SYLLABUS
MENG 4253 – 201: CONTROL SYSTEMS
(Required Course)
Spring 2021

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	11:00 am – 12:20 pm	MY 136
Wednesday		
Thursday	11:00 am – 12:20 pm	MY 136
Friday		

VIRTUAL OFFICE HOURS

Days	*Time*	*Location*
Monday	04:00 pm – 05:00 pm	via Zoom
Tuesday	04:00 pm – 05:00 pm	via Zoom
Wednesday	10:00 am – 11:00 am	via Zoom
Thursday	05:00 pm – 06:00 pm	via Zoom
Friday	10:00 am – 11:00 am	via Zoom

DELIVERY MODE: *"HYBRID"*
This course has been planned to be delivered in "hybrid" mode, which permits ***socially distant classroom with assigned seating*** as well as ***livestreaming option*** for students who are unable to be in class due to health reasons. Students can attend the regular lectures in-person or virtually via Zoom. However, ***students are expected to come to class to take the mid-term and final exams, unless they have a valid excuse due to health reasons or a major conflict to attend an athletic/academic event.***

Detailed instructions on how to connect with Zoom is posted in D2L. Simply click on the link provided in D2L to connect the lectures. Note that the same link will also be used to join virtual office hours without need for pre-coordinating with the instructor.

MASK REQUIREMENT
During class, each student must comply with MSU's requirement for wearing a face covering as mandated in the MSU Taskforce to Return to Campus.

ATTENDANCE POLICY
Attendance (either in-class or virtual) is mandatory for this class; hence, it represents a part of your overall grade. Attendance will be checked randomly on select lectures using the AttendMe app. (detailed instructions will be made available). However, for the health and safety of the others, ***please consider following the class online whenever you are feeling sick or showing COVID-related symptoms.***

D2L (DESIRE 2 LEARN) & PULSE APP
I will use D2L platform for posting syllabi, course communication, lecture notes, assignments, and grades. Mobile version of the D2L platform is the Pulse app, which is available for free on iPhone, iPad, and Android devices. Consider downloading Pulse for instant notifications on course announcements, new content, grades, and more.

TECHNOLOGY REQUIREMENT
Online students are required to have access to a hardware (computer, laptop, or iPad with webcam, microphone, and/or speakers), a basic scanning device and/or software such as Camscanner. For additional details, be sure to review D2L technology requirements at MSU Texas website for online students.

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 (2nd 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 (online or in-class)	5%
TOTAL	**100%**

FINAL EXAM
Tuesday, April 27, 01:00 pm – 03:00 pm

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 after 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 and the student to reach a resolution.
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, using the computer (unless requested by the instructor), 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 for this class will provide a Midterm Progress Report for at-risk students through their WebWorld account between the weeks 6-8 (2/15-3/8). 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 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. Do not wait until the last day to start the homework or to prepare for exams. 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.

- **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.

- **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.

- **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.

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, fluid, thermal, 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.

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 2021.