SYLLABUS FOR AI 445/545 Section 01: Machine Learning Operations — WINTER 2026

1 Course Description

Machine Learning Ops (ML Ops) focuses on the deployment, monitoring, and management of machine learning models in production environments. This course covers end-to-end model lifecycle operations, including CI/CD pipelines, versioning, model governance, and infrastructure automation for scalable AI deployment.

2 Instructor Information

- Name: Dr. Rahat Ibn Rafiq (Dr. Rafiq)
- Office: C-2-213 MAK
- Email: rafiqr@gvsu.edu
- Personal Page

3 Class Information

- Class times: 3:00PM - 4:15 PM Monday, Wednesday
- Classroom : DCIH 507
- Course Page: Blackboard and Course Page Here
- Prerequisites: SE 511 or similar software engineering courses in undergrad/grad
- Online Class Streaming Session link: Use this zoom link to join the class session online
- Recorded class lectures will be uploaded in the course website

4 Communication Information

- Office Hours: 2 PM-3 PM, Wednesday, DCIH 540, zoom link
- By appointment or when my office door is open (C-2-213 MAK)
- Join this discord channel to communicate to me: AI545 discord channel. *I prefer discord over emails*.

5 Course Objectives

After successful completion of the course, students will be able to

- Develop end-to-end machine learning pipelines, integrating version control, automation, and containerization to ensure reproducibility and scalability.
- Prepare pipelines for monitoring, and maintaining machine learning models in production environments using modern MLOps tools and CI/CD pipelines
- Apply different MLOps tools and techniques, examining their effectiveness for various machine learning deployment scenarios.
- Evaluate current state-of-the-art MLOps tools and techniques being used in different industry verticals (Graduate)

6 Course Materials

- Instructor's handouts and slides.
- Download Materials from Here

7 Grading Proportions

The last day to drop a course with a grade of "W" is March 27 by 5:00 pm. I will also have lots of extra credits as in-class exercises. To get the extra credits, you will have to be present in the lectures.

Graded Item	AI 445 Weight	AI 545 Weight
midterm	10	10
final	10	10
Project	25	20
In class activity	15	10
Assignments	4*10 = 40	40
Survey paper	N/A	10

A >=94%	A- >=90%	B+ >=87%	B >=83%
B- >=80%	C+ >=77%	C >=73%	C- >=70%
D+ >=67%	D >=60%	F <60%	NA

Late Policy: Ping me on discord and let me know of your reasons. I will decide on each case individually. I am a very lenient person and if I deem the case good enough, I will always let you submit the assignments without any penalty.

8 Assignments

Homework assignments must be completed individually. Both person must submit the assignment on Blackboard.

9 Survey Paper

Survey paper has to be written individually, not more than two pages long. Before you decide on writing it, it is advised you contact me to get suggestions and approvals on your idea and planned work.

10 Midterms/Finals

Midterms and Finals will be on BB. You will have to turn on Respondus Browser and Respondus Monitor. Make sure to check the text exam on BB, see if you can access the test, finish it etc. It is your responsibility to make sure your environment is compatible with Respondus. Midterms and Finals will be closed book an closed notes. You will have a 48 hour window to finish the exam once it is opened on BB.

11 Group Project

The project has to be done in a group of 2. For project grading rubric, final report template, checkpoint update report template and submission guidelines, please visit the Course Page.

12 Course Policies and General Information

- F-1 and J-1 International Students who are enrolled in one or moreMultiple Delivery (MD) courses or one MD course along with anonline course in a standard semester must submit the Multiple Delivery Attestation form to confirm that they will attend the necessary MD course at least 25% in-person for the duration of the semester. 25% attendance in-person is approximately 4 weeks of in-person meetings in a standard Fall/Winter semester. When attending this way, the course is considered in-person for immigration purposes. Fully online participation in MD courses does not meet immigration requirements when a student is taking the MD course in combination with other MD courses or online courses
- The student is responsible for material covered or announcements made in class any day they are absent.
- The Fred Meijer Center for Writing, with locations at the Allendale and Pew/Downtown Grand Rapids campuses, is available to assist you with writing for any of your classes. Writing consultants, who are fellow GVSU students, are trained to help you with all stages of your writing process, from brainstorming to organizing to editing your papers. Simply bring a draft of your paper, the assignment sheet, and your questions/concerns to any of the Center's locations. Also, through your Gmail account, you have access to online consultations through GoogleDocs. The Center's services are free and you can drop in and work with a consultant or make an appointment, either through our website or by calling the Center (331-2922). For more information about our services and locations, please visit our website: http://www.gvsu.edu/wc/
- Be aware of the SCIS policy on academic honesty. Visit the department website here for the full statement on academic honesty. Academic dishonesty will not be tolerated. Violations will result in at least failure of the assignment. However, violations may also include failure of the

entire course and referral to the university resulting in additional consequences, including possible expulsion.

- I prefer Discord over emails. Make sure to post your questions on the AI545 Channels insteasd of DM-ing me. In that way, everyone can see my answers.
- Special Needs: If there is any student in this class who has special needs because of a disability, please contact Disability Support Resources at www.gvsu.edu/dsr/ (DSR) at 616-331-2490.
- This course is subject to the GVSU policies listed at http://www.gvsu.edu/coursepolicies/.
- In Case of Emergency Fire: Immediately proceed to the nearest exit during a fire alarm. Do not use elevators. More information is available on the University's Emergency website located at gvsu.edu/emergency

13 Course Schedule

A very course schedule of topics and deadlines are included in the table below. Note, the week that topics are covered or even the order they are covered is tentative and may be adjusted throughout the semester.

Week	Lecture	Exam	Assignment
W1, January 12	MLOps Foundation		
W2, January 19	Model,Data versioning, DVC Demo		
W3, January 26	DVC Deep Dive Demo, MLFlow Foundations		Assignment 1 due
W4, Feb 2	MLFlow Deep Dive Demo		
W5, February 9	Containerization with Docker		
W6, February 16	Containerization with Docker		Assignment 2 due
W7, February 23	Deployment with Kubernetes		
W8, March 1	CI/CD with Git Actions	Midterm	
W9, March 8	Spring Break		
W10, March 15	CI/CD with Git Actions, Choose a project		Assignment 3 due
W11, March 22	Industry Tool Demo: Weights& Biases		
W12, March 28	Industry Tool Demo:Databricks		
W13, April 5	Industry Tool Demo: Databricks		Assignment 4 due
W14, April 12	ML Observability, ML Feature Store		
W15, April 19	Finals Review	Final	
W16, April 25			Project submission, survey paper submision