

MECE 3304: System Dynamics – Fall 2023

Course Information

Class Schedule/Room:	MW 9:30 AM – 10:45 AM/EENGR 1.250
Instructor:	Samantha Ramirez
Office:	EENGR 3.261
Office Hours:	MW 10:45 AM – 12:00 PM
Email:	samantha.ramirez@utrgv.edu
Website:	http://faculty.utrgv.edu/samantha.ramirez/
Pre-requisites:	“C” or better in Dynamics (MECE 2302) and Mechanical Engineering Analysis II (MECE 3450)
Catalog Description:	This course covers lumped-parameter modeling of mechanical, electrical, hydraulic, and thermal systems. An energetic approach based on bond graph techniques, invented in 1959 by Henry M. Paytner, is introduced. Primary focus is on analysis of linear first- and second-order systems. Time- and frequency-domain methods are covered. Students are shown how to model, analyze, and numerically simulate systems in MATLAB/Simulink. Advanced topics include state-space modeling and feedback control of dynamic systems.
Required Materials:	<i>System Dynamics and Control with Bond Graph Modeling</i> , Kypuros, J.A., CRC Press, Boca Raton, Florida, 2013. Non-programmable calculator, a device to access MATLAB, a device to allow scanning, and web cam
Course Modality:	Traditional face-to-face (TR), See Attendance and Classroom Etiquette for more information.

Course Outcomes and Assessment:

Upon completion of this course, students shall demonstrate that they can

1. Utilize concepts from courses across the Mechanical Engineering curriculum (including but not limited to Dynamics, Heat Transfer, and Electrical Systems) to derive constitutive relations for physical components or elements of dynamic systems;
2. Synthesize graphical models of multi-energy-domain systems using bond graphs;
3. Derive mathematical representations of dynamic systems in the form of sets of differential and algebraic equations using bond graphs;
4. Use Laplace transforms to model dynamic responses of first-, second-, and higher-order dynamic systems;
5. Utilize impedance bond graphs to derive transfer function models of dynamic systems;
6. Conduct basic time-domain analyses of first-, second-, and higher-order dynamic systems;
7. Conduct basic frequency-domain analyses of first-, second-, and higher-order dynamic systems; and
8. Use MATLAB/Simulink or other similar numerical simulation package as a tool to simulate and analyze the responses of dynamic systems.

Course Calendar

There is a course calendar in Blackboard for you to reference. It will show the most up-to-date due dates and times for all assignments and exams in this course.

Topic	Book Sections	Class Days
Introduction to System Dynamics	1.1-1.10	1
Basic Bond Graph Elements	2.1-2.6	1
Bond Graph Synthesis and Equation Derivation	3.1-3.9	Many
The State-Space and Numerical Simulation	4.1-4.7	2
Exam 1 (See Course Calendar in Blackboard)	Chapters 1-4	1
Laplace Transforms	5.1-5.7	2
Impedance Bond Graphs	6.1-6.10 (6-7)	Many
Exam 2 (See Course Calendar in Blackboard)	Chapters 5-6	1
Time Domain Analysis	7.1-7.8	3
Frequency Domain Analysis	8.1-8.5	1
Final Exam (Wednesday, 12/12/2023 at 8:00 AM)	Chapters 7-8	1

Grading Policy

Exam 1	20%
Exam 2	20%
Final Exam	20%
Quizzes/Lecture Assignments	20%
Homework	20%

EXAMS

Exams will be administered **in-person** during class time. Each exam will be semi-cumulative, meaning that each will primarily cover the material since the last exam, but may include select material from the prior exam, especially if the class on average performed poorly on a specific problem type. The exam average will account for 60% of your overall grade.

In the event that I am not able to administer an exam in person on the scheduled day, I will administer the exam via Zoom. Students will be required to attend a special Zoom session emailed to you for the duration of the

exam where they will be required to have a camera on to be monitored. Students will only be allowed to use the provided exam booklet for the exam. All exam work will be scanned and uploaded in Blackboard for grading.

In the event that you are not allowed on campus to take the scheduled exam due to illness, you will need to provide a doctor's excuse. Once approved, students will be required to attend a special Zoom session emailed to you for the duration of the exam where they will be required to have a camera on to be monitored. Students will only be allowed to use the provided exam booklet for the exam. All exam work will be scanned and uploaded in Blackboard for grading.

- Absolutely no bathroom breaks, programmable calculators, calculator covers, cell phones, laptops, iPads, iPods, or any other smart technology devices are allowed during exams.
- You only have 24 hours to contest your exam grade after it is returned.

QUIZZES

For each chapter, reading assessments will be administered online through Blackboard. You are responsible for reading the textbook. It is impossible to thoroughly cover everything you need to know in lecture. **You will be held responsible for reviewing and understanding the textbook material.** Assessments are used to measure your understanding of the reading assignments. As detailed in the class schedule, you are assigned sections from the textbook to read for each chapter. You are responsible for understanding the conceptual material therein. The assessments will assist you in identifying and remembering the key concepts in each chapter. You are expected to read the material ahead of time (i.e., prior to reviewing it in lecture). **Thus, assessments will be due by your scheduled class time on the day of the first lecture for each chapter.** This is done to insure you have read the material beforehand and to enable the instructor to identify early-on particular concepts that the class may have issues understanding and remembering.

You could have in-class quizzes at the instructor's discretion.

HOMEWORK/LECTURE ASSIGNMENTS

Homework grades will be based on the chapter assignments. There will be at least one homework assignment for each chapter. Assignments will be due two lectures immediately after a chapter is completed (e.g. if chapter X is completed on a Wednesday, the homework is due the following Wednesday). Though homework is worth 20% of your final grade, to successfully pass this course with the requisite C or better, it is recommended that you continuously be doing homework problems a few at a time as opposed to waiting until the day before the assignment is due to complete them all.

It is required that homework be submitted in the format described below. Each problem should have the following sections if appropriate:

1. *Problem Statement.* Restate the problem and include any schematics given to help describe the problem.
2. *Given.* List the given parameters including symbols, values with units, and descriptions.
3. *Find.* Briefly describe what the problem asks you to solve for.
4. *Solution.* Provide a detailed solution showing all steps. Insure that the detail provided is sufficient for another to clearly follow how the solution was derived.
5. *Remarks.* Comment on the solution. Does it make sense? If so, why? Is there anything that remains unclear for which you would like further clarification? If so, what?

Beginning in Chapter 4, one of the homework assignments for each chapter will be one that requires using MATLAB. You should be able to download a student version of MATLAB if you do not already have one. You will need to install the **Symbolic Math Toolbox** and the **Control System Toolbox**. You can visit the following link for more information: <https://support.utrgv.edu/TDClient/1849/Portal/KB/ArticleDet?ID=76312>

Homework will be scanned and submitted in Blackboard. It is in your best interest to use the provided Course Calendar in Blackboard to keep up with due dates for the homework assignments.

As in most any Engineering course, the material is best mastered through practice. Homework is one's best opportunity to practice the concepts learned in lecture. Moreover, the material in this course can only be mastered through practice. As such, what matters most is one's genuine and active participation. Note that homework accounts for 15% of the final grade. Assignments will be graded based on effort demonstrated and not on whether the solution is correct. The rubric below will be used for grading. Homework solutions will be shown the day after the assignment is due during class time.

Score	Description
5, Excellent	All problems were attempted. All work is shown. Solutions were neat and use required format.
4, Good	Nearly all problems were attempted (missing 1 at most). Steps were sufficiently detailed.
3, Fair	Most problems were attempted (missing at most 2 problems). Steps may not be sufficiently detailed.
2, Poor	Majority of problems were attempted. Steps were missing or solutions were incomplete.
1, Unacceptable	A few problems were attempted. Solutions were incomplete. Work was missing for the majority of problems.
0, Missing	Assignment was not submitted.

Homework is mandatory and must be submitted in a timely fashion. **Late homework will not be accepted without prior approval.** If you have an extraordinary circumstance, contact Mrs. Ramirez immediately to make arrangements prior to the due date. Those that make a concerted effort to attempt each problem and submit their work on time can be rewarded.

Though students are encouraged to collaborate on homework assignments, the work submitted should reflect the student's own effort and understanding of the material. If there is evidence that the student is copying solutions from another or a solution manual, the incident will be reported to the Dean of Students Office as required by the Student Conduct Code (see section below on Academic Integrity and Dishonesty for further details).

You will also have assignments to submit after specific course content is covered. These "lecture assignments" will count as quiz grades. It is in your best interest to use the provided Course Calendar in Blackboard to keep up with due dates for the lecture assignments.

Attendance & Classroom Etiquette

- This course is scheduled as a traditional face-to-face class and will be held as. I will not hold live Zoom sessions during our scheduled class time, but respective pre-recorded videos will be available to you 1 week before the exam is scheduled.
- The use of classroom recordings is governed by the Federal Educational Rights and Privacy Act (FERPA), UTRGV's acceptable-use policy, and UTRGV HOP Policy STU 02-100 Student Conduct and Discipline. A recording of class sessions will be kept and stored by UTRGV, in accordance with FERPA and UTRGV policies. Your instructor will not share the recordings of your class activities outside of course participants, which include your fellow students, teaching assistants, or graduate assistants, and any guest faculty or community-based learning partners with whom we may engage during a class session. **You may not share recordings outside of this course.** As referenced in [UTRGV HOP Policy STU 02-100 Student Conduct and Discipline](#), doing so may result in disciplinary action.
- In the event that I am not able to attend f2f classes due to illness, I will hold online synchronous class via Zoom if I am able to. If I am also not able to hold online synchronous class, then I will assign pre-recorded lecture videos for the class day(s) until I can return to live classes.
- Attendance will be taken daily.
- If, during the semester, you fall ill and are not able to complete coursework, you will be allowed to make up any homework, quizzes, and/or exams that are missed as long as you email me letting me know about your situation and provide a doctor's excuse/test results (with your name and date of birth). Do not wait until after due dates/exam dates to let me know.

Scholastic Integrity:

Members of the UTRGV community uphold the [Vaquero Honor Code](#)'s shared values of honesty, integrity and mutual respect in our interactions and relationships. In this regard, academic integrity is fundamental in our actions, as any act of dishonesty conflicts as much with academic achievement as with the values of honesty and integrity. The Writing Center is an excellent resource to assist in learning about and avoiding plagiarism in writing. Violations of academic integrity include, but are not limited to: cheating, [plagiarism \(including self-plagiarism\)](#), and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts (Board of Regents Rules and Regulations, STU 02-100, and UTRGV Academic Integrity Guidelines). **All violations of Academic Integrity will be reported to Student Rights and Responsibilities through [Vaqueros Report It](#).**

Course Drops:

According to UTRGV policy, students may drop any class without penalty earning a grade of DR (drop) until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the "3-peat rule" and the "6-drop" rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.

Students can withdraw from a course through the *Office of the Registrar* on or prior to:

- September 13, 2023: Last day to drop a class before it appears on the transcript and count toward the "6-drop" limit.
- November 9, 2023: Drop/Withdrawal Deadline; last day for students to drop the course and receive a "DR" grade. After this date, students will be assigned a letter grade for the course that will count on the GPA.

Students with Disabilities:

Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive reasonable academic accommodations should contact **Student Accessibility Services (SAS)** for additional information. In order for accommodation requests to be considered for approval, the student must apply using the [mySAS portal](#) and is responsible for providing sufficient documentation of the disability to SAS. Students are required to participate in an interactive discussion, or an intake appointment, with SAS staff. Accommodations may be requested at any time but are not retroactive, meaning they are valid once approved by SAS. Please contact SAS early in the semester/module for guidance. Students who experience a broken bone, severe injury, or undergo surgery may also be eligible for temporary accommodations.

Pregnancy, Pregnancy-related, and Parenting Accommodations

Title IX of the Education Amendments of 1972 prohibits sex discrimination, which includes discrimination based on pregnancy, marital status, or parental status. Students seeking accommodations related to pregnancy, pregnancy-related condition, or parenting should submit the request using the form found at [Pregnancy and Parenting | UTRGV](#).

Student Accessibility Services staff can be contacted at either campus:

Brownsville Campus:

Music and Learning Center building (BMSLC, 1.107), phone (956) 882-7374, email ability@utrgv.edu.

Edinburg Campus:

University Center (EUCTR, 108), phone (956) 665-7005, email ability@utrgv.edu.

Sexual Misconduct and Mandatory Reporting:

In accordance with UT System regulations, your instructor is a “Responsible Employee” for reporting purposes under Title IX regulations and so must report to the Office of Institutional Equity & Diversity (OIED@utrgv.edu) any instance, occurring during a student’s time in college, of sexual misconduct, which includes sexual assault, stalking, dating violence, domestic violence, and sexual harassment, about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found through the [Office of Institutional Equity and Diversity](#), including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect that is free from sexual misconduct, discrimination, and all forms of violence. If students, faculty, or staff would like confidential assistance, or have questions, they can contact OVAVP (Office for Victim Advocacy & Violence Prevention) at (956) 665-8287, (956) 882-8282, or OVAVP@utrgv.edu.

Dean of Students

The Dean of Students office assists students when they experience a challenge with an administrative process, unexpected situation, such as an illness, accident, or family situation, and aids in resolving complaints. Additionally, the office facilitates student academic related requests for religious accommodations, support students formerly in foster care, helps to advocate on behalf of students and inform them about their rights and responsibilities, and serves as a resource and support for faculty and campus departments.

[Vaqueros Report It](#) allows students, staff, and faculty a way to report concern about the well-being of a student, seek assistance in resolving a complaint, or report allegations of behaviors contrary to community standards or campus policies. The Dean of Students can be reached by email (dos@utrgv.edu), phone (956-665-2260), (956-882-5141), or by visiting one of the following office locations: Cavalry (BCAVL) 204 or University Center (EUCTR 323).

Course Evaluation:

Students have the opportunity to complete an ONLINE evaluation of this course, accessed through your UTRGV account (<http://my.utrgv.edu>). Course evaluations are used by the instructor to better understand the student experience in the course, which can inform revisions of the course to ensure student success. Additionally, course evaluations are also used by the instructor for annual performance review and promotion applications, teaching award applications, among others. For these reasons, your feedback, reflections, and insights on your experience in the course are invaluable to ensure student success and a quality education for all. You will be contacted through email with further instructions. Students who complete their evaluations will have priority access to their grades.

Online evaluations will be available on or about:

Fall Module 1 (7 weeks)

October 4 – 10, 2023

Fall Regular Term 2023

November 15 – December 6, 2023

Fall Module 2 (7 weeks)

November 29 – December 5, 2023

Student Support Resources:

We are committed to your personal, academic, and professional success; please know you can reach out to me for questions and/or I can help you identify the resources you need. UTRGV offers student support resources designed to contribute to your well-being and academic excellence.

Students seeking academic help in their studies can use university resources in addition to an instructor's office hours. University Resources include the Advising Center, Career Center, Counseling Center, Learning Center, and Writing Center. These centers provide services such as tutoring, writing help, counseling services, critical thinking, study skills, degree planning, and connections student employment (through [Handshake](#) and [HR Student Employment](#)). In addition, services, such as the Food Pantry are also provided. Locations are listed below.

Center Name	E-mail	Brownsville Campus	Edinburg Campus
Advising Center	AcademicAdvising@utrgv.edu	BMAIN 1.400 (956) 665-7120	EITTB 1.000 (956) 665-7120
Career Center	CareerCenter@utrgv.edu	BINAB 1.105 (956) 882-5627	ESTAC 2.101 (956) 665-2243

Center Name	E-mail	Brownsville Campus	Edinburg Campus
Counseling Center	Counseling@utrgv.edu Mental Health Counseling and Related Services List	BSTUN 2.10 (956) 882-3897	EUCTR 109 (956) 665-2574
Food Pantry	FoodPantry@utrgv.edu	BCAVL 101 & 102 (956) 882-7126	EUCTR 114 (956) 665-3663
Learning Center	LearningCenter@utrgv.edu	BMSLC 2.118 (956) 882-8208	ELCTR 100 (956) 665-2585
University Library	circulation@utrgv.edu www.utrgv.edu/library	BLIBR (956) 882-8221	ELIBR (956) 665-2005
Writing Center	WC@utrgv.edu	BLIBR 3.206 (956) 882-7065	ESTAC 3.119 (956) 665-2538

Financial Need

Students who demonstrate financial need have a variety of options when it comes to paying for college costs, such as scholarships, grants, loans and work-study. Students should visit the Student Services Center (U Central) for additional information. U Central is located in BMAIN 1.100 (Brownsville) or ESSBL 1.145 (Edinburg) or can be reached by email (ucentral@utrgv.edu) or telephone: (956) 882-4026. In addition to financial aid, U Central can assist students with registration and admissions.

Blackboard Support

If you need assistance with course technology at any time, please contact the Center for Online Learning and Teaching Technology (COLTT).

Campus:	Brownsville	Edinburg
Location	Casa Bella (BCASA) 613	Marialice Shary Shivers (EMASS) 3.142
Phone	(956)-882-6792	(956)-665-5327
Toll Free	1-(866)-654-4555	
Support Tickets	Submit a Support Case via our Ask COLTT Portal	
Online Support	Chat with a Support Specialist online.	
24/7 Support	Need Blackboard assistance after hours? You can call our main office numbers, (956)-882-6792 or (956)-665-5327, to speak with a support representative.	