Course Syllabus

Course Information

Signals and Systems		**ECSE 2410**	**Summer 2023**
Lecture	MR	10:30AM-12:05PM	DARRIN 330/ WEBEX

Course Websites:

Piazza – one-stop source for class notes, HW, solutions, announcements, and discussions.
The platform is highly catered to getting you help quickly and efficiently from classmates, the TAs, and the professor. **Rather than emailing questions to the teaching staff, please post your questions on Piazza**.

Use the URL below to sign up for this class on Piazza:
https://piazza.com/rpi/summer2023/ecse2410/resources

Gradescope for grading and HW submission
https://www.gradescope.com/courses/543366

Blackboard – may be used to host some select class related material
https://lms.rpi.edu

Prerequisites:
ECSE-2010 Electric Circuits. MATH-2400 Introduction to Differential Equations. Familiarity with the Rensselaer Computing System (to use MATLAB).

Course Description

Time and frequency-domain representation of continuous- and discrete-time signals and systems. Response of linear, time-invariant systems. Convolution, Fourier series, Fourier transform, Laplace transform and z-transform. Applications in communication, feedback control, and signal processing.

Course Text(s)

Primary Text: Alan V. Oppenheim, Alan S. Willsky, and S. Hamid, Signals & Systems, 2nd edition. Prentice Hall, 1996. ISBN:978-0138147570 (customized version for RPI: ISBN: 9781269815727.

Optional Supplemental Text: H. Hsu, Schaum's Outline of Signals and Systems, 2nd edition. McGraw Hill, 2010. ISBN: 978-0071634724. This outline contains hundreds of fully solved problems and is a useful reference.

Course Goals / Objectives

On completion of this course, students should be sufficiently familiar with the theoretical basis, formal representation, computational methods, notation, and vocabulary of linear models to be able to analyze and design communication systems, control systems, and signal processing applications.

Instructor

Dr. Prabhakar Neti Email: netip@rpi.edu

Office Hours: Monday 4pm – 6 pm

Location: WebEx: https://rensselaer.webex.com/meet/netip

Teaching Assistant(s)

Name	Location	Hours	Email
Amol Dwivedi	https://rensselaer.webex.com/meet/dwivea2	**TBD**	Dwivea2@rpi.edu

Homework and Midterm Exam Schedules

There will be ~10 homework sets assigned in this course. Homework will be assigned each week and generally will be due in about a week. Keep track of dates on piazza and gradescope. All Homework grades will be considered for course final grade evaluation.

Exam	**Date**
Midterm 1	June 19th, 2023 (Monday)
Midterm 2	July 17th, 2023 (Monday)
Final Exam	TBD

Student Learning Outcomes

1. Be able to represent discrete-time and continuous-time signals in terms of step functions, delta functions, sequences and phasors.
2. Understand the principal of superposition (convolution) and its role in linear, time-invariant systems.
3. Be able to characterize and analyze steady-state system behavior via the real frequency domain using Fourier transforms.
4. Be able to characterize and analyze transient system behavior via the complex s-domain using Laplace transforms.
5. Apply the above methodology to the analysis of amplitude modulation communication systems, filtering and signal processing applications, and to feedback control systems.

Course Assessment Measures

Assessment	Date	Learning Outcome #s
Exam 1		1, 2
Exam 2		3, 4
Final Exam		1, 2, 3, 4, 5
Homework		1, 2, 3, 4, 5

Grading Criteria

Two midterm exams - 50% (25%, 25%)
Final exam – 25 %
Homework assignments -20 %
Attendance and in-class participation -5 %

Submitting all Homework Assignments is mandatory.

Other Course Policies

Homework Policy: All assignments have to be submitted electronically through Gradescope before the deadline. The submission website will close automatically at deadline. Late homework will not be accepted. You may work in groups, but you must write up your solution individually and independently. Copied homework will receive a grade of zero. Repeated violations will lead to failing the course.

Assignment Grade Appeal: To appeal an assignment grade, you should apply for Gradescope regrade request **within two days** after receiving your graded assignment. In your request you must clearly specify why you believe you deserve a higher credit for the solutions you are appealing.

Exam Grade Appeal: To appeal an exam grade, you should submit a written **email request** to the professor **within a week** after receiving your graded exam. In your request you must clearly specify why you believe you deserve a higher credit for the solutions you are appealing.

Important Note: The only circumstance under which an appeal in the assignment or exam grades will be considered is a demonstrable factual error in grading, meaning either that scores were incorrectly totaled, or a correct answer was marked incorrect. Uniform standards for partial credit are applied for the class, so we will not revisit the amount of points awarded for an incorrect or incomplete solution.

Exam Policy: If you require extra time on exams or another form of accommodation, please contact the Dean of Students Office. Please do this early in the term so that we have plenty of time to plan.

Midterm and final exams: All students are expected to take all midterm and final exams given during the semester.

Academic Integrity

Student-Professor relationships are built on trust. Students must trust that professor has made appropriate decisions about the structure and content of the courses they teach, and professor must trust that the assignments that students turn in represent their own work. Acts that violate this trust undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities defines various forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student's own work. In cases where unofficial help was received, or significant teamwork was involved, a notation on the assignment should indicate your collaboration.

If you have any question concerning this policy before submitting an assignment, please ask for clarification.

- Any violation of this policy will result in a 0 score for the related evaluation.
- Repeated violation will result in F grade.
- We have a zero-tolerance policy in exams, and any violation of the policies result in an F grade.
- For any case of academic dishonesty, a report will be filed to the Dean of Students.

Course Number		**ECSE 2410**				
Course Name		**Signals and Systems**				
Teaching Semester		**Summer 2023**				
Instructor		**Dr. Prabhakar Neti**				
Instructor's WebEx Personal Room			https://rensselaer.webex.com/meet/netip			
Instructor's Office Hours		**Mon: 4:00PM to 6:00PM**	**Location (WebEx)**	https://rensselaer.webex.com/meet/netip		
TA's Name		**TA's Office Hours**	**TA's Email**	**Location (WebEx)**		
Amol Dwivedi		**TBD**	dwivea2@rpi.edu	https://rensselaer.webex.com/meet/dwivea2		
Primary textbook:		**A. V. Oppenheim, A. S. Willsky, and S. H. Nawab, Signals & Systems, 2nd ed., Englewood Cliffs, NJ: Prentice Hall, 1996.**				
ISBN-10: 0138147574.						
Supplemental texts:		**H. Hsu, Schaum's Outline of Signals and Systems, 2nd ed. McGraw Hill, 2010.**				
ISBN-10: 007163472X						
Date	**Day**	**Time**	**Location**	**Details**	**Topics**	**Readings**
5/22/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 1	Logistics, Syllabus, Overview of Signals & Systems	1.0 - 1.2
5/25/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 2	Special Signals	1.3 - 1.5
5/31/2023	Wednesday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 3	System Properties	1.6
6/1/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 4	Discrete-Time Convolution	2.0 - 2.1
6/5/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 5	Linear Time-Invariant Systems	2.3
6/8/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 6	Continous-Time Convolution	2.2
6/12/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 7	Fourier Series	3.0 - 3.3
6/15/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 8	Fourier Series Properties	3.5, 3.8
6/19/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Midterm Exam-1	Midterm Exam-1	
6/22/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 9	Fourier Trasforms	4.0 - 4.1
6/26/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 10	Fourier Transform Proerties	4.2 - 4.3
6/29/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 11	Fourier Transform Convolution Proerties	4.4 - 4.5
7/10/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 12	Amplitude Modulation	8.0 - 8.3
7/13/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 13	Sampling Theorem & Aliasing	7.0 - 7.3
7/17/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Midterm Exam-2		
7/20/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 14	Laplace Trasforms	9.0 - 9.2
7/24/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 15	Inverse Laplace Transform and Proerties	9.3, 9.5
7/27/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 16	Laplace Transform Proerties	9.5
7/31/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 17	Poles and Zeros	9.4, 9.7
8/3/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 18	Midterm Exam-2	
8/7/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 19	Butterworth Filters	9.7
8/10/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 20	Feedback Systems, Root Locus	11.0 - 11.3
8/14/2023	Monday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 21	Feedback Systems, Root Locus	11.0 - 11.3
8/17/2023	Thursday	10:30 AM to 12:05 PM	DARRIN 330	Lecture 22	Z-Transforms and Proterties	10.3
TBD	TBD	TBD	TBD	FINAL EXAM	Cummulative	