Spring 2024

MAE 384: Advanced Mathematical Methods for Engineers

Course Data

Class number:	17938
Days and Time:	M,W: 12-1:15pm
Location:	PSF-101
Online Tools:	Zoom / Canvas / EdDiscussion / Gradescope / Matlab Grader
Recitation:	W 1:30-2:45pm (GWC-535), W 3-4:15pm (ECG-218), W 4:30-5:45pm (ECG-227)

Contact Information

Instructor:	Marcus Herrmann
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Teaching Ass.:	Sri Ram Padma Kumar
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Office Hours

Instructor:	M, W, Th, F: 10-11am, ERC311 and Zoom (370 345 0297), **for up to date information, please subscribe to the Class Google calendar (link on Canvas in Module 0) Zoom link:** https://asu.zoom.us/j/3703450297
Teaching Ass.:	tbd

Disclaimer

Except when prohibited by ASU policy, all provisions in this syllabus are subject to change if deemed necessary by the instructor. Changes are announced in a timely manner on Canvas.

Course Description

Methods for numerical solutions to engineering problems. Nonlinear equations, curve fitting, quadrature, ordinary differential equations. Analytical and numerical solutions to partial differential equations.

Enrollment Requirements

- Prerequisite: MAE 215 Introduction to Programming in MATLAB; MAT 274 Ordinary Differential Equations or 275 Modern Differential Equations; MAT 242 Elementary Linear Algebra or MAT 343 Applied Linear Algebra.
- Pre-/co-requisite: MAT 267 Calculus for Engineers III or MAT 272 Calculus w/Analytic Geometry III.

Prerequisite competencies

- Solution of linear systems; eigenvalues and eigenvectors; ODE's;
- **Programming in MATLAB**
  It is essential that students review their programming in Matlab skills prior to taking this class. Knowledge of programming concepts like variables (incl. multi-dimensional array variables), functions with multiple input and output variables, anonymous functions, loops, conditional structures, program comments, 1D and 2D graphing/plotting commands are **essential prerequisites from MAE215 that will not be re-taught in this course**. If you struggle with these concepts, please review the posted MAE215 videos, your MAE215 notes, and/or Appendix A of the textbook and, if necessary, seek outside help, e.g., from the tutoring center, **before the start of the semester**.

Please also review the math background presented in chapter 2 of the book as soon as possible. **Chapter 2 will not be covered in class and it is your responsibility to review these pre-requisites.**

Required Course Materials

- Wiley Custom Learning Solutions :"Numerical Methods Matlab", 3rd ed.
- iClicker Reef account using your ASU email / ASURITE username
  (instructions of setting up your account are available on Canvas)
- Laptop/desktop with Matlab installed (free license for Engineering students)

You are encouraged to use a PC, Mac laptop or desktop equipped with a built-in or standalone webcam for Zoom access. You will need an internet connection that can effectively stream live broadcasts (e.g. 3G, 4G, Cable or DSL Wifi).

Course Objectives and Expected Learning Outcomes

Required Course Core Outcomes

	Course Core Outcome (CCO)	Level	#req
1	Identify and estimate errors in numerical solutions.	Comprehension	3
2	Solve linear system of equations using direct methods.	Application	1
3	Solve nonlinear single variable functions and multivariate systems of functions using basic root finding techniques.	Application	1
4	Perform curve fitting and interpolation using given or generated data sets.	Application	1
5	Calculate derivatives of given or generated data sets of one or more independent variables using finite differences.	Application	1
6	Calculate integrals of given or generated data sets using numerical integration techniques.	Application	1
7	Analyze periodic data using discrete Fourier transforms.	Application	1
8	Solve ordinary differential equations (single ODEs and systems of ODEs) using numerical methods.	Application	1
9	Solve linear partial differential equations analytically.	Comprehension	1
10	Solve a partial differential equation using numerical methods.	Comprehension	1
11	Present numerical results in appropriate fashion.	Application	4
12	Solve engineering problems using a combination of appropriate numerical methods.	Analysis	1

Course Topics

- Round-off and Truncation Errors
  - Computer representation of numbers
- Numerical solution to systems of linear equations
  - Gauss-Jordan; Condition number
- Roots of Equations
  - Bracketing methods; Open methods
  - Systems of nonlinear equations
- Curve Fitting
  - Fitting data by least-squares; Interpolation
- Fourier Analysis
  - Fourier series; Discrete Fourier transform

- Numerical integration and derivatives
  - Newton-Cotes formulas;
  - Forward, backward and central differences
  - Accuracy
- Numerical solution to ordinary differential equations
  - Explicit and implicit methods
  - Euler, Runge-Kutta
  - Accuracy and stability
  - Boundary-value problems (optional)
- Analytical solution to partial differential equations
  - Classification of PDE's
  - Separation of variables solutions for linear homogeneous equations
  - Inhomogeneous boundary conditions
  - Self-similar solutions (optional)
- Numerical solution to partial differential equations
  - Finite difference solution to the heat equation
  - Finite difference solution to the Laplace equation (optional)

In-person attendance

This class is offered as an in-person class only and will follow all ASU policies concerning in-person classes.

Do not attend class if you feel sick, may be infected with Covid-19, or have been exposed to someone infected with Covid-19! Simply follow the guidelines set by the CDC for isolation/quarantine and notify the instructor as soon as possible. On an individual basis, a plan will be worked out to let you make up for any missed class participation credit.

Grading Policies

Grades are calculated using the following weighted sum of scores obtained in 3 assignment categories:

Exams:	63% (9 module exams for 7% each)
Class & Recitation participation:	17%
Final Project:	20%

The letter grade associated with the final weighted score will be determined depending on the overall performance of the classes using the standard grading scheme as a guideline. The grading scheme will include the grades of A, B+, B, C+, C, D, and E.

Students have to meet several core course outcomes outlined above and in a separate document available as an assignment on Canvas. **A grade of C or better, regardless of the overall course score, can only be assigned if all the core outcomes have been met.** To meet a core outcome, students have to score at least 75% of the available points of a core outcome problem for a number a number of problems listed in the table (#req). For example, to satisfy core outcome #1, students have to score 75% or better on at least 3 problems in the exams/final project that are marked as relating to core outcome #1. Students can track their core outcome demonstration status on Canvas.

If you have questions or complaints about the grading of individual problems, you must submit a re-grade request for the respective problem on Gradescope within 5 days of the grade being published. No re-grade requests will be entertained outside Gradescope's re-grade request procedure.

Exams

Exams are take home exams, open textbook and open class notes. Students are **not allowed to collaborate** in any form or use any not explicitly in the assignment text allowed resources to solve the exams. Any outside help sought, for example from other students, the Tutoring Center, or any other person, will be treated as an Academic Integrity Violation unless specifically authorized in the exam instructions.

Each exam primarily covers one learning module and is worth 7% of the overall grade. Exams may contain additional bonus problems for the prior module's exam. These bonus problems are clearly marked and can be used to obtain additional core outcome credit and to further improve your score from the relevant prior module exam. However, individual exams are capped at a 100% score. For example: you score 70 out of 80 points in exam 2 covering module 2; if in exam 3, there is a bonus problem related to exam 2 for 15 bonus points that you solve entirely correct, your exam 2 score will increase from 70 points to 80 points (70+15 = 85, but capped to 100%, i.e. 80 points).

Homework

Each module offers a set of homework problems that can be submitted for bonus points for that module's exam. **Students can freely discuss on EdDiscussion, cooperate with each other, and seek help from ASU's Engineering Tutoring Center to solve the homework problems.** However, homework is **not** a group assignment. Each student has to submit their own homework on Gradescope and Matlab Grader. Submitted homework problems are graded mainly on completion, however spot checks for accuracy may be performed at any time. As a general guideline (subject to change), homework is worth approximately 10% of the module's exam in bonus points. However, these bonus points are subject to the 100% score cap as outlined above. No Course Core Outcome credit is available on homework assignments.
Important: to be successful in the exams, it is imperative that you fully understand the homework problems.

Class & Recitation participation

Class and recitation participation is determined via iClicker based quizzes/challenge questions given in each class and recitation session. A credit of 1 point is earned by participating in the activity, regardless of whether the given answers are correct or not. **Credit in this category can be earned only via the use of the iClicker Reef app on your mobile phone or via a browser**. Instructions of how to set up an iClicker Reef account and respond to questions are available on Canvas. Since ASU has a site license for iClicker, there should be no additional cost to you using the mobile app or browser based reply.

Bonus credit for the class/recitation participation category can be earned by filling out iClicker Exit Polls after each class before the end of the class day. Four submitted exit polls equal 1 bonus participation point. These bonus points do not carry over to any other category and the total score in the category is capped at 100%.

Final project

The final project is a take home exam to be completed by each student individually that can cover all topics taught in this class.

Assignment Submission Policies

Exams, homework, and the final project assignment will be posted as pdf files on the class' Canvas site. Due dates and times for each, as well as submission instructions are stated in the posted assignments.

All assignment submissions have to be done online using Matlab Grader, Canvas, and/or Gradescope. You will be able to access the class' Gradescope and Matlab Grader websites via a link on Canvas. **Failure to submit the source code files on Matlab Grader and Gradescope if requested may result in a score of zero for the entire problem or a severe point reduction.**

Note that in addition to the source code file upload, assignments may require the submission of **a printout of the code used in the regular Gradescope assignment**. Code must be well documented by comments in the source code. Using these comments, one must be able to understand the purpose of individual code segments, i.e. for loops, if statements, subroutines, etc. Uncommented code may incur grading penalties.

All work must be submitted **before** the due date and time, however, a grace period of 60 minutes after the deadline for late submissions without penalty is granted unless otherwise noted in the assignment sheet. **No credit will be given for work submitted after this grace period.** It is thus imperative that you start

your online submission as early as possible and that you not wait until the last minute/hour/day. **Computer and/or internet problems are not an excuse and do not extend the deadlines.**

Absence & Make-Up Policy

Class and recitation attendance

Attending classes and recitation is mandatory. Attendance and classroom participation will be ascertained using the iClicker app via in-class quizzes and/or sign-ins.

Do not attend class if you feel sick, may be infected with Covid-19, or have been exposed to someone infected with Covid-19! Simply follow the guidelines set by the CDC for isolation/quarantine and notify the instructor as soon as possible. On an individual basis, a plan will be worked out to let you make up for any missed class participation credit.

Excused absences due to illness other than Covid-19, require a doctor's note and will be accepted for up to 4 classes only. The doctor's note must be Emailed to the instructor and, upon request, presented to the instructor, within 5 days after the end of the excused period covered.

No other make-up opportunities are offered for class participation/attendance.

Accommodations will be made for religious observances provided that students notify the instructor **at the beginning of the semester** concerning those dates. Students who expect to miss class due to officially university-sanctioned activities should inform the instructor **early in the semester**. Alternative arrangements will generally be made for any examinations and other graded in-class work affected by such absences. The preceding policies are based on ACD 304–04, "Accommodation for Religious Practices" and ACD 304–02, "Missed Classes Due to University-Sanctioned Activities."

Exams, homework, and final project

No extensions for any reason, including due to illness/doctor's notes will be granted for exams, homework, and the final project.

A doctor's note covering at least 60% of the time an assignment is available to a student, will result in the assignment being excluded from the student's grade calculation. This accommodation applies to at most two exams and does not apply to the final project. The instructor reserves the right to not accept any doctor's note, if, for example, the student attended class during the covered period.

No make-up opportunities are offered for exams, homework, or the final project.

Recitation

The purpose of the recitation sessions is to review class content, discuss aspects of programming logic for methods covered in class, and practice problem solving by working on example and homework problems. Most recitations will be organized as small group (3-5 students) activities that require at least one laptop per group with Matlab installed.

Honors Contract

An Honors Contract is offered for this class for Honors students only. The Honors contract must be on file before the due date of the first homework. The contract consists of solving extra problems in the exam assignments that need to be independently solved using the class text book. The assignments cover topics not covered in class. No collaboration or outside help may be sought on the Honors contract problems. To fulfill the Honors contract, honors students need to score 80% or higher of the available points for 70% (rounded down) of the given Honors contract problems. The final project will give Honors students the opportunity to redo 2 Honor problems from earlier in the semester for which they failed to receive Honors credit. Failing to fulfill the contract will have no impact on the course grade.

Classroom Behavior

The use of recording devices is not permitted during class. Any violent or threatening conduct by an ASU student in this class will be reported to the ASU Police Department and the Office of the Dean of Students.

Academic Integrity and Copyright Laws

Students in this class must adhere to ASU's academic integrity policy, which can be found at https://provost.asu.edu/academic-integrity/policy). Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. In addition, all engineering students are expected to adhere to both the ASU Academic Integrity Honor Code and the Fulton Schools of Engineering Honor Code. All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). The AIO maintains record of all violations and has access to academic integrity violations committed in all other ASU college/schools.

As a reminder, it is, amongst other things, a violation of the Academic Integrity Policy if one

- refers to materials or sources or uses devices (e.g., computer disks, audio recorders, camera phones, text messages, crib sheets, calculators, solution manuals, **materials from previous classes**, or commercial research services) not authorized by the instructor for use during the Academic Evaluation or assignment;
- possesses, reviews, buys, sells, obtains, or uses, without appropriate authorization, any materials intended to be used for an Academic Evaluation or assignment in advance of its administration;
- uses an iClicker registered to another student.

For example, you are not authorized to use any solutions from homework/exams/mid-term exams/project assignments from prior years, including but not limited to course posted solutions and solutions of prior year students for any of the assignments of this class, which include homework assignments, exams, midterm exams, and the final project.

In this course, all assignments must be completed by the student. Artificial Intelligence (AI), including ChatGPT and other related tools used for creating of text, images, computer code, audio, or other media, are not permitted for use in any work in this class. Use of these generative AI tools will be considered a violation of the ASU Academic Integrity Policy, and students may be sanctioned for confirmed, non-allowable use in this course.

You are permitted to work with other students, seek help from the tutoring center or the instructor during office hours, pose questions and help other students on EdDiscussion in order to solve **homework problems**.

No collaboration is allowed for the exams and no help may be sought to solve the exam problems with the exception of asking questions to the instructor directly (either as a private post on EdDiscussion or as a direct message).

The use of discussion groups and sites (other than the class's Ed Discussion site), discord, and/or tutoring websites to help you solve exams and final project problems is not permitted and will constitute a violation of the Academic Integrity Policy. Note that "tutoring" sites like chegg, bartleby, etc. are routinely monitored and academic integrity violation investigations are initiated for anyone suspected of having used these sites.

Copyright

All course content and materials, including lectures are copyrighted materials and students **may not share outside the class, upload to online websites not approved by the instructor,** sell, or distribute course content or notes taken during the conduct of the course (see ACD 304–06, "Commercial Note Taking Services" and ABOR Policy 5-308 F.14 for more information).

You must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Policy against Threatening Behavior, per the Student Services Manual, SSM 104–02

Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services. Interfering with the peaceful conduct of university-related business or activities or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on- or off-campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students.

Disability Accommodations Policy

Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with the ASU Disabilities Resource Center and provide documentation of that registration to the instructor. Students should communicate the need for an accommodation in sufficient time for it to be properly arranged. See ACD 304-08 Classroom and Testing Accommodations for Students with Disabilities.

iClicker Policy

The class uses the iClicker Reef app / browser to register attendance and participation via quizzes/challenge questions posed in class and recitation. Students have to set up an iClicker Reef account and link to this class. Instructions of how to do this are available on Canvas.

- It is your responsibility to use the iClicker app/browser in every class and recitation. No credit will be given for the class & recitation participation/quizzes grading category without a working iClicker account.
- All academic integrity rules apply to the use of iClickers, e.g., using someone else's iClicker is prohibited.

Harassment and Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

Mandated sexual harassment reporter

As an employee of the University I am considered a mandated reporter and therefore obligated to report any information regarding alleged acts of sexual discrimination that I am informed of or have a reasonable basis to believe occurred.

ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish to discuss any concerns confidentially and privately.

Class Schedule

The following is a provisional class schedule, subject to change. Homework (H) is generally released at the start of a module and is due at 5pm on listed Fridays. Exams (E) are typically released at 5pm on Monday and are due on Tuesday at 11:59pm. These guidelines are superseded by due dates/times announced in Canvas/Gradescope/MatlabGrader for each assignment.

#	Date	Day	due	Topic	out	due
1	**1/8**	**M**		**Module 0:** Syllabus; How to be successful in this class; **Module 1**: binary numbers		
2	**1/10**	**W**		floating point numbers; IEEE-754 and its consequences;		
1.1	**1/10**	**W**		*Module 1, Recitation 1: Converting decimal to binary using code*		
	1/12	**F**				**H0**
	1/15	**M**		**no class** (MLK)		
3	**1/17**	**W**		IEEE-754 and its consequences (cont.); round-off, truncation, true errors;		
1.2	**1/17**	**W**		*Module 1, Recitation 2: Finite precision & truncation errors*		
	1/19	**F**	**5pm**			**H1**
4	**1/22**	**M**		**Module 2**: Solving linear systems: Gauss-Jordan method;	E1	
	1/23	**Tu**	**11:59pm**			**E1**
5	**1/24**	**W**		Pivoting and partial pivoting;		
2.1	**1/24**	**W**		*Module 2, Recitation 1: Gauss Jordan without pivoting*		
6	**1/29**	**M**		Vector and array norms; Residual; Condition number;		
7	**1/31**	**W**		**Module 3**: Solving non-linear equations; tolerances; relative errors;		
2.2	**1/31**	**W**		*Module 2, Recitation 2: Condition number*		
	2/2	**F**	**5pm**			**H2**
8	**2/5**	**M**		Bisection method; Newton's method; Secant method;	E2	
	2/6	**Tu**	**11:59pm**			**E2**
9	**2/7**	**W**		Solving systems of nonlinear equations;		
3.1	**2/7**	**W**		*Module 3, Recitation 1: Bisection method & Newton's method for systems*		
	2/9	**F**	**5pm**			**H3**
10	**2/12**	**M**		**Module 4:** Curve fitting: linear least squares regression;	E3	
	2/13	**Tu**	**11:59pm**			**E3**
11	**2/14**	**W**		non-linear function linear least squares fitting; polynomial curve fitting		
4.1	**2/14**	**W**		*Module 4, Recitation 1: Linear Regression*		
12	**2/19**	**M**		Interpolation w/ polynomials; Lagrange polynomials; Linear & Quadratic Splines		
13	**2/21**	**W**		Cubic splines;		
4.2	**2/21**	**W**		*Module 4, Recitation 2: Cubic Splines*		
	2/23	**F**	**5pm**			**H4**
14	**2/26**	**M**		**Module 5:** Numerical differentiation: Finite differences;	E4	
	2/27	**Tu**	**11:59pm**			**E4**
15	**2/28**	**W**		Order; Numerical partial derivatives;		
5.1	**2/28**	**W**		*Module 5, Recitation 1: Numerical Differentiation*		
	3/1	**F**	**5pm**			**H5**
	3/4	**M**		**no class** (spring break)		
	3/6	**W**		**no class / recitation** (spring break)		
16	**3/11**	**M**		**Module 6:** Numerical Integration: Rectangle methods; Mid-point methods, Trapezoidal methods;	E5	
	3/12	**Tu**	**11:59pm**			**E5**

#	Date	Day	due	Topic	out	due
17	**3/13**	**W**		Simpson's 1/3 and 3/8 methods; Order of accuracy of integration methods		
6.1	**3/13**	**W**		*Module 6, Recitation 1: Numerical Integration*		
18	**3/18**	**M**		Gaussian quadrature		
19	**3/20**	**W**		**Module 7:** Fourier Series and transform		
6.2	**3/20**	**W**		*Module 6, Recitation 2: Numerical Integration (cont.)*		
	3/22	**F**	**5pm**			**H6**
20	**3/25**	**M**		DFT; Power spectrum	E6	
	3/26	**Tu**	**11:59pm**			**E6**
21	**3/27**	**W**		**Module 8:** ODEs: classification, Explicit, Modified & Midpoint Euler method		
7.1	**3/27**	**W**		*Module 7, Recitation 1: Discrete Fourier Transform & Power Spectrum*		
	3/29	**F**	**5pm**			**H7**
22	**4/1**	**M**		Errors and order; Runge-Kutta methods;	E7	
	4/2	**Tu**	**11:59pm**			**E7**
23	**4/3**	**W**		Analytical Solutions; Stability, Euler's implicit method;		
8.1	**4/3**	**W**		*Module 8, Recitation 1: RK methods*		
24	**4/8**	**M**		Accuracy; System of ODEs;		
25	**4/10**	**W**		Higher-order ODEs ; Stiff ODEs;		
8.2	**4/10**	**W**		*Module 8, Recitation 2: System of ODEs*		
	4/12	**F**	**5pm**			**H8**
26	**4/15**	**M**		**Module 9:** PDEs: Method of separation of variables; Numerical methods	E8	
	4/16	**Tu**	**11:59pm**			**E8**
27	**4/17**	**W**		PDEs: Numerical methods (cont.); Accuracy; Higher dimensions		
9.1	**4/17**	**W**		Module 9, Recitation 1: PDEs: Analytical and numerical solutions		
	4/19	**F**	**5pm**			**H9**
28	**4/22**	**M**		**Module 10:** Applications	E9	
	4/23	**Tu**	**11:59pm**			**E9**
29	**4/24**	**W**		Applications; Final Project Q&A	FP	
X.1	**4/24**	**W**		*Final Project, Recitation 1: Q&A*		
	4/29	**M**	**11:59pm**	**Final project due at 11:59pm**		**FP**

Some Important Dates

First day of class:	1/8/24
Last day of class:	4/24/24
No in-person class on:	1/15 (MLK); 3/4 & 3/6 (spring break)
No recitation on:	3/6 (spring break)
No office hours on:	see Office Hour Google calendar (**subscribe to it using link on Canvas/Ed Discussion**)
Final Project due date:	11:59pm on 4/29

Additional Information

- Any information in this syllabus (other than grading and absence policies) may be subject to change with reasonable advance notice.
- Should the instructor fail to arrive on time, students are obliged to wait at least 15 minutes beyond the start time of the class for the class to start. Students may be directed to wait longer by someone from the academic unit if they know the instructor will arrive shortly.

- Class notes will be posted on Canvas throughout the semester. They contain any slides used in class and what will be handwritten during class. I will attempt to upload these notes before each class, so you can concentrate on following the content and are not occupied with copying the board's writings.
- Videos of recitation problem solutions will be posted on Canvas after a week's last recitation session. These are not intended to replace the in-person recitation and are intended only as an additional reference if a specific solution procedure remains unclear to you or was not fully covered during the in-person recitation.
- Solutions to homework and exams will be posted on Canvas immediately following the assignment's grace period.
- The Tutoring Center provides a valuable resource for students struggling with the concepts covered in class and may be used to help with homework.
- Students may collaborate on solving homework problems.
- Please make use of the office hours to have problems/questions cleared up as early as possible. If the regular office hours don't work for you, schedule a meeting by sending me an Email.
- If you decide to set up additional channels of communication amongst yourself (Discord for example), I request that you add me to these communication channels. This will allow me to monitor and participate in the communication and, if necessary, intervene to avoid potential academic integrity violations.
- If you are retaking this class, remove all prior material you may have access to. Do not use it for any assessments (homework, exams, final project), see also the Academic Integrity policy. Start from scratch!
- Why the Friday 5pm deadline for homework and not midnight? The 5pm deadline allows us to start grading your homework on Fridays to return it to you as soon as possible to help you study for the corresponding exam.

Tips on how to be Successful in this Class

- It is essential that you have a good basic knowledge of coding and Matlab. The class's Canvas site will provide some MAE 215 videos to refresh your Matlab knowledge. Matlab coding basics are not retaught in this class and are required pre-requisite knowledge from MAE 215.
- **It is absolutely crucial that you continuously work on the content of this class throughout the semester.**
- Although the homework is voluntary since it is for bonus points only, I cannot stress strongly enough that **it is essential** to be able to solve the exams in a reasonable time. Seeing content and problems for the first time in an exam that you have to solve on your own without having practiced, discussed with your fellow students, and worked through similar problems in the homework, will almost guarantee that you will struggle in this class and spend extra time on this class.
- It has been my experience that students that struggle with an exam problem, have not fully understood the corresponding homework or class problem and its solution. Thus, should you struggle with an exam problem, **identify the corresponding homework or class problem and seek help fully understanding the homework or class problem on EdDiscussion**. This can be done even during the exam period!
- Use Matlab Grader to check your Matlab functions! You have unlimited submission tries on Matlab Grader, and only the last submission will be graded.
- It is crucial that you treat the 9 exams of this class as **EXAMS**. Although the exams are open textbook, open class notes, and are available to you for 30+h, you still need to study for each exam as you likely would for any in-classroom exam **before** the exam. **I strongly recommend you summarize each module on a 1-2 page cheat sheet before the exam. You can of course use your cheat sheets during the exam and the final project.**

- Exams typically should take 1-2h to solve. This assumes you have studied **before** each exam. It's been my experience that the "shortcut" of not studying before an exam and instead relying on the homework, recitation, and class examples to concoct a solution after a specific exam problem has been released will not only increase significantly your solution time for an exam, but will in almost all cases cause significant issues in the final project.