-honesty-30.htm
- You can learn a lot from your peers, therefore, I encourage collaboration, but passing their work off as your own is prohibited.

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With respect to all individual assignments in this course:

- Document collaboration; **no electronic transfer of code** between students is permitted.
- You are encouraged to engage in conversations in **online forum**s, but do not post solutions or solicit others to complete your work for you.
- You are encouraged to talk about problems with each other in **non-technical terms** (i.e., not code).
- Ultimately, **you are responsible** for all aspects of your submissions. You should be able to explain and defend if the work is entirely your own.

Policy & expectation

Use of Generative AI Tools for Learning

- Students are permitted to use generative AI tools (e.g., ChatGPT) to support their learning, such as clarifying concepts, generating test cases, or assisting with code debugging.
- However, AI must not be used to complete or generate any part of the final work submitted for credit.
- All AI use must be clearly documented, and students are responsible for verifying the accuracy of AI-generated content.
- Improper or undocumented use of AI may constitute an academic integrity violation.

For detailed usage guidelines, responsibilities, and documentation requirements, please refer to the full document: **“Guidelines for Using Generative AI Tools in Learning”**, shared through **Blackboard**.

Useful resources

Blackboard: Course materials, assignments, grades, and announcements will be posted to Blackboard (https://lms.gvsu.edu/). It is your responsibility to stay informed.

Other academic resources: GVSU also provides opportunities for students to improve your **academic skills** through resources, such as:

- The writing center
- Computing Success Center
- Speech lab
- Research consultants
- Library Resources

Disability support : If you are in need of accommodations due to disability you must present a memo to me from Disability Support Resources (DSR), indicating the existence of a disability and the suggested reasonable accommodations. If you have not already done so, please contact the Disability Support Resources office (215 CON) by calling 331-2490 or email to dsrgvsu@gvsu.edu. Please note that I cannot provide accommodations based upon disability until I have received a copy of the DSR issued memo. All discussions will remain confidential. For more information, see https://www.gvsu.edu/dsr/

Computing Success Center: he Computing Success Center, located in MAK A-1-101, is a great place to get help or simply hang out. The Computing Success Center offers free drop-in tutoring for a variety of College of Computing courses throughout the week during the academic year.