

Course Outline (Winter 2017)

ELE635 Communication Systems

Instructor	NAME: Lian Zhao Office: ENG434 Phone: 416-979-5000 ext: 6101 E-mail: l5zhao@ryerson.ca Office Hours: Tuesdays 11:00-12:00 PM; Wednesdays 2:00-3:00 PM
Calendar Description	This course studies basic principles of communication theory as applied to the transmission of information. The course topics include: baseband signal transmission, amplitude, phase and frequency modulation, modulated waveform generation and detection techniques, effects of noise in analog communication systems, frequency division multiplexing.
Prerequisites	ELE 532, MTH 514 and CEN 199
Compulsory Text(s):	<ol style="list-style-type: none"> 1. B.P. Lathi and Zhi Ding, <i>Modern Digital and Analog Communication Systems</i>, 4th edition, Oxford University Press, 2009 2. M. Zeytinoglu, <i>ELE 635 Course Notes</i>, available from course homepage on D2L. 3. Laboratory experiment descriptions and procedures, available from course home page on D2L.
Reference Text(s)	
Learning Objectives (Indicators)	<p>At the end of this course, the successful student will be able to:</p> <ol style="list-style-type: none"> 1. Learn Mathematical analysis and formulation for Fourier series analysis, modulation/demodulation, spectral analysis, and stochastic signal analysis (1b, 1c); 2. Learn to model complete communication systems, and study bandwidth efficient communication techniques (2b); 3. Learn different amplitude- and frequency modulation systems, study their characteristics, power efficiency and limitations (3b); 4. Learn to conduct lab experiments with specialized test and measurement equipment to measure modulated signal characteristics in time- and frequency domains (5b) <p>NOTE: Numbers in parentheses refer to the graduate attributes required by the Canadian Engineering Accreditation Board (CEAB).</p>
Course Organization	<p>3 hours of lecture per week for 13 weeks, in 11 sections 3 hours of lab/tutorial per week for 5 weeks 11 Lab/tutorial sections of maximum 20 students 5 Teaching Assistants, 2-3 sections per TA</p>

Teaching Assistants	(The following is a Table and you can add/remove rows/columns as needed)									
	Randy Tan randy.tan@ryerson.ca (leading TA) Shuo Yu s1yu@ryerson.ca Pooya Sobhe Pooya.sobhebidari@ryerson.ca Bidari Ali Alnoman ali@ryerson.ca Mushu Li mushu1.li@ryerson.ca									
Course Evaluation	(The following is a Table and you can add/remove rows/columns as needed)									
	<table border="1"> <tr> <td>Experiments</td> <td>25 %</td> </tr> <tr> <td>Formal Lab Report</td> <td>5 %</td> </tr> <tr> <td>Midterm Exam</td> <td>25 %</td> </tr> <tr> <td>Final Exam</td> <td>45 %</td> </tr> <tr> <td>TOTAL:</td> <td>100 %</td> </tr> </table>	Experiments	25 %	Formal Lab Report	5 %	Midterm Exam	25 %	Final Exam	45 %	TOTAL:
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Formal Lab Report	5 %									
Midterm Exam	25 %									
Final Exam	45 %									
TOTAL:	100 %									
Examinations	Midterm exam in Week 7, two hours, problems and solutions, closed book (covers Weeks 1-6). Final exam, during exam period, two hours, and closed-book (covers Weeks 4-13).									
Other Evaluation and/or Information	N/A									

Course Content

Week	Sections	hours	Lecture Topic
1	Chapter 2	3	Introduction, Representation of signals & systems
2	Chapter 3, Sections: 1-3	3	Analysis and transmission of signals
3	Chapter 3, Sections: 4-8	3	Analysis and transmission of signals
4	Chapter 4, Sections: 1-3	3	Amplitude modulation
5	Chapter 4, Sections: 4-6	3	Amplitude modulation (cont'd)
6	Chapter 4, Sections: 7-8	3	Amplitude modulation (cont'd)
7	Chapter 5, Sections: 1	1	Angle modulation Midterm Examination
8	Chapter 4, Section 8	3	Phase-Locked Loop and Applications
9	Chapter 5, Sections: 1-3	3	Angle modulation
10	Chapter 5, Sections: 4-5	3	Angle modulation (cont'd)
11	Chapter 5, Sections: 6-7	3	Angle modulation (cont'd)
12	Chapter 9,	3	Random processes

	Sections: 1-3 Chapter 9, Sections: 4-9		Effects of noise
13	Chapter 10, Sections: 1-4	3	Effects of noise (cont'd)

Laboratory/Tutorials

Week	Title	Room
3,4	Spectral Analysis	ENG311
7,8	Amplitude Modulation and Demodulation	ENG311
9,10	Frequency Modulation and Demodulation	ENG311
11,12	Software Defined Radio	ENG311

Important Notes

- All of the required course-specific written reports will be assessed not only on their technical/academic merit, but also on the communication skills exhibited through these reports.
- All assignment and lab/tutorial reports must have the standard cover page which must be signed by the student(s) prior to submission of the work. Submissions without the cover page **will not** be accepted. The cover page can be found on the departmental web site: [Standard Assignment/Lab Cover Page](#)
- Should a student miss a mid-term test or equivalent (e.g. studio or presentation), with appropriate documentation, a make-up assessment **may** be scheduled. Alternatively, the weight of the missed work is placed on the final exam, or another single assessment. This may not cause that exam or assessment to be worth more than 70% of the student's final grade. If a student misses a scheduled make-up test or exam, the grade may be distributed over other course assessments even if that makes the grade on the final exam worth more than 70% of the final grade in the course. Make-up assessments cover the same material as the original assessment but need not be of an identical format.
- Students who miss a final exam for a verifiable reason and who cannot be given a make-up exam prior to the submission of final course grades, must be given a grade of INC (as outlined in the *Grading Promotion and Academic Standing Policy*) and a make-up exam (normally within 2 weeks of the beginning of the next semester) that carries the same weight and measures the same knowledge, must be scheduled.
- Medical or Compassionate documents for the missing of an exam must be submitted within 3 working days of the exam. Students are responsible for notifying the instructor that they will be missing an exam as soon as possible.
- If a student is requesting accommodation due to a religious, aboriginal and/or spiritual observance, he or she must submit a Request for Accommodation of Student Religious, Aboriginal, and Spiritual Observance AND an Academic Consideration form within the FIRST TWO WEEKS OF CLASS or, for a final examination, within two weeks of the posting of the examination schedule.** If the required absence occurs within the first two weeks of classes, or the dates are not known well in advance as they are linked to other conditions, these forms should be submitted with as much lead time as possible in advance of the required absence.
Both documents are available at <http://www.ryerson.ca/senate/forms/reobservforminstr.pdf>. Full-time or part-time degree students must submit the forms to their own program department or school.
- The results of the first test or mid-term exam will be returned to students before the deadline to drop an undergraduate course in good Academic Standing.
- Students are required to adhere to all relevant University policies including:
 - Undergraduate Grading, Promotion and Academic Standing: <http://www.ryerson.ca/senate/policies/pol46.pdf>
 - Student Code of Academic Conduct: <http://www.ryerson.ca/senate/policies/pol60.pdf>
 - Student Code of Non-Academic Conduct: <http://www.ryerson.ca/senate/policies/pol61.pdf>

- Undergraduate Academic Consideration and Appeals: <http://www.ryerson.ca/senate/policies/pol134.pdf>
- Examination Policy: <http://www.ryerson.ca/senate/policies/pol135.pdf>
- Course Management Policy: <http://www.ryerson.ca/senate/policies/pol145.pdf>
- Accommodation of Student Religious, Aboriginal and Spiritual Observance: <http://www.ryerson.ca/senate/policies/pol150.pdf>
- Establishment of Student E-mail Accounts for Official University Communication: <http://www.ryerson.ca/senate/policies/pol157.pdf>

9. Students are required to obtain and maintain a Ryerson e-mail account for timely communications between the instructor and the students.
10. Any changes in the course outline, test dates, marking or evaluation will be discussed in class prior to being implemented.
11. Assignments, projects, reports and other deadline-bound course assessment components handed in past the due date will receive a mark of ZERO. Marking information will be made available at the time when such course assessment components are announced.
12. If you have taken the course previously and are currently looking to get a laboratory exemption, then you must fill out this form: <http://www.ee.ryerson.ca/guides/ECE-LabExemptionForm.pdf>

Approved by: _____
Course Instructor

Date _____

Approved by: _____
Associate Chair or Program Director

Date _____