PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING
ABET COURSE SYLLABI

IEE2103 SIGNALS AND SYSTEMS

Credits and contact hours:	10 UC credits/10 hours (3 Lecture hours per week ; 1.5 problem session hours per week and 5.5 hours of Independent learning experience per week)
Instructor's name:	Rodrigo Cádiz
Course coordinator's name	Pablo Irarrázaval
Textbook:	Análisis de Señales, P. Irarrázaval; McGraw Hill 1999 Or Análisis de Señales, second edition, P. Irarrázaval, 2008 (Available on-line)
Course Catalog Description:	The focus of this course is to help students understand and use the fundamental concepts of signals and systems analysis, in preparation for future courses in communications, control theory and other advance areas of Electrical Engineering.
Prerequisite Courses:	MAT1640 Differential Equations
Co-requisite Courses:	To be defined
Status in the Curriculum:	Required
Course Learning Outcomes:	1. To recognize and classify signals (periodic, even, etc.) and systems (causal, lineal, etc.) and to understand the difference between continuous and discrete signals and systems 2. To apply the concepts of convolution, impulse response and state variables in continuous and discrete systems. 3. To interpret and apply the concepts of sampling and reconstruction of signals (Nyquist theorem and aliasing). 4. To analyze signals employing its frequency contents (real and complex). 5. To understand and apply the definition and properties of the continuous and discrete Fourier transform; the Laplace transform; and the Z transform. 6. To determine the response of lineal systems to any input by means of transfer functions in the domain of Fourier or Laplace, continuous or discrete.

Relation of Course to ABET Criteria:

b. Design and conduct experiments: analyze and interpret data
c. Design a system, component, or process
e. Identify, formulate, and solve engineering problems
j. Knowledge of contemporary issues
k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Signals
1.1. Some important signals
1.2. Signals properties
2. LTI systems
2.1. Convolution
2.2. Systems represented by differential or difference equations
2.3. State variables
3. Fourier Analysis
3.1. Continuous Time Fourier series
3.2. Fourier transform
3.3. Properties of the Fourier transform
3.4. Discrete Time Fourier Series
3.5. Discrete Time Fourier Transform
3.6 Filters
4. Discretization of continuous signals
4.1. Sampling
4.2. Interpolation
5. Laplace transform
5.1. ROC, poles and zeros
5.2. Properties of the Laplace transform
5.3. Unilateral Laplace transform
6. Z transform
6.1. ROC, poles and zeros
6.2. Properties of the Z transform
6.3. Unilateral Z transform
7. Advance topics
7.1. Bi-quadratic filters
7.2. Two Dimensional Fourier transform
7.3. Short Time Fourier transform
7.4. Wavelets
7.5. 3D Audio