Introduction to Digital Communications

General Information

1- Schedule:

Lectures: Tuesdays and Thursdays, 13:15-14:30, room FG B.055

Instructor Name: Dr. Reza Soleymani
Office Location: Room EV 5.125
Tel.: (514) 848-2424 ext. 4103
Email: reza.soleymani@concordia.ca
Office hours: Tuesdays from 14:30 TO 16:30.
Laboratories: Lab coordinator: Jorris Moreau

Contact information: jorris.moreau@concordia.ca

- The labs start after the DNE deadline (September 19th. 2022).
- There will be 4 lab experiments.
- There will be a lab exam.
- The lab attendance is mandatory.
- If the student come late more than 20 minutes, the student will be considered absent from his lab and
will not be graded for that lab.
- Students have to submit individual lab report to the lab demonstrator (TA).
- The lab work is worth 15 % of the course grade. If the student fail the labs (i.e. score less than 60% for
the lab work), the student fail the course.
- All students will receive complete lab information about lab rules, lab manual, lab report, lab
schedule, etc...via their address e-mail given to Concordia University.

Lab location: H-801

2- Course Content and Objectives

2.1- Calendar Course Description

ELEC 367 Introduction to Digital Communications (3.5 credits)
Prerequisite: ELEC 342 or ELEC 364; ENGR371

Analog communications and frequency multiplexing; pulse-code-modulation and time multiplexing; additive white Gaussian noise; matched filter and correlator receiver; maximum likelihood receiver and error probability; intersymbol interference, pulse shaping filter; Signal Space Analysis; Union Bound on the probability of error; Pass-band communication Systems; coherent and non-coherent communication systems; linear block codes, syndrome-based decoding; coding versus modulation. Lectures: three hours per week. Laboratory: 15 hours total.

2.2- Knowledge Required for this Course

Knowledge of probability theory and signals & systems are required.

2.3- Course Objectives

This course will teach you point-to-point wired and wireless communication systems. This course will teach analog communication schemes, analog-to-digital convertor, digital-to-analog convertor. The main part of the course will teach digital communication schemes. At the end of this course, you will be able to analyze and design basic blocks of point-to-point communication systems.

2.4- Course Learning Outcomes

Upon successful completion of the course, the students should be able to:

- Analyze and design amplitude modulator and demodulator.
- Analyze and design analog-to-digital and digital-to-analog convertors
- Analyze and design Frequency Division Multiplexing and Time Division Multiplexing schemes.
- Analyze and design digital modulators/demodulators such as BPSK, QPSK, MQAM, MPSK and MFSK.
- Evaluate bit error rate of digital communication systems.

2.5- CEAB Graduate Attribute

This course emphasizes and develops the following CEAB (Canadian Engineering Accreditation Board) graduate attributes and indicators.

GRADUATE ATTRIBUTE	***INDICATOR***	***LEVEL***	***Evaluation Method***
KB - A knowledge base for engineering Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program	ECE-KB-3. Knowledge base in a specific domain of electrical engineering	Advanced	Whole Course
INV – Investigation An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions	ECE-INV-3. Conducting experiments and collection of data ECE-INV-4. Analysis and interpretation of data	Intermediate Introductory	Lab 4, 5 Lab 4, 5
UET - Use of engineering tools (An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations)	ECE-UET-1. Ability to use appropriate tools, techniques, and resources ECE-UET-3. Demonstrate awareness of limitations of tools, create and extend tools as necessary	Advanced Introductory	Lab 1, 5 Lab 3, 4
DE - Design An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.	ECE-DE-2. Idea generation and Selection ECE-DE-3. Detailed design	Intermediate Intermediate	Final Exam Final Exam

3- Course Material

3.1- Text Book

Coursepack available at the bookstore

You may use any of the four textbooks used to create the coursepack for more information.

3.2- Other Course Material

Qther required course material will be posted on the course web site.

4- Assessments

4.1- Tutorials

There will be 13 tutorials in the form of workshop. Students are supposed to attend each tutorial and solve the problems presented by the tutor in the tutorials session and submit their solution to the tutor. The tutor will be helping the students and teaching them how to solve the problems.

4.2- Assignments

There will be several assignments which are to be answered and delivered to the instructor. Solutions will be provided after the due time.

4.3- Laboratory

There are five experiments bi-weekly and a final lab test. See the course web site for detailed lab schedule, lab rules and lab descriptions.

4.4- Midterm Exam

One closed book midterm exam will be held which is related to the material covered up to the midterm date. **Midterm exam will be held on Sunday Oct. 23 from 10:00 to 12:00.** If you do not write the midterm exam without any legitimate reason, the grade of your midterm exam will be zero. If a student has a legitimate reason not attending the midterm exam, he/she should immediately inform the instructor (either before or immediately after the exam). If you do not write the midterm exam with a legitimate reason, the weight of that midterm exam will be added to the final exam. You are allowed a crib sheet of letter size two sided.

4.5- Final Exam

A closed book exam will be held from whole the course material. The final examination will be scheduled by the university during the examination period. You are allowed a crib sheet of letter size two sided.

5- Grading Scheme

The letter grade will be given based on your overall mark out of 100 which will be calculated as follows:

Tutorial:	5%
Assignment:	5%
Laboratory:	15%
Midterm Exam:	25%
Final Exam:	50%

Following scheme will be used to issue letter grades without any curving:

A-, A, A+:	Overall mark of 80% or above
B-, B, B+:	Overall mark of 68% to 79%
C-, C, C+:	Overall mark of 56% to 67%
D-, D, D+:	Overall mark of 50% to 55%

Note: If you do not write both midterm and final exams, your grade will be **R-DNW.**

6- Rights and Responsibilities

6.1- Academic Code of Conduct

All Concordia University students must abide by the University's code of conduct which can be found in section 17.10 of Concordia University Undergraduate Calendar.

6.2- Expectations of Originality

Please note that you have to submit a signed copy of "expectations of originality" form to the TA in your first laboratory experiment.

You must write one of the following statements on the title page of each piece of work that you submit:

For individual work: **"I certify that this submission is my original work and meets the Faculty's Expectations of Originality"**, with your signature, I.D. #, and the date.

For group work: **"We certify that this submission is the original work of members of the group and meets the Faculty's Expectations of Originality"**, with the signatures and I.D. #s of all the team members and the date.

Faculty of Engineering and Computer Science (Expectations of Originality)

This form sets out the requirements for originality for work submitted by students in the Faculty of Engineering and Computer Science. Submissions such as assignments, lab reports, project reports, computer programs and take-home exams must conform to the requirements stated on this form and to the Academic Code of Conduct. The course outline may stipulate additional requirements for the course.

1. Your submissions must be your own original work. Group submissions must be the original work of the students in the group.
2. Direct quotations must not exceed 5% of the content of a report, must be enclosed in quotation marks, and must be attributed to the source by a numerical reference citation[1]. Note that engineering reports rarely contain direct quotations.
3. Material paraphrased or taken from a source must be attributed to the source by a numerical reference citation.
4. Text that is inserted from a web site must be enclosed in quotation marks and attributed to the web site by numerical reference citation.
5. Drawings, diagrams, photos, maps or other visual material taken from a source must be attributed to that source by a numerical reference citation.
6. No part of any assignment, lab report or project report submitted for this course can be submitted for any other course.
7. In preparing your submissions, the work of other past or present students cannot be consulted, used, copied, paraphrased or relied upon in any manner whatsoever.
8. Your submissions must consist entirely of your own or your group's ideas, observations, calculations, information and conclusions, except for statements attributed to sources by numerical citation.
9. Your submissions cannot be edited or revised by any other student.
10. For lab reports, the data must be obtained from your own or your lab group's experimental work.
11. For software, the code must be composed by you or by the group submitting the work, except for code that is attributed to its sources by numerical reference.

You must write one of the following statements on each piece of work that you submit:

For individual work: **"I certify that this submission is my original work and meets the Faculty's Expectations of Originality",** with your signature, I.D. #, and the date.

For group work: **"We certify that this submission is the original work of members of the group and meets the Faculty's Expectations of Originality",** with the signatures and I.D. #s of all the team members and the date.

A signed copy of this form must be submitted to the instructor at the beginning of the semester in each course.

I certify that I have read the requirements set out on this form, and that I am aware of these requirements. I certify that all the work I will submit for this course will comply with these requirements and with additional requirements stated in the course outline.

Course Number: _____ELEC 367_____ Instructor: _____Yousef Shayan__
Name: _____ I.D. # _____
Signature: _____ Date: _____

[1] Rules for reference citation can be found in "Form and Style" by Patrich MacDonagh and Jack Bordan, fourth edition, May, 2000, available at http://www.encs.concordia.ca/scs/Forms/Form&Style.pdf.
Approved by the ENCS Faculty Council February 10, 2012