EEL 3135: Signals and Systems
Department of Electrical & Computer Engineering
Florida International University
Fall 2022

Faculty	:	Dr. Jean Andrian
Office Hours	:	Mo & We 12:00 PM – 2:00 PM (No consultations on exam days)
Office	:	EC 3912
Phone	:	(305) 348-2115
Email	:	andrianj@fiu.edu
Prerequisite	:	MAP 2302
Section/Classroom/time	:	RVC: available through FIU Canvas

Textbook	:	F. T. Ulaby and A. E. Yagle" Engineering Signals and Systems in Continuous and Discrete Time ", Second Edition, nts.

Course Description

Use of Fourier analysis in electrical and electronic systems. Introduction to probability theory, linear algebra and complex variables. (3 credits)

Course Objectives

To give students the necessary mathematical tools for upper-level courses in communication systems, control systems, and digital signal processing.

Topics Covered

1. Complex numbers
2. Introduction to signals and systems
3. Time domain analysis of LTI systems
4. The Fourier series and the Fourier Transform
5. Laplace Transform

ABET Relationship of course to program outcomes

In this course, the student will have to show:

1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Grading Scheme

Midterm exam	**35%**
Final	**35%**
Homework	**10%**
Project	**20%**
Total	**100%**

In-Class Rule

O Cellular Phone (or Beeper) is allowed to ring inside the classroom.

Tentative Grading Scale

A	**100-95**	**B+**	**85-89**	**C+**	**70-75**			**F**	**0-59**
A-	**90-94**	**B**	**80-84**	**C**	**65-69**	**D**	**60-64**		
		B-	**76-79**						

Missed Test:

Call Instructor or Secretary (348-2807) <u>BEFORE</u> test time to notify of problem and to make special arrangements with instructor before next class.

Tentative Dates:

- Midterm Exam **October 19th, 2022**
- Final Exam **December 07th, 2022**

University's Code of Academic Integrity

Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational Mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will

be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

More information can be found at http://academic.fiu.edu/academic_misconduct.html

Department Regulations Concerning Incomplete Grades

1. Must be unable to complete the course through <u>documented</u> circumstances beyond his/her control.

2. Must be passing the course prior to that part of the course that is not completed.

3. Must contact the instructor or the secretary immediately before or during the part missed, so the instructor will be aware of the circumstances causing the incomplete.

4. Must make up the incomplete work through the instructor of the course and should not be allowed to sit through another entire course to make up the incomplete.

5. Must make proper arrangements with the instructor to complete the course <u>before</u> the last two weeks of the second term.

Homework will be assigned every week.

University policies on sexual harassment, and religious holidays, and information on services for students with disabilities

Please visit the following websites:
http://academic.fiu.edu/
http://drc.fiu.edu

Course Policies:

- **Academic Misconduct:** For work submitted, it is expected that each student will submit their own original work. Any evidence of duplication, cheating or plagiarism will result at least a failing grade for the course.
- **Unexcused Absences:** Two unexcused absences are permitted during the term. More than two will result in the loss of points from your final grade. (1 point per absence above two, 3 points per absence above 5).
- **Excused Absences:** Only emergency medical situations or extenuating circumstances are excused with proper documentation. After reviewing documentation you are required to email a description of the excuse and absence dates as a written record to kaleemf@fiu.edu.
- **On Time:** As in the workplace, on time arrival and preparation are required. Two "lates" are equivalent to one absence. (Leaving class early is counted the same as tardy.)
- **Deadlines:** Assignments are due at the beginning of the class period on the date specified. Assignments submitted late (within 1 week) will receive half credit.
- To get assistance try to see me by an appointment.
- Students are encouraged to ask questions and to discuss course topics with the instructor and with each other.

- **Any work submitted should display Panther ID number and should be signed, as the students' own work, and that no unauthorized help was obtained.**
- Cell phones, communicators, MP3 players, head sets are not allowed to be used in the class.
- **DO NOT** send assignments by email.
- Instructor reserves right to change course materials or dates as necessary.

Exam policy

1. Make sure to complete the assigned homework in order to do well in the exam.
2. All exams are closed book and closed notes.
3. Use of any electronic device with keyboard is prohibited. This also applies to cellphones with messaging system.
4. No discussion is permitted during the exams.
5. Instructor is not compelled to give credit for something he cannot read or follow logically.
6. Cheating is considered as a serious offense. Students who are caught will receive the appropriate consequences.

Class Schedule

Week	Date	Topic	Assignment
Week-1	08/22/2022	Review of complex numbers: rectangular and polar forms	
Week-2	08/29/2022	Complex numbers: nth roots, quad. Equation.	
Week-3	09/05/2022	Introduction to signals and systems. Signals: classification. Signal transformations.	
Week-4	09/12/2022	Elementary signals: impulse, step, and ramp functions, real and complex exponential functions.	
Week-5	09/19/2022	Properties of the impulse (delta) function, energy and power signals.	
Week-6	09/26/2022	General definition and description of a system. Linear systems, Time-invariant systems, Linear and Time-invariant (LTI) systems. Project is available starting October 3rd .	
Week-7	10/03/2022	Impulse response and step response of an LTI system. Convolution integral. Graphical convolution method	
Week-8	10/10/2022	Causal, BIBO stable LTI systems. LTI response to a sinusoidal input. LTI	

		systems summary.	
Week-9	10/17/2022	Midterm exam. Introduction to Fourier Analysis. Three Fourier Series représentations of periodic signals. Calculation of complex exponential Fourier series coefficients.	
Week-10	10/24/2022	Calculation of Trigonometric Fourier Series coefficients. Trigonometric Fourier Series of odd and even signals. Compact Trigonometric Fourier Series.	
Week-11	10/31/2022	Magnitude, Amplitude, and Phase plots of Fourier coefficients. Fourier series and LTI systems. The average power of a periodic signal in terms of Fourier series coefficients. Summary of the Fourier representation of periodic signals. Sufficient conditions for the existence of Fourier series (Dirichlet conditions for Fourier series).	
Week-12	11/07/2022	Introduction and derivation of the Fourier Transform and its inverse. Conditions for the existence of Fourier transform (Dirichlet conditions for Fourier transform). Fourier transforms of common signals. Properties of Fourier transform.	
Week-13	11/14/2022	Introduction to Laplace transform. Laplace transform representation of signals. Convergence of the Laplace transform. The s-plane. Poles and Zeroes	
Week-14	11/21/2022	Properties of the Laplace transform. Initial and Final value theorems. Inversion of the unilateral Laplace transform. Solving Differential Equations using Laplace transform.	
Week-15	11/28/2022	Transfer function. Stability and transfer function. Laplace transform methods for circuit analysis	
Week-16	12/05/2022	Final exam December 07, project due December 07	