

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

**Course Syllabus**

<b>1. General Information:</b>	
Alpha-numeric codification: INEL5309 Course Title: Digital Signal Processing Number of credits: 3 Contact Period: 3 hours of lecture per week Elective in INEL and ICOM	
<b>2. Course Description:</b>	
English: Signal Classification; Z-transform and discrete Fourier transform; matrix representation of digital filters and digital systems; digital filter design; discrete Fourier transform algorithms. Spanish: Clasificación de señales, transformada de Z y transformada discreta de fourier; representaciones matriciales de filtros y sistemas digitales; diseño de filtros digitales; algoritmos de la transformada discreta de fourier.	
<b>3. Pre/Co-requisites and other requirements:</b>	
INEL 4301	
<b>4. Course Objectives:</b>	
After completing the course, the student should be able to: analyze discrete signals and systems using the DFT, DTFT and Z transforms; design FIR and IIR discrete filters; analyze discrete signals using the DFT.	
<b>5. Instructional Strategies:</b>	
<input checked="" type="checkbox"/> conference <input type="checkbox"/> discussion <input type="checkbox"/> computation <input type="checkbox"/> laboratory  <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop  <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutoring  <input type="checkbox"/> research <input type="checkbox"/> other, please specify:	
<b>6. Minimum or Required Resources Available:</b>	
<b>7. Course time frame and thematic outline</b>	
<b>Outline</b>	<b>Contact Hours</b>
Introduction to DSP	1
Discrete Signals	4
Discrete Systems	4
Discrete Time Fourier Transform	4
Discrete Fourier Transform	4
Spectral Analysis	2
Z Transform	5
Frequency Representation of systems	3
Sampling and Reconstruction	3
Filter Specifications	3
IIR filter design	5
FIR filter design	4
Exams	3

<b>Total hours: (equivalent to contact period)</b>	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: Homeworks	3 or more	10
<b>TOTAL:</b>		<b>100%</b>

**10. Bibliography:**

- Sanjit Mitra, "Digital Signal Processing: A Computer Based Approach," McGraw Hill 3<sup>rd</sup> ed. 2006.
- A. Oppenheim, R. Schafer, J. Buck, "Discrete time Signal Processing," Prentice Hall 1999.
- B. Porat, "A Course in Digital Signal Processing," Wiley, 1997

**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
			√

**13. Course Outcomes**

**Map to Program Outcomes**

- |   |     |
|---|-----|
| 1. Compute the DFT, DTFT and Z transforms   | (a) |
| 2. Apply the DFT and DTFT for the spectral analysis of discrete signals                                   | (b) |
| 3. Apply the DTFT and Z-transform for the analysis of discrete systems                                    | (a) |
| 4. Perform operations such as convolution, addition and multiplication of sequences                       | (a) |
| 5. Determine system properties such as linearity, causality, time invariance, ...                         | (a) |
| 6. Calculate the transfer function and frequency response of discrete LTI systems                         | (a) |
| 7. Use and explain the Nyquist theorem for sampling and reconstruction of continuous band limited signals | (a) |
| 8. Design discrete IIR and FIR filters based on specifications  | (c) |
| 9. Use of MATLAB for analysis and design of discrete time systems   | (k) |
| 10. Determine the inverse Z transform using the partial fractions expansion method                        | (a) |

Person (s) who prepared this description and date of preparation: Shawn Hunt. Submitted by: Miguel Vélez, jul 07.