MECHENG 567 001 WN 2024

Jump to Today

Class Meeting: Monday/Wednesday 10:30a-11:50a

Starts: January 10, 2024
Ends: April 22, 2024

Location: 1200 EECS (recorded)

Instructor: Daniel Bruder, Ph.D.

Email: bruderd@umich.edu

Office Hours: Mondays 2:00-3:00p, Thursdays 2:00-3:00p

Office: 3480 GGB

Graduate Student Instructor 1: Kush Dhanwatay

Email: kushd@umich.edu

Office Hours: Tuesdays, 2:00-4:00p

Location: Hybrid (2540 GGB/Online)

Zoom Link: https://umich.zoom.us/j/99795624885

Graduate Student Instructor 1: Ross Cortino

Email: cortinrj@umich.edu

Office Hours: Wednesdays, 3:00-5:00p

Location: Hybrid (2300 FRB/Online)

Zoom Link: https://umich.zoom.us/j/99272200077 (https://umich.zoom.us/j/99272200077)

Passcode: 773202

Midterm Exam: 10:00a on Wed., March 20 to 10:00a on Thurs., March 21 (take-home)

Final Exam: 12:00p on Tues., April 30 to 12:00p on Wed., May 1 (take-home)

Course Pre-requisites, Co-requisites, and/or Other Restrictions

An introduction to linear systems at the level of EECS 560 / AERO 550 / ME 564 or ROB 501 is highly recommended. An undergraduate controls class is recommended. Knowledge of linear algebra and differential equations is required.

Course Description

MECH/EECS 567 / ROB 510 - Robot Kinematics and Dynamics *(3 semester hours) Geometry, kinematics, differential kinematics, dynamics, and control of robot manipulators. The mathematical tools required to describe spatial motion of a rigid body will be presented in full.*

Student Learning Objectives/Outcomes

Upon successful completion of this course, students will:

1. *have a basic understanding of the kinematics of robot manipulators and mobile robots.*
2. *understand the dynamics of Lagrangian mechanical systems and be able to compute the dynamic equations of motion of any robot manipulator.*
3. *have a basic understanding of nonlinear control methods and be able to analyze the stability and tracking performance of closed loop systems using Lyapunov theory.*
4. *be able to model, design, and simulate nonlinear controllers for manipulators and mobile robots.*

Required Textbooks and Materials

(MLS) *R. Murray, Z. Li, and S. Sastry, A Mathematical Introduction to Robotic Manipulation, CRC Press, Boca Raton, FL, 1994.*

Free PDF on Canvas

(SHV) *Mark W. Spong, Seth Hutchinson, and M. Vidyasagar, Robot Modeling and Control,* ***2nd ed.****, John Wiley & Sons, Inc., New York, NY, 2020.*

Online UM library access: *https://search.lib.umich.edu/catalog/record/017849644* **(https://search.lib.umich.edu/catalog/record/017849644)**

Required Software

MathWorks MATLAB

Access/installation: ***https://teamdynamix.umich.edu/TDClient/76/Portal/KB/ArticleDet?ID=5448*** **(https://teamdynamix.umich.edu/TDClient/76/Portal/KB/ArticleDet?ID=5448)**

Wolfram Mathematica

Access/installation: ***https://its.umich.edu/computing/computers-software/software-services/software-information/mathematica*** (https://its.umich.edu/computing/computers-software/software-services/software-information/mathematica)

Tutorials: ***http://www.wolfram.com/broadcast/screencasts/handsonstart/*** (http://www.wolfram.com/broadcast/screencasts/handsonstart/)

iClicker Cloud

We will be using iClicker Cloud for live polls during class. To set it up, go to the following url:

https://join.iclicker.com/MMAW (https://join.iclicker.com/MMAW)

You'll have to make an account the first time you try to login.

You can run iClicker at the above url from inside a browser window on your phone/laptop, or you can download the 'iClicker Student' App from the app store. You should open iClicker at the start of each class session and enter your answers to polls when prompted.

Online Resources

We will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the GSI, and myself. Rather than emailing questions to the teaching staff, please post your questions on Piazza (except when related to grades). You should first check to see if your question has already been posted and answered. You are encouraged to contribute to answers on Piazza; the more you help others the more they will help you!

Link: **https://piazza.com/umich/winter2023/rob510mecheng567eecs567** (https://piazza.com/umich/winter2023/rob510mecheng567eecs567)

Topical Outline

1. *Screw Theory for Kinematics* (MLS)
    - *Rotation Matrices and Homogeneous Transformations*
    - *Exponential Coordinates for Rigid Motion*
    - *Twists and Wrenches*
    - *Forward Kinematics (D-H and Product of Exponentials)*
    - *Inverse Kinematics*
    - *The Manipulator Jacobian*
2. *Dynamics* (MLS/SHV)

- *The Euler-Lagrange Equations*
- *The Dynamics of Example Manipulators*
- *Properties of Manipulator Dynamic Equations*

3. *Multivariable Nonlinear Control* (SHV)
    - *Lyapunov Stability and the Invariance Principle*
    - *PD Control*
    - *Inverse Dynamics*
    - *Robust and Adaptive Control*
    - *Passivity-Based Control*
    - *Force Control*
    - *Impedance Control*
    - *Feedback Linearization*

Exams and Grading Policy

There will be homework assignments involving worked problems and computer simulations, a midterm exam, and a final exam. Grades will be calculated according to the weights in the table below, and your final grade will be the maximum of Options 1-3.

	Option 1	***Option 2***	***Option 3***
Homework	20%	30%	40%
Midterm Exam	35%	30%	25%
Final Exam	45%	40%	35%

Active participants on Piazza whose answers get endorsed by instructors will be rewarded with bumping up borderline course grades at the end of the semester.

HW Scoring: (each problem)

1. **three** (3) points if the problem is perfectly correct or nearly so. Of course, "nearly so" is a subjective I don't consider a numerical mistake to be important if it doesn't change the basic problem nor lead to greatly simplified reasoning. I am always concerned about conceptual errors.

2. **two** (2) points if there are several minor errors or at least one major error, but it is clear that the person had a good idea of how to work the problem
3. **one** (1) point if the problem was attempted, but the reasoning is quite wrong, quite incomplete, or if the solution was unreadable (illegible writing, undefined notation,)
4. **zero** (0) points only if the problem was not attempted.

Homework will be submitted online via Canvas (**high-quality** scans or photos). **NO LATE HW ACCEPTED** without prior arrangement with the instructor. The total number of points for each HW set may vary based on the number of assigned problems. When computing HW averages, each HW set will be normalized to a score of 100% and your lowest score will be dropped. If you have a concern with your HW grading, please talk to the GSI first. Professor Bruder will only get involved after you give them a chance to address the concern.

OTHER COURSE POLICIES

Make-up Exams: No make-up exams will be given. In the event of an excused absence (illness with doctor's note, job-related travel, holy day absence, etc.; Proper documents should be provided), the weight of the exam will be shifted to the remaining exam.

Late Work: Not acceptable without prior arrangement with instructor (illness with doctor's note, job-related travel, holy day absence, etc.; Proper documents should be provided)

Honor Code: HW solutions for certain problems may be online; submitting these resources as your own solutions is considered dishonest conduct. This will constitute a violation of course policy and the College of Engineering Honor Code, resulting in a referral to the Honor Council. Failure to learn these concepts in your HW will then make the exams seem very hard.

Use of Generative AI: The use of AI tools to *generate* solutions to HW assignments and exams is expressly forbidden. Students who are found to have used ChatGPT or the like to complete an assignment will receive a grade of zero for that assignment. However, using generative AI tools as a *study aid* is permissible (e.g., to help clarify concepts, explain sample code, etc.). A rule of thumb is to treat ChatGPT like one of your classmates; it is okay to discuss course content with them, but not okay to copy their solutions.

Class Attendance: Lectures will be recorded but live attendance is encouraged. We will use iClicker for in-class exercises and students who submit answers to at least 75% of the iClicker exercises *will be rewarded with extra credit equivalent to a 5% bump on the final exam.*

Classroom Citizenship: Professional at all times. Please do not have a conversation with your neighbor during lecture. As courtesy to classmates and instructor, electronic devices should be silenced during class.

Disability Statement: The University of Michigan is committed to providing equal opportunity for participation in all programs, services and activities. Request for accommodations by persons with disabilities may be made by contacting the Services for Students with Disabilities (SSD) Office located at G-664 Haven Hall (ssdoffice@umich.edu). Once your eligibility for an accommodation has been determined you will be issued a verified individual services accommodation (VISA) form. Please present this form to me at the beginning of the term, or at least two weeks prior to the need for the accommodation (test, project, etc.).

Inclusion Statement: It is my intention that students from all backgrounds and perspectives will be well served by this course, and that the diversity that students bring to this class will be viewed as an asset. I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class. Your suggestions are encouraged and appreciated.

These descriptions and timelines are subject to change at the discretion of the Professor.

Course Summary:

Date	Details	Due
Wed Jan 10, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775318&include_contexts=course_659445)	10:30am to 12pm
Wed Jan 17, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775320&include_contexts=course_659445)	10:30am to 12pm

Date	Details	Due
	Office Hours (https://umich.instructure.com/calendar?event_id=1807457&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807472&include_contexts=course_659445)	3pm to 5pm
Fri Jan 19, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808101&include_contexts=course_659445)	2pm to 4pm
Mon Jan 22, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775321&include_contexts=course_659445)	10:30am to 12pm
Tue Jan 23, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808086&include_contexts=course_659445)	2pm to 4pm
Wed Jan 24, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775322&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807458&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807473&include_contexts=course_659445)	3pm to 5pm
Mon Jan 29, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775323&include_contexts=course_659445)	10:30am to 12pm
Tue Jan 30, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808087&include_contexts=course_659445)	2pm to 4pm
Wed Jan 31, 2024	Robot Kinematics and Dynamics WN 2024	10:30am to 12pm

Date	Details	Due
	(https://umich.instructure.com/calendar?event_id=1775324&include_contexts=course_659445)	
	Office Hours (https://umich.instructure.com/calendar?event_id=1807459&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807474&include_contexts=course_659445)	3pm to 5pm
Thu Feb 1, 2024	HW 1 (https://umich.instructure.com/courses/659445/assignments/2244908)	due by 11:59pm
Mon Feb 5, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775325&include_contexts=course_659445)	10:30am to 12pm
Tue Feb 6, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808088&include_contexts=course_659445)	2pm to 4pm
Wed Feb 7, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775326&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807475&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807460&include_contexts=course_659445)	3:30pm to 5:30pm
Mon Feb 12, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775327&include_contexts=course_659445)	10:30am to 12pm
Tue Feb 13, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808089&include_contexts=course_659445)	2pm to 4pm
Wed Feb 14, 2024	Robot Kinematics and Dynamics WN 2024	10:30am to 12pm

Date	Details	Due
	(https://umich.instructure.com/calendar?event_id=1775328&include_contexts=course_659445)	
	Office Hours (https://umich.instructure.com/calendar?event_id=1807461&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807476&include_contexts=course_659445)	3pm to 5pm
Thu Feb 15, 2024	HW 2 (https://umich.instructure.com/courses/659445/assignments/2244909)	due by 11:59pm
Mon Feb 19, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775329&include_contexts=course_659445)	10:30am to 12pm
Tue Feb 20, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808090&include_contexts=course_659445)	2pm to 4pm
Wed Feb 21, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775330&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807462&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807477&include_contexts=course_659445)	3pm to 5pm
Tue Feb 27, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808091&include_contexts=course_659445)	2pm to 4pm
Mon Mar 4, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775333&include_contexts=course_659445)	10:30am to 12pm
Tue Mar 5, 2024	GSI Office Hours (https://umich.instructure.com/calendar?	2pm to 4pm

Date	Details	Due
	event_id=1808092&include_contexts=course_659445)	
Wed Mar 6, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775334&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807464&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807479&include_contexts=course_659445)	3pm to 5pm
Thu Mar 7, 2024	HW 3 (https://umich.instructure.com/courses/659445/assignments/2244910)	due by 11:59pm
Mon Mar 11, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775335&include_contexts=course_659445)	10:30am to 12pm
Tue Mar 12, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808093&include_contexts=course_659445)	2pm to 4pm
Wed Mar 13, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775336&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807465&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807480&include_contexts=course_659445)	3pm to 5pm
Thu Mar 14, 2024	Rescheduled Office Hours (https://umich.instructure.com/calendar?event_id=1831082&include_contexts=course_659445)	2pm to 4:15pm
Mon Mar 18, 2024	Robot Kinematics and Dynamics WN 2024	10:30am to 12pm

Date	Details	Due
	(https://umich.instructure.com/calendar?event_id=1775337&include_contexts=course_659445)	
Tue Mar 19, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808094&include_contexts=course_659445)	2pm to 4pm
	Office Hours (Zoom Only) (https://umich.instructure.com/calendar?event_id=1807466&include_contexts=course_659445)	4pm to 6pm
Wed Mar 20, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775338&include_contexts=course_659445)	10:30am to 12pm
Thu Mar 21, 2024	Midterm Exam (https://umich.instructure.com/courses/659445/assignments/2244913)	due by 10am
Mon Mar 25, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775339&include_contexts=course_659445)	10:30am to 12pm
Tue Mar 26, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808095&include_contexts=course_659445)	2pm to 4pm
Wed Mar 27, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775340&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807467&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807482&include_contexts=course_659445)	3pm to 5pm
Thu Mar 28, 2024	HW 4 (https://umich.instructure.com/courses/659445/assignments/2244911)	due by 11:59pm
Mon Apr 1, 2024	Robot Kinematics and Dynamics WN 2024	10:30am to 12pm

Date	Details	Due
	(https://umich.instructure.com/calendar?event_id=1775341&include_contexts=course_659445)	
Tue Apr 2, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808096&include_contexts=course_659445)	2pm to 4pm
Wed Apr 3, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775342&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807468&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807483&include_contexts=course_659445)	3pm to 5pm
Mon Apr 8, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775343&include_contexts=course_659445)	10:30am to 12pm
Wed Apr 10, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775344&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807469&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807484&include_contexts=course_659445)	3pm to 5pm
Thu Apr 11, 2024	MECHENG 567 001 WN 2024 (https://umich.instructure.com/calendar?event_id=1837982&include_contexts=course_659445)	2pm to 4pm
	HW 5 (https://umich.instructure.com/courses/659445/assignments/2244912)	due by 11:59pm
Mon Apr 15, 2024	Robot Kinematics and Dynamics WN 2024	10:30am to 12pm

Date	Details	Due
	(https://umich.instructure.com/calendar?event_id=1775345&include_contexts=course_659445)	
Tue Apr 16, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808098&include_contexts=course_659445)	2pm to 4pm
Wed Apr 17, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775346&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807470&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807485&include_contexts=course_659445)	3pm to 5pm
Mon Apr 22, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775347&include_contexts=course_659445)	10:30am to 12pm
Tue Apr 23, 2024	GSI Office Hours (https://umich.instructure.com/calendar?event_id=1808099&include_contexts=course_659445)	2pm to 4pm
Wed Apr 24, 2024	Robot Kinematics and Dynamics WN 2024 (https://umich.instructure.com/calendar?event_id=1775348&include_contexts=course_659445)	10:30am to 12pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807471&include_contexts=course_659445)	3pm to 5pm
	Office Hours (https://umich.instructure.com/calendar?event_id=1807486&include_contexts=course_659445)	3pm to 5pm
Thu Apr 25, 2024	HW 6 (https://umich.instructure.com/courses/659445/assignments/2266612)	due by 11:59pm
Tue Apr 30, 2024	GSI Office Hours (https://umich.instructure.com/calendar?	2pm to 4pm

Date	Details	Due
	event_id=1808100&include_contexts=course_659445)	
Wed May 1, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807487&include_contexts=course_659445)	3pm to 5pm
Wed May 8, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807488&include_contexts=course_659445)	3pm to 5pm
Wed May 15, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807489&include_contexts=course_659445)	3pm to 5pm
Wed May 22, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807490&include_contexts=course_659445)	3pm to 5pm
Wed May 29, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807491&include_contexts=course_659445)	3pm to 5pm
Wed Jun 5, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807492&include_contexts=course_659445)	3pm to 5pm
Wed Jun 12, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807493&include_contexts=course_659445)	3pm to 5pm
Wed Jun 19, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807494&include_contexts=course_659445)	3pm to 5pm
Wed Jun 26, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807495&include_contexts=course_659445)	3pm to 5pm
Wed Jul 3, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807496&include_contexts=course_659445)	3pm to 5pm
Wed Jul 10, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807497&include_contexts=course_659445)	3pm to 5pm

Date	Details	Due
Wed Jul 17, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807498&include_contexts=course_659445)	3pm to 5pm
Wed Jul 24, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807499&include_contexts=course_659445)	3pm to 5pm
Wed Jul 31, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807500&include_contexts=course_659445)	3pm to 5pm
Wed Aug 7, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807501&include_contexts=course_659445)	3pm to 5pm
Wed Aug 14, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807502&include_contexts=course_659445)	3pm to 5pm
Wed Aug 21, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807503&include_contexts=course_659445)	3pm to 5pm
Wed Aug 28, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807504&include_contexts=course_659445)	3pm to 5pm
Wed Sep 4, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807505&include_contexts=course_659445)	3pm to 5pm
Wed Sep 11, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807506&include_contexts=course_659445)	3pm to 5pm
Wed Sep 18, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807507&include_contexts=course_659445)	3pm to 5pm
Wed Sep 25, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807508&include_contexts=course_659445)	3pm to 5pm
Wed Oct 2, 2024	Office Hours (https://umich.instructure.com/calendar?	3pm to 5pm

Date	Details	Due
	event_id=1807509&include_contexts=course_659445)	
Wed Oct 9, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807510&include_contexts=course_659445)	3pm to 5pm
Wed Oct 16, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807511&include_contexts=course_659445)	3pm to 5pm
Wed Oct 23, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807512&include_contexts=course_659445)	3pm to 5pm
Wed Oct 30, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807513&include_contexts=course_659445)	3pm to 5pm
Wed Nov 6, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807514&include_contexts=course_659445)	3pm to 5pm
Wed Nov 13, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807515&include_contexts=course_659445)	3pm to 5pm
Wed Nov 20, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807516&include_contexts=course_659445)	3pm to 5pm
Wed Nov 27, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807517&include_contexts=course_659445)	3pm to 5pm
Wed Dec 4, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807518&include_contexts=course_659445)	3pm to 5pm
Wed Dec 11, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807519&include_contexts=course_659445)	3pm to 5pm
Wed Dec 18, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807520&include_contexts=course_659445)	3pm to 5pm

Date	Details	Due
Wed Dec 25, 2024	Office Hours (https://umich.instructure.com/calendar?event_id=1807521&include_contexts=course_659445)	3pm to 5pm
Wed Jan 1, 2025	Office Hours (https://umich.instructure.com/calendar?event_id=1807522&include_contexts=course_659445)	3pm to 5pm
Wed Jan 8, 2025	Office Hours (https://umich.instructure.com/calendar?event_id=1807523&include_contexts=course_659445)	3pm to 5pm