

**TEXAS A&M UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING**

**MEEN 364 Dynamic Systems and Controls
Sections 502
Spring 2024**

General Description (Credit 3. 3 Lecture Hours.):

Mathematical modeling and analysis of different types of dynamic systems; introduction to feedback control, time and frequency domain analysis of control systems, stability, PID control, root locus; design of computer-based controllers.

Prerequisites:

Grade of C or better in MEEN 260, MEEN 363, and ECEN 215

Instructor:

Dr. Won-jong Kim
Associate Professor
Dept. of Mechanical Engineering
223 Mechanical Engr. Office Bldg.
Ph. 979-845-3645
E-mail: wjkim@tamu.edu

Lecture TA:

Pranav Shivaprasad
E-mail: pranav_18@tamu.edu

Meeting Times and Place:

Monday, Wednesday, and Friday 9:10 AM – 10:00 AM
HECC 200

Office Hours:

Dr. Kim – Wednesday 6:00 PM – 8:00 PM ONLINE, or by appointment. The ZOOM meeting ID and passcode are posted at Canvas.

Mr. Shivaprasad – Tuesday and Thursday 11:00 AM – noon at JCAIN 203.

Additional help is available by scheduling an appointment with instructors or the lecture TA. The easiest way to reach the instructor or TA is via e-mail.

Textbooks:

- G. F. Franklin, J. D. Powell, and A. E.-Naeini, *Feedback Control of Dynamic Systems*, Prentice Hall, 2018. 4th through any edition is OK.
- D. Childs and A. P. Konkey, *Dynamics in Engineering Practice*, 11th Ed., CRC Press, 2015.

Additionally, some material regarding modeling of dynamic systems may be found in

- B. T. Kulakowski, J. F. Gardner, and J. L. Shearer, *Dynamic Modeling and Control of Engineering Systems*, Third Edition, Prentice Hall, 2007. This textbook is available online at the library website (<http://app.knovel.com/web/toc.v/cid:kpDMCESE03>).

On-line Course Material:

All other course material such as class notes and homework problems, and homework solutions will be posted at canvas.tamu.edu.

- (1) Canvas: Files -> In-Class Examples

I will cover these templates during the lectures.

- (2) ALSO link to Canvas -> Notes

You will find both related theory and examples in these additional lecture notes.

Use of Computer Software:

This course will introduce you to and make extensive use of MATLAB/SIMULINK. This will be used for solving homework problems. The software tools you will be introduced to are intended to help you solve the various numerical problems you encounter in this course. Such problems would otherwise require extensive number crunching. Even though one could perform symbolic calculations with some of these tools, we highly recommend against it. You could use the symbolic calculators of MATLAB to check some of the mathematics you perform by hand. However, we expect you to know how to do mathematics by hand and you may have to show your skills in the tests. Review notes on various aspects of mathematics needed in this course will be made available on the course web page. It is also OK to use Python if that is what you are accustomed to.

Student Evaluation:

To be consistent with the traditional MEEN 364's student evaluation:

Homework		10%
Exam I	Wednesday, February 21, 7:30 – 9:30 PM at TBA	20%
Exam II	Wednesday, April 3, 7:30 – 9:30 PM at TBA	20%
Final Exam - Comprehensive	Friday, May 3, 8:00 AM – 10:00 AM	25%
Total		75%

Then, a factor of 4/3 (four thirds) will be multiplied to consider your overall performance out of 100%.

Exams will be based on individual work and they will be closed book and closed notes. Information you might need from certain tables in the textbook will be made available to you. **CALCULATORS WILL NOT BE ALLOWED IN THE COMMON EXAMS AND THE FINAL.**

Homework Collection will be canceled the weeks of the common mid-term exams. Two lectures will be canceled (TBA) to accommodate the two mid-term exam times.

Policy on Make-up Exams:

Make-up exams will be given only for those with University-excused absences from the regular exams. Contact the instructor as soon as you are aware of the absence so that a make-up exam can be scheduled. Contact the instructor BEFORE the actual exam takes place. Make-up exams will be scheduled by the instructor.

Homework Assignments:

Homework will be posted as an ASSIGNMENT on the CANVAS course web page *every Wednesday, and it will be due at 11:59 PM on the following Wednesday. Your solutions must be uploaded through CANVAS Assignments. Late homework will not be accepted without a University-excused absence.* All written work must be clear and professionally done with the necessary steps leading to the solution clearly marked. Homework solutions will be made available on the course web site. One of the homework problems will be selected for grading randomly and it will carry 80% of the grade for that homework set. The remaining problems will receive a checkmark, if a convincing solution is present they will receive 20% of the grade for that homework set. **MAKE SURE TO BOX YOUR ANSWERS**

Homework is intended to show your individual work. Each student is required to turn-in his or her solutions to the homework assignments. However, you are allowed to form groups or join each other on discussions regarding the problems. **Please, read the section on plagiarism below.**

Policy on Grading Complaints for Homeworks and Exams:

If you feel a mistake was made in grading any material involving (1) points not added or not recorded properly, (2) points taken-off for an answer that is not 100% correct, or (3) for giving partial credit, please ***write a description*** of your complaint on the respective page of the assignment ***within one week*** after the graded paper was distributed. Turn in the annotated document to your lecture instructor. They will route it to the appropriate grader for re-checking. Please, be very clear and specific about your complaints.

Attendance Policy:

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments. Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy:

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor. Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

- Late work is submitting a deliverable after the established deadline. Work submitted by a student as makeup work for an excused absence is not considered late work and is exempted from the late work policy. See Student Rule 7.

Academic Integrity Statement and Policy:

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

On all course work, assignments, and examinations at Texas A&M University, the following Honor Pledge will apply either implicitly or explicitly by the student:

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

Signature of Student

Americans with Disabilities Act (ADA) Policy:

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Please email Dr. Kim your paperwork from Testing Services for extended exam time.

Title IX and Statement on Limits to Confidentiality:

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

- Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

- Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness:

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

Campus Safety Measures – COVID-19:

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the SPRING 2022 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. **Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction.**
- Face Coverings—Face coverings (cloth face covering, surgical mask, etc.) are highly encouraged to be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the Face Covering policy and Frequently Asked Questions (FAQ) available on the Provost website.
- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students are highly encouraged to wear a face covering (or a face shield if they have an exemption letter).

Personal Illness and Quarantine:

Students required to quarantine must participate in courses and course-related activities remotely and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or Illness that is too severe for the student to attend class qualify for an excused absence (See Student Rule 7, Section 7.2.2.) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7. While Student Rule 7, Section 7.3.2.1, indicates a medical confirmation note from the student's medical provider is preferred.

COVID Policies:

For more information on COVID policy and news, please visit <https://www.tamu.edu/coronavirus/index.html> and <https://covid.engr.tamu.edu/employee-safety/>

- Course Modalities – all classes continue to be 100% face to face with traditional seating capacities and schedules. Students are not allowed to attend face-to-face designated classes remotely. However, faculty may post a recording of the class after it is delivered.
- Faculty may **NOT** require students to wear masks, segregate students based on the use of a mask, or ask students about vaccination status. Faculty may generally encourage safety protocols and best practices.
- Student Illness or Quarantine – any absence for illness or quarantine falls under Student Rule 7 (<https://student-rules.tamu.edu/>), there is no specific Covid addendum in place.

- Faculty should have substitution plans in place to take over their class should they need to quarantine or isolate.

To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking — regardless of vaccination status — have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.