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

IEE2513 COMMUNICATIONS

Credits and contact hours:	10 UC credits / 10 hours (3h lecture hours per week and 7h hours of Independent learning experience per week)
Instructor's name:	Christian Oberli/ Miguel Rios
Course coordinator's name	Christian Oberli
Textbook:	S. Haykin, Communication Systems, 4th ed. Wiley, 2001.
Course Catalog Description:	This course provides students with the theory knowledge and mathematical tools necessary to understand the fundamentals of modern communications technologies. Students learn to model and analyze such systems considering the spectral efficiency, energy efficiency and implementation complexity compromises.
Prerequisite Courses:	IEE2103 Signals and Systems, EYP1113 Probability and Statistics
Co-requisite Courses:	To be defined
Status in the Curriculum:	Elective
Course Learning Outcomes:	Understand the basic structure and components of a communication system: data source, encoding, modulation, channel noise, networks and protocols, OSI model.
Relation of Course to ABET Criteria:	a. Knowledge of mathematics, science and engineering c. Design a system, component, or process e. Identify, formulate, and solve engineering problems k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Introduction: structure of communication systems: source, coding, modulation, channel; noise; networks and protocols, OSI model; history aspects.
2. Continuous wave modulation: Amplitude Modulation (AM) and its variants (double sideband, BLD, and single sideband, SSB); frequency modulation (FM), phase-locked loops.
3. Noise: stochastic processes: stationary and ergodic processes, autocorrelation, power spectral density; thermal noise.
4. Baseband pulse transmission: matched filter; probability of error; notions of intersymbol interference and eye pattern.
5. Equivalent baseband representation: Hilbert transform, pre-envelope,

complex envelope; systems representation and noise.

6. Passband digital transmission: geometric representation of signals, signal space and geometric receiver formulation; coherent Binary FSK and PSK; probability of error; coherent M-PAM and M-QAM; performance comparison.
7. Fundamental limits of information theory: entropy and channel capacity.