SYLLABUS
MENG 4253 – 201: CONTROL SYSTEMS
(Required Course)
Spring 2024

COURSE INSTRUCTOR

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

TEACHER ASSISTANT

Mr. Sharome Burton (seburton1106@my.msutexas.edu)

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	12:00 pm – 01:00 pm	MY 219E
Thursday	10:00 am – 11:00 am	MY 219E
Friday	01:00 pm – 02:00 pm	MY 219E

ATTENDANCE POLICY

This course will be delivered 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 UPDATES & PROCEDURES

For the most up-to-date information, please refer to the Updated COVID-19 Procedures at MSU Texas website: (https://msutexas.edu/coronavirus/index.php)

D2L (DESIRE 2 LEARN) & PULSE APP

I will use the D2L platform (https://d2l.msutexas.edu/d2l/home) for posting the syllabus, course communication, lecture notes, assignments, and grades. Mobile version of the D2L platform is the Brightspace Pulse app, which is available for free on iPhone, iPad, and Android devices. Consider downloading Pulse for instant notifications: (https://apps.brightspace.com/pulse/launch)

STUDENT RESOURCES

For quick links to numerous offices and student services available on the MSU Campus, please refer to the MCOSME Student Resources website:
(https://msutexas.edu/academics/scienceandmath/student_resources.php)

USE OF GENERATIVE AI (ChatGPT)

Since writing, analytical, and critical thinking skills are part of the learning outcomes of this course, all writing assignments should be prepared by the student. Developing strong competencies in this area will prepare you for a competitive workplace. Therefore, AI-generated submissions are ***not permitted*** and will be treated as ***plagiarism*** in this course.

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)

REFERENCE 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
- PID Control
- State feedback control
- Intro to advanced topics*

**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 9, 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.

- **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.

- **Student Attitude:** After the class starts, the use of phones/laptops, 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. Midterm grades will not be reported on the students' transcript; nor will they be calculated in the cumulative GPA. They simply give students an idea of where they stand at the midpoint of the semester. Students with a midterm grade below a C should talk to 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 ***submitted online*** 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.***

- **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 what constitutes acceptable on-campus behavior: (https://msutexas.edu/student-life/_assets/files/handbook.pdf)

- **Grade Appeals:** Grade appeals should be resolved with the instructor. If unresolved, they need a formal written appeal to the dean of the college in which the course was taught. For more information, consult the Grade Appeal Checklist through the MCOSME Student Resources website, or through the link: (https://msutexas.edu/academics/scienceandmath/_assets/files/grade_appeal_checklist1.pdf)

- **Academic Honesty Appeals:** Academic honesty appeals are reported to the chair. If unresolved, they are appealed to the department chair of the department offering the course. Consult the Academic Honesty Checklist through the MCOSME Student Resources website, or through the link: (https://msutexas.edu/academics/scienceandmath/_assets/files/academic_honesty_checklist1.pdf)

- **Disability Support Services:** If you have a documented disability that will impact your work, please contact the instructor and the Disability Support Services to accommodate your needs via their website: (https://msutexas.edu/student-life/disability)

- **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: Course objectives matched with the ABET student outcomes (1-7)

COURSE OBJECVTIVES	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 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 2024.