



COURSE OUTLINE WINTER 2020

	Date	Initials
Prepared by Instructor	19-Mar-20	MH
Approved by Head		

1. Calendar Information

ENEL 471

Introduction to Communications Systems and Networks

Introduction to communications systems and networks. Analog communications concepts including filtering and analog modulation. Sampling and digital communications concepts including binary baseband/passband modulation, matched filtering and detection. Telecommunications and data network fundamentals including network protocol architectures, design and performance.

Course Hours: 3 units; H(3-1T-3/2)

Academic Credit: 3

Calendar Reference: <http://www.ucalgary.ca/pubs/calendar/current/electrical-engineering.html#7623>

2. Learning Outcomes

At the end of this course, you will be able to:

- 1 Describe the basic features and characteristics of communication systems and networks
- 2 Define communication network architectures and protocols, analyse the throughput-delay characteristics of medium access control protocols
- 3 Define pass-band and stop-band of low-pass, high-pass and band-pass filters; and analyse the frequency response and impulse response characteristics of low-pass filters
- 4 Define the various types of amplitude modulation; and describe the important methods of generating and demodulating amplitude modulated signals
- 5 Develop the spectral properties and calculate power efficiency of amplitude modulation; and analyse the demodulated signals in the presence of noise and interference
- 6 Define the various types of angle modulation; and describe the important methods of generating and demodulating angle modulated signals
- 7 Describe the basic concepts of pre-emphasis and de-emphasis filters for frequency modulated signals
- 8 Develop the spectral properties and calculate the transmit power of frequency modulation and analyse the demodulated frequency-modulated signals in the presence of noise and interference
- 9 Describe the basic concept of digital baseband and passband modulation and demodulation
- 10 Analyse the bit error rate performance of baseband and passband binary modulation and demodulation formats when used over additive white Gaussian noise channel

3. Timetable

Section	Day(s) of the Week	Time	Location
LEC 01	MWF	9:00 AM - 9:50 AM	ICT 122

TUT T01	F	12:00 PM - 12:50 PM	EDC 179
LAB B01	W	2:00 PM - 4:50 PM	ENA 301
LAB B02	W	2:00 PM - 4:50 PM	ENA 305
LAB B03	T	2:00 PM - 4:50 PM	ENA 301
LAB B04	T	2:00 PM - 4:50 PM	ENA 305

4. Course Instructors

Course Coordinator

Section	First Name	Family Name	Phone	Office	Email
L01	Mohamed	Helaoui	403-210-5404	ICT 340	mhelaoui@ucalgary.ca

Other Instructors

Section	First Name	Family Name	Phone	Office	Email

Teaching Assistants

Section	First Name	Family Name	Phone	Office	Email
L01	Yulong	Zhao		ICT 318	yulong.zhao@ucalgary.ca
L01	Hammam	Orabi		ICT 305	hammam.orabi@ucalgary.ca
L01	Muhamma d	Ali		ICT 318	ali.buetk@gmail.com
L01	Rajith	Madduma Bandarage			rajith.maddumabandar@ucalgary.ca
L01	Mostafa	Raeisi Ziarani			mostafa.raeiszian@ucalgary.ca

5. Examinations

The following examinations will be held in this course:

1. Two Midterm Exams
2. One Final Exam

All exams will be closed books and closed notes.

Note: The timetable for Registrar Scheduled exams can be found at the University's Enrolment Services website, <http://www.ucalgary.ca/registrar/>.

6. Use of Calculators in Examinations

Nonprogrammable calculators may be used in the exams

7. Final Grade Determination

The final grade in this course will be based on the following components:

Component	Learning Outcome(s) Evaluated	Weight
Quizzes / Assignments*	1 to 9	10%
Labs ****	3 to 7	10%
Midterm Examination 1	1 to 4	15%
Midterm Examination 2 **	5 to 7	15%
Final Examination ***	1 to 10	50%

Total: 100%

Notes:

a) It is not necessary to earn a passing grade on the final exam in order to pass the course as a whole.

b) Conversion from a score out of 100 to a letter grade will be done using the conversion chart shown below. This grading scale can only be changed during the term if the grades will not be lowered.

Letter Grade	Total Mark (T)
A+	$T \geq 94.0\%$
A	$88.0\% \leq T < 94.0\%$
A-	$82.0\% \leq T < 88.0\%$
B+	$76.0\% \leq T < 82.0\%$
B	$70.0\% \leq T < 76.0\%$
B-	$65.0\% \leq T < 70.0\%$
C+	$60.0\% \leq T < 65.0\%$
C	$56.0\% \leq T < 60.0\%$
C-	$52.0\% \leq T < 56.0\%$
D+	$48.0\% \leq T < 52.0\%$
D	$44.0\% \leq T < 48.0\%$
F	$T < 44.0\%$

8. Textbook

The following textbook(s) is required for this course:

Title	Communication System
Author(s)	S.Haykin
Edition, Year	Selected chapter from 5th edition, 2009
Publisher	Wiley

The following textbook(s) is recommended for this course:

Title	
Author(s)	
Edition, Year	
Publisher	

9. Course Policies

Advising Syllabus

All Schulich School of Engineering students and instructors have a responsibility to familiarize themselves with the policies described in the Schulich School of Engineering Advising Syllabus available at:

<http://schulich.ucalgary.ca/undergraduate/advising>

Emergency Evacuation/Assembly Points

In the event of an alarm sounding, all classrooms and labs must be evacuated immediately. Please respond to alarms promptly by leaving the building by the closest available exit. Faculty and students must remain outside the building until the 'all clear' has been given by a Fire Marshall. In case of emergency, call 220-5333.

Assembly Points have been identified across campus. These areas have been selected as they are large enough to hold a significant number of people and will provide an evacuated population access to washroom facilities and protection from the elements. More information on assembly points can be found at

<http://www.ucalgary.ca/emergencyplan/assemblypoints>

WELLNESS AND MENTAL HEALTH RESOURCES

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services>) and the Campus Mental Health Strategy website (<http://www.ucalgary.ca/mentalhealth/>).

10. Additional Course Information

Major Topics:

1. Introduction to communication systems and networks (2 hours)
2. Filter overview (3 hours)
3. Amplitude modulation and demodulation (9 hours)
4. Frequency modulation and demodulation (9 hours)
5. Sampling of analogue waveforms (3 hours)
6. Digital baseband modulation and demodulation (4 hours)
7. Digital passband modulation and demodulation (4 hours)
8. Overview of communication networks (5 hours)

Changes to the course evaluation process due to moving to online learning:

The grading components, grading weights, final grade determination, and letter grade attribution WILL NOT BE CHANGED compared to the original outline. Changes will only affect the format of the examination and the expected submission timeline to accommodate a smooth transition to online learning and to account for the delay of the two-day classes interruption. These changes are as follows:

*** Quizzes :**

- Quiz 6, initially planned for March 13th, will be delivered using D2L quiz feature on Friday March 20th. While the quiz is planned for only 10 minutes, it will be available for you to work on it and submit your answers online on Friday 20th, from 9 am to 9 pm.

- Quiz 7 and 8, initially planned for March 27 and April 3rd, will be turned into the submission and grading of Assignments 9 and 10, respectively. The deadlines for submission of the assignments are postponed to April 3rd and April 10th, respectively. Assignments should be submitted to D2L's Dropbox before 11:59 pm the day of the deadline. Should you face a technical challenge submitting your work to D2L's Dropbox, you can submit your work to me by email. One question will be picked randomly from the assignment to be marked.

**** Midterm II:**

Midterm II, initially planned for March 20, will be postponed to March 25. The exam format will be a take-home exam. While the exam should take no more than 50 minutes, it will be available on March 25 at 9 am and should be submitted to D2L's Dropbox before 9pm the same day. Should you face a technical challenge submitting your work to D2L's Dropbox, you can submit your work to me by email. The submission format should be a clearly scanned PDF file of your HANDWRITTEN PERSONAL

***** Final Exam**

The Final exam, initially planned for April 22 for 180 minutes, will be a take-home exam. While the exam should take no more than 180 minutes, it will be available on April 22 at 9 am and should be submitted to dropbox by April 23 before 9 pm. Should you face a technical challenge submitting your work to D2L's Dropbox, you can submit your work to me by email. The submission format should be a clearly scanned PDF file of your HANDWRITTEN PERSONAL work.

****** Labs :** There will be no changes to the submission timeline and evaluation of Lab reports. Lab material will be available on D2L at least three days before the lab sessions. The sessions will be delivered online using zoom session organized by the TAs, who will provide you assistance when needed. TAs will assign each group to a breakout room to collaborate freely with your groupmates without interfering with other groups. While your lab work is still a group collaborative work, I HIGHLY RECOMMEND THAT YOU SHOULD NOT BE PHYSICALLY IN THE SAME LOCATION when working on your lab. The lab reports should be a clearly scanned PDF file of your work. They should be submitted to D2L's Dropbox. Should you face a technical challenge submitting your work to D2L's

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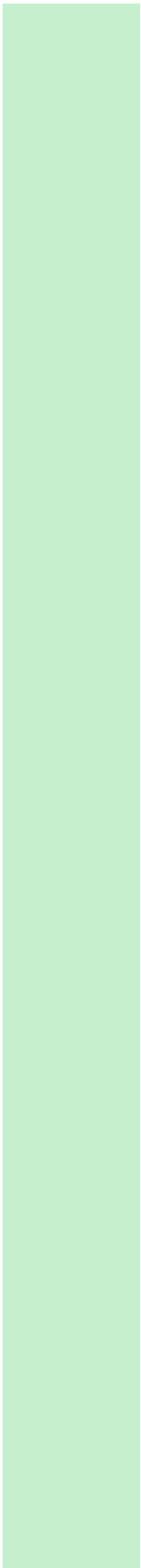
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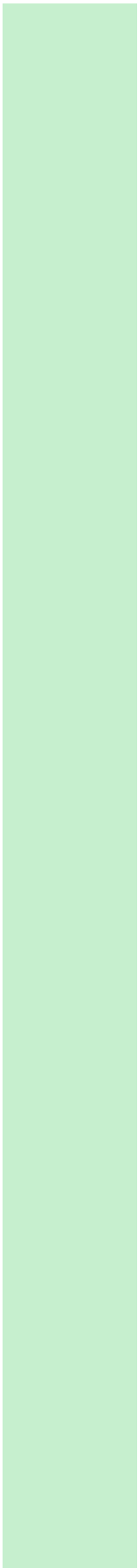
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