SYLLABUS
MENG 4253 – 201: CONTROL SYSTEMS
(Required Course)
Spring 2022

COURSE INSTRUCTOR

Dr. Zeki Ilhan (zeki.ilhan@msutexas.edu)
Office: McCoy Hall 219E
Phone: (940) 397-4004

TEACHER ASSISTANT

To be announced.

CLASS SCHEDULE

Days	***Time***	***Location***
Monday		
Tuesday	08:00 am – 09:20 am	MY 136
Wednesday		
Thursday	08:00 am – 09:20 am	MY 136
Friday		

OFFICE HOURS

Days	***Time***	***Location***
Monday	12:00 pm – 01:00 pm	MY 219E
Tuesday	10:00 am – 11:00 am	MY 219E
Wednesday	10:00 am – 11:00 am	MY 219E
Thursday	05:00 pm – 06:00 pm	MY 219E
Friday	01:00 pm – 02:00 pm	MY 219E

ATTENDANCE POLICY

This course will be delivered predominantly in "face-to-face" mode. Attendance is mandatory, and it represents a part of your overall grade. Attendance will be ***checked randomly on select lectures*** using the AttendMe app. (Detailed instructions on how to download and use the app will be made available in the lectures).

COVID-19 PROCEDURES & REPORTING

Any student (vaccinated or unvaccinated) who has a laboratory confirmed case of COVID-19 must complete the COVID-19 Reporting Form for Students. This form will be used to notify campus health professionals and residence life staff (if you reside on campus) and generate ***absence notifications*** to your instructors.

For the most up-to-date information, please refer to the Updated COVID-19 Procedures at MSU Texas website.

LIVESTREAMING OPTION

Do not attend face-to-face classes if you are sick or experiencing COVID-19 symptoms. However, livestreaming option is possible ***only*** for those students with valid medical excuse. To request access for livestreaming, students must email the instructor first and explain their excuse. The instructor ***may*** ask for a ***doctor's report*** or ***absence notification***, and then provide the Zoom link to accommodate those students for livestreaming the class.

MASK REQUIREMENT

Face coverings are ***strongly recommended*** when ***around others*** and ***indoors***, especially during the first 2-3 weeks of classes and during the peak activity of the omicron variant. The wearing of masks while in public indoor settings and frequently washing your hands has proven to be effective at preventing the spread of COVID-19.

D2L (DESIRE 2 LEARN) & PULSE APP

I will use D2L platform for posting lecture notes, assignments, and grades. Mobile version of the D2L platform is the Pulse app. Consider downloading it for instant notifications on announcements, content, grades, and more.

CATALOG DESCRIPTION
Feedback control of mechanical systems. Emphasis on thermal, fluid, and motion systems under feedback control. Topics include programmable logic controllers, PID control, Laplace transforms, system modeling and performance analysis, stability theory, s-plane, and root locus and/or frequency-based design. Design and computer problems.

COURSE PRE-REQUISITES
MENG 4123 – Mathematical Methods for Engineers
MENG 4203 – Mechanical Engineering Analysis (co-requisite)

REQUIRED TEXTBOOK
Schaum's Outline of Feedback and Control Systems by J. DiStefano (3rd Edition)
McGraw-Hill, 2013. (ISBN-13: 978-0071829489)

LIST OF TOPICS COVERED*
- History of feedback control
- Control-oriented modeling
- Laplace transforms
- Block diagram algebra
- Stability analysis
- Time response
- Proportional control
- Integral control
- Derivative control

**Additional material might be covered as the time permits.*

GRADING SCHEME
The overall grade for the course will be based on the scores earned on the tests, homework assignments, and the class attendance. The contribution of each grade item to the overall score is provided in Table 1.

Table 1: Percentage contribution of each grade item to the overall grade.

Grade Items	**Contribution**
Test 1	25%
Test 2	25%
Final Exam	30%
Homework	15%
Attendance	5%
TOTAL	**100%**

FINAL EXAM
Thursday, May 5, 08:00 am – 10:00 am

CONFLICT RESOLUTION PROCESS

1. In the event of an issue with the course or the instructor, the student should first contact the instructor face to face or via e-mail. The faculty and the student will discuss the issue, and hopefully, a resolution is reached.
2. The student should notify the faculty via email again if the issue still did not get resolved step 1.
3. If not resolved, the student could then contact the Chair of the McCoy School of Engineering, Dr. Desai, face to face or via email, (raj.desai@msutexas.edu), and discuss the issue.
4. Dr. Desai will discuss the issue at hand with the faculty member. Dr. Desai will discuss the result of this discussion with the student. Hopefully, a resolution is reached on the issue after this step.
5. The student should notify the Chair via email if the issue still did not get resolved.
6. The Chair will contact the Dean and try to resolve the conflict. In case the conflict deals with the student grade, she will forward the case to the Grade Appeals Committee, if necessary.

COURSE ORGANIZATION AND ASSESMENT

- **Course Format:** This course consists of two 80-minute sessions each week. Class meetings will contain lecture sessions that cover the relevant topics for that particular class. Not all material can be covered during the class session, hence, expect to spend extra time outside of class to finish reviewing the material.

- **Student Attitude:** Once class starts, the use of cell phones, conducting private discussions, working on anything that is not directly related to the course, and making derogatory remarks about your classmates or instructor will not be accepted and may result in your dismissal from the class.

- **Midterm Progress Reports:** In order to help students keep track of their progress toward course objectives, the instructor will provide a Midterm Progress Report for at-risk students through their WebWorld account between the weeks 6-8 (2/14-3/4). Midterm grades simply give students an idea of where they stand at the midpoint of the semester. Students earning below a C at the midway point should schedule a meeting with the professor and seek out tutoring.

- **Homework Evaluation Method:** Your performance will be tested regularly throughout the semester by homework assignments. While several homework problems may be assigned as part of a homework assignment, it may be the case that only a subset of problems will be graded. However, you must attempt all problems. ***Do not try to guess which problems will not be graded.***

- **Late Assignments:** Homework assignments must be turned in on the due date, at the due time. Late assignments will ***NOT*** be accepted. However, depending on the overall class progress, ***one (or two) of the lowest graded assignments may not be included in the final grade.***

- **Exam Make-up:** Make-up exams will be given only in case of an ***emergency*** (accompanied by a doctor's report) or a major conflict due to a scheduled ***athletic event*** or a ***conference.***

- **General Study Guidelines:** Plan on spending few hours outside of class each week to review the material weekly, and to work on homework assignments. Utilize office hours throughout the semester whenever you need help about the assignments or the course material.

- **Academic Integrity Policy:** Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the student handbook regarding student responsibilities & rights, and the intellectual property policy information about procedures and what constitutes acceptable on-campus behavior.

- **Student Resources**: Please refer to MCOSME Student Resources for quick links to numerous offices and student services available on the MSU Campus. This page aims to shorten the distance between our students and provide helpful information that can build a path toward equity, diversity and student success.

- **Disability Support Services:** If you have a documented disability that will impact your work in this class, please contact the Disability Support Services and the instructor to accommodate your needs.

- **Campus Carry Rules/Policies:** Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information, please refer to campus carry rules and policies.

- **Disclaimer Statement:** Information contained in this syllabus, other than grading policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

COURSE OBEJCTIVES IN RELATIONSHIP TO ABET STUDENT OUTCOMES

Table 2: Specific outcomes of instruction matched with the ABET student outcomes (1-7)

SPECIFIC OUTCOMES OF INSTRUCTION	1	2	3	4	5	6	7
Students should be able to apply first-principles modeling techniques and Laplace transforms to generate open-loop transfer functions for various (mechanical, thermal, fluid, electrical, and aerodynamic) systems.	**X**						**X**
Given a feedback loop, students should be able to apply block diagram reduction techniques to generate the overall (i.e., closed-loop) transfer function.	**X**						
Given a transfer function, students should be able to apply Routh-Hurwitz stability theory to determine the necessary conditions for stability.	**X**						
Given the transient response plot of a system, students should be able to extract an appropriate first or second order open-loop transfer functions.	**X**						
Given a plant under feedback control, and a set of performance specifications, students should be able to design and tune appropriate P, PI, PD, or PID controllers.	**X**	**X**					
Students should be able to use MATLAB/SIMULINK platform to test the performance of the proposed P, PI, PD and/or PID control algorithms.	**X**					**X**	

Table 3: Detailed descriptions of the ABET student outcomes (1-7) listed in Table 2.

ABET OUTCOME	DESCRIPTION
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2	an ability to apply engineering design to produce solutions that meets specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3	an ability to communicate effectively with a range of audiences.
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Prepared by Zeki O. Ilhan, January 2022.