MENG 5330 – Process Control/MSEL 5330– System Engineering & Process Control Course Syllabus

Semester / Year	Spring (1st 7-week) 2026
Catalog Description	The course focuses on the use of controls in the process industry. The development of process models will involve measurement of variables, controller types, and final elements. Design and evaluation of controllers in processes including thermal systems will be carried out. General instrumentation design and practice will be conducted. Graduate students are expected to carry out a major project as an assignment within this course.
Prerequisites	MENG 4312 or EENG 4308 (or Equivalent Controls course)
Section Number	MSEL 5330.060 / MENG 5330.051 & 050
Instructor Name	Dr. M. A. Rafe Biswas
Contact Information	Email: mbiswas@uttyler.edu , Zoom ID: 9035666115 - https://uttyler.zoom.us/j/9035666115 , Office: HEC A214
Class Type / Instruction Mode / Location	060: Online Delivery 050 & 051:Room TBA
Class Time	N/A
Office Hours	WTh 11:30 to 1 pm or By appointment
No. of Credits	3
Required Textbook	None
Optional References	Recommended textbooks (some available via library using patriots account) – - Agachi, Paul Serban, and Mircea Vasile Cristea. *Basic Process Engineering Control*, Walter de Gruyter GmbH, 2014. *ProQuest Ebook Central*, https://ebookcentral.proquest.com/lib/uttyler/detail.action?docID=4190803 - Agachi, Paul Serban, et al. *Advanced Process Engineering Control*, Walter de Gruyter GmbH, 2016. *ProQuest Ebook Central*, https://ebookcentral.proquest.com/lib/uttyler/detail.action?docID=4793896 - Chandra, Rames Panda, and T. Thyagarajan. *Introduction to Process Modelling Identification and Control for Engineers, An*, Alpha Science International, 2017. *ProQuest Ebook Central*, https://ebookcentral.proquest.com/lib/uttyler/detail.action?docID=5426842 - Chapter 8 Process control from Green, Don W., and Robert H. Perry. "Perry's chemical engineers' handbook." 8th Ed., McGraw-Hill Education (2007). Additional Material on Canvas: Websites, Class Handouts, Tutorials on MATLAB and Simulink by Mathworks, Inc.

Additional Rules and Requirements	MATLAB, Simulink & Simscape by MathWorks, Inc. (available through virtual desktop – one.uttyler.edu and IT support) 1. Since the mechanical engineering program is designed to prepare students for professional practice, all submitted work (e.g., homework, lab reports, projects, presentations) is expected to meet professional standards. Work that does not reflect professional quality may be subject to grade reductions, even if professionalism is not explicitly listed in the grading rubric. 2. This course allows the use AI tools (such as ChatGPT and Copilot) in self-learning. Students will be notified as to when and how these tools will be used, along with guidance for attribution. Using AI tools outside of these parameters violates UT Tyler's Honor Code, constitutes plagiarism, and will be treated as such. http://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE_Reference_Guide.pdf
Evaluation Method	**Project** **30%** **Exam & Quiz** **30%** **Assignments & Course Participation** **40%**
Grading Policy / Scale	Letter grades, scale: A: 90 – 100; B: 80 – 89; C: 70 – 79; D: 60 – 69; F: < 60
Important Events / Dates	Census date: January 16 Last date to withdraw from one or more 7-week courses: February 12 Final project report due: Feb 26 Final Exams, end of Second 7-week session – Feb 28
Attendance / Makeup policy / other rules	Attendance is expected per university policy. Attendance of lectures may be regularly checked using Canvas. Make-up exams or assignments if approved will be administered during finals week. No email submission of assignment(s). All assignments MUST be submitted to Canvas for grading. Student with SAR status should contact the UT Tyler Office of Student Accessibility and Resources for exam arrangements. Any minor violation of the Student Behavior by a student will result in a full letter grade reduction for each incident and any single major violation such as cheating and plagiarism by a student will result in automatic failing grading in the course. Late submissions of assignments, reports (e.g., if due at 11:59:00 pm, then any time after such as 11:59:30 pm is late) will result in 10 % deduction per day from the graded score until down to 10% remaining. Late or no submission for any exam results in automatic grade of zero. Questions involving knowledge covered in class will be answered if the student proves that they have tried to come up with the answer. Solution to homework and quizzes will not be given. However, students can work on the right solution by checking their work with the instructor.

	Grade appeal: grades can be appealed by sending a Canvas message in written or typed format and then meeting the instructor during office hours, but no later than a week after the grade has been posted. Moreover, students may appeal any grade reduction to the instructor if valid excuse with documentation is provided. Note: your final semester grade is based on the 10-point scale. No curving or scaling will be applied even if you receive borderline grade such as 79.99.
Course Learning Objectives / ABET & PEOs Relation	By the end of this course, students will be able to: 1. Ability to develop mathematical models and transfer functions of processes. 2. Analyze and model dynamic processes in time domain. 3. Utilize computational tools to design and analyze different types of control systems. 4. Able to read and interpret block diagrams, and process and instrumentation diagrams. 5. Relate the use of control systems to real-world problems.
Tentative Topics / Course Plans	• Mathematical modeling of different processes includes thermal fluid systems • Process Dynamic modeling and Analysis including empirical modeling • Advanced Control architectures including Feedback and Feedforward control • Control System Design, Tuning and Analysis • Process and instrumentation diagram • Machine Learning
University Policies	https://www.uttyler.edu/offices/academic-affairs/files/syllabus-information-rev122025.pdf

Course Schedule for 7 week session - https://www.uttyler.edu/academics/academic-calendar.php

Week of		Chapter /Class Activity	Major Assignments due
January	12	Intro to Process Control Laplace Transform & Transfer Functions	Welcome and Intro Module 1 Discussion and Assignments
	19	Process Dynamic modeling and Analysis	Module 2 Discussion and Assignments
	26	Empirical Modeling/System Identification/Machine Learning	Module 3 Discussion and Assignments
February	2	Intro to Feedback Control/ Control System Instrumentation	Module 4 Discussion and Assignments including Scope Report
	9	Control System Design, Tuning and Analysis	Module 5 Discussion and Assignments
	16	Advanced Control architectures	Module 6 Discussion and Assignments
Feb	23	Project & Basics of Systems Engineering	Final Project Report due /Final Exam due

Evaluation activities

> Exam & Quiz: There will be an exam and multiple quizzes during the semester. Final exam is comprehensive covering all modules and related to the project. Quiz will cover topics from each module except for module 1, which will not have any quizzes. No late submission will be accepted and will result in automatic grade of zero. Make-up exam if approved by instructor will be administered during finals week.

> Project: There will be 2 reports during the semester. Each student will choose a complex thermal fluid energy system to model and control which they will present as Scope Report. Each student analyzes the system and simulate the system to and develops the control architecture for given system and provide results for different operating (input/disturbance) conditions to then submit Final Report. Instructions on the report format/style, grading rubric form and checklist will be posted separately. No late submission will be accepted and will result in automatic grade of zero.

> Assignments & Course Participation and Conduct: Participation are expected per university policy. Check class and Canvas regularly for any announced assignments according to the topics covered in lectures. Questions involving knowledge covered in class can be checked if your work is shown to the instructor, but no solutions will be posted on Canvas. Be prepared for the course by reviewing relevant material, taking notes, solving problems and participating in discussions, which are all expected. Late submissions of assignments will result in 10% deduction from the graded score after each 24-hour period.

Instructions on the report format/style, checklist and grading rubric form will be posted separately on Canvas. Figure 1 shows approximate amount time that should be invested into the course weekly.

NOTE: The syllabus is subject to change during the course of semester as deemed necessary.