

University of Puerto Rico
 Mayagüez Campus
 College of Engineering
 Department of Electrical and Computer Engineering
 Bachelor Programs in Electrical and Computer Engineering

Course Syllabus

1. General Information:

Alpha-numeric codification: INEL 4095
 Course Title: Signals and Systems
 Number of credits: 3
 Contact Period: 3 hours of lecture per week
 Require for the New Electrical Engineering Curriculum

2. Course Description:

English: Introduction to the mathematical representation of analog and discrete signals and systems. Study of Fourier series, the Fourier transform, and the Z transform applied to analog and discrete signals. Sampling of analog signals. Analysis of signals and frequency response of linear systems. Characterization of linear time-invariant systems using transform methods.

Spanish: Introducción a la representación matemática de señales y sistemas análogos y discretos. Estudio de la serie de Fourier, la transformada de Fourier y la transformada Z aplicadas a señales análogas y discretas. Muestreo de señales análogas. Análisis de señales y respuesta de frecuencia de sistemas lineales. Caracterización de sistemas lineales invariantes en tiempo utilizando métodos de transformadas.

3. Pre/Co-requisites and other requirements:

INEL 4102 and MATE 4009

4. Course Objectives:

Electrical and Computer engineering students will learn discrete and continuous mathematical transforms and use them for the analysis of discrete and analog signals and linear time invariant systems. Students will also be able to develop mathematical representations of physical systems using the tools studied in class and understand how the same mathematical tools can be used to analyze signals and systems independent of the underlying physics. They will also be able to interpret the mathematical results based on the underlying physical process.

5. Instructional Strategies:

- conference discussion computation laboratory
- seminar with formal presentation seminar without formal presentation workshop
- art workshop practice trip thesis special problems tutoring
- research other, please specify:

6. Minimum or Required Resources Available:

Standard lecturing facilities, Signal Processing Laboratory for demonstrations and computer assisted homework, and MATLAB software.

7. Course time frame and thematic outline

Outline	Contact Hours
Signals and Systems – mathematical representation	2
Systems – mathematical representation	2
Introduction to Fourier Transforms	1
1. Fourier Series	2
2. Discrete Time Fourier Transform (DTFT)	3
3. Fourier Transform	3
4. Discrete Fourier Transform (DFT)	2
Using the FT with signals	3

Using the FT with systems	3
Sampling Theorem	3
Review of Laplace Transform	4
Characterizing LTI continuous systems with the Laplace Transform	4
Z-Transform	4
Using the Z-Transform to solve difference equations	3
Characterizing LTI discrete systems with the Z-Transform	3
Tests	3
Total hours: (equivalent to contact period)	45

8. Grading System

Quantifiable (letters) Not Quantifiable

9. Evaluation Strategies (Suggested): The faculty member teaching the course will provide the student with the evaluation strategy he/she will be using throughout the semester. This will be done within the first week of classes.

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	3	60
<input checked="" type="checkbox"/> Final Exam	1	30
<input type="checkbox"/> Short Quizzes		
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input type="checkbox"/> Projects		
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Homework	3-4	10
TOTAL:		100%

10. Bibliography:

- Alan V. Oppenheim, Alan S. Willsky, and S. Hamid, Signals and Systems, 2 Edition, Prentice Hall.
- J. McClellan, R.Schafer, and M. Yoder, Signal Processing First, Prentice Hall, 2003
- S. Haykin and B. Van Veen, Signals and Systems, John Wiley, 2005
- C.L. Phillips, E.A. Riskin, and J.H. Parr, Signals, Systems, and Transforms, Prentice Hall, 2007.
- A.D. Poularikas, Signals and Systems Primer with MATLAB, CRC Press, 2007.
- C.T. Chen, Signals and Systems, Oxford University Press, 2003.
- IEEE On-line Publications: <http://ieeexplore.ieee.org>
- CRC Electrical Engineering Netbase: <http://www.electricalengineeringnetbase.com/>

11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

12. Contribution of Course to meeting the requirements of Criterion 5:

Math	Basic Science	General	Engineering Topic
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13. Course Outcomes

Map to Program Outcomes

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| 1. Apply mathematical transforms and series to analyze engineering system. | (a) |
| 2. Use available software or tools for systems analysis using transforms and series. | (k) |

Person who prepared this description and date of preparation: Academic Affairs Committee, May 15, 2008
 Submitted by: Raúl E. Torres, Committee Coordinator, May 15, 2008.