Winter 2015 Syllabus
Communication Systems
ECE316S
The Edward S. Rogers Sr. Department of Electrical & Computer Engineering
University of Toronto

Instructors
LEC 01 Prof. Dimitrios Hatzinakos (Course Coordinator), BA 4144, dimitris@ece.utoronto.ca
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Course Objectives
Communication systems are an integral part of our modern lives providing unprecedented opportunities to
connect, convey and distribute information. Our ubiquitous dependence on such systems have made
communication technologies, networks, assets and services essential to our society’s health, safety, security
and economic well-being. The objective of this course is to provide an introduction to analog and digital
communication systems. Topics include analog amplitude, frequency and phase modulation systems, pulse
code modulation, baseband and passband digital communications, amplitude, phase- and frequency-shift
keying, signal constellations and performance analysis of analog modulation in the presence of noise.

Textbook
S. Haykin and M. Moher, Introduction to Analog & Digital Communications, 2nd ed., John

Lectures
LEC 01 Mondays, 5:00-6:00 pm, GB303
(Hatzinakos) Wednesdays, 5:00-6:00 pm, GB303
Thursdays, 5:00-6:00 pm, GB303
LEC 02 Mondays, 11:00 – 12:00, GB220
(Kundur) Wednesdays, 11:00 – 12:00, GB220
Thursdays, 11:00 – 12:00, GB220

Tutorials
TUT 01 Fridays, 5:00-6:00 pm, BA2165
TUT 02 Mondays, 1:00 – 2:00 pm, BA2145
TUT 03 Mondays, 9:00 – 10:00 am, HA401

Tutorials will begin the week of January 12, 2015 and will be used to teach problem-solving
techniques based on the assigned problem sets. Regular attendance is strongly
recommended. Problem sets will be assigned weekly, but will not be marked.

Labs
Lab(s) will begin the week of Jan. 05 and will take place in room SF2201 (Photonics Lab). Lab content can be found at: http://www.comm.utoronto.ca/~b kf/ECE316/. Our lab coordinator is Mr. Bruno Korst, bkf@ece.utoronto.ca. Labs will be executed by teams of at most 2 students. One lab report per group should be prepared and submitted within one week from the lab date (please note that lab preparation is marked individually). Please refer to lab scheduling for more details.
Composition of Final Mark

- Lab(s): 20%
- Test(s): 30% administered out of class
- Final Exam: 50%

Syllabus:

- **Signal and System Representations and Filtering**: Review of the Fourier transform and its properties, LTI systems, filtering. (Text, §2.1-2.7)
- **Amplitude Modulation**: AM, double-sideband suppressed carrier, single-sideband. (Text, §3.1-3.6)
- **Angle Modulation**: Phase modulation (PM) and frequency modulation (FM), wide-band FM, generation and detection of FM. (Text, §4.1-4.4, 4.6-4.8)
- **Pulse Modulation**: The sampling theorem, pulse-amplitude modulation, quantization, pulse code modulation (PCM), line codes. (Text, §5.1-5.5)
- **Digital Transmission at Baseband**: Pulse transmission, intersymbol interference, Nyquist's criterion, raised-cosine pulses, eye-patterns. (Text, §6.1-6.6)
- **Digital Modulation Techniques**: Amplitude-shift keying, phase-shift keying, frequency-shift keying, M-ary modulation, signal constellations. (Text, §7.1-7.8)
- **Communication in the Presence of Noise**: White Gaussian noise, power spectral density, filtering of noise, noise analysis: coherent AM demodulators, envelope detector, FM demodulators. (Text, portions of §8.6-8.10, 9.1-9.5, 9.7-9.8)

Course Website and Blackboard

The course will make use of Blackboard (http://portal.utoronto.ca). *All students must register on Blackboard.* Course notices, handouts, office hours and important communications will be administered using this site.

Course Policies and Information

- All tests and the final exam make use of a non-programmable (Type 2) calculator. No programmable calculators are allowed. The final exam is Type C (candidates may prepare, bring to the exam and use a single standard aid sheet supplied by the registrar’s office).
- The ECE Undergraduate (UG) Office’s policy on Petition for Consider in Course Work will be employed for missed tests and late assignments. Official supporting documentation must be provided and the completed petition must be filed with the UG Office.
- Questions regarding marking must be formally written on a piece of paper and submitted along with the associated test/assignment to the cognizant TA. There is a 48-hour limit from the time the test/assignment is first returned in which you may request a recheck.
- Please note that late assignments (e.g., lab write-ups) will be deducted 15% per business day.
- Academic integrity is of utmost important. Any issues of plagiarism and inappropriate collaboration will be taken seriously and reported to the appropriate higher authority.
- Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or Accessibility Services at (416) 978 8060; http://accessibility.utoronto.ca.