



Faculty of Engineering

COURSE OUTLINE

ECE 350 - Communications Theory and Systems 1

Term – Fall 2020 (202009)

Instructor

Dr. Peter Driessen
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Office Hours

Days: Monday
Time: 1:15-2:00
Link: same as class

Course Objectives

To learn how to describe and analyze analog and digital communication systems

Learning Outcomes

1	Describe a communications system at a block diagram level
2	Describe the operation of each block
3	Explain general IQ modulation and demodulation of a carrier wave
4	Explain special cases of analog IQ modulation, including AM, FM, SSB
5	Describe the time domain representation of AM, FM, SSB signals
6	Analyze the spectrum of AM, FM, SSB signals
7	Describe a digital baseband signal as a sum of weighted delayed pulses
8	Describe different pulse shapes and their effect on the occupied spectrum
9	Describe signal constellation and digital IQ modulations ASK, FSK, PSK
10	Identify signals on a time-frequency diagram waterfall display
11	Select components (blocks) to build a specified system (ASK, PSK, FSK, AM, FM, SSB)
12	Design, build and test a specified communications system using software defined radio
13	Analyze the link budget for a communications system

Syllabus

Principles of amplitude, frequency and phase modulation. Modulators, mixers and demodulators. Design of complete and representative transmission systems using link budget. Qualitative treatment of modulation systems in the presence of noise. Elementary digital communications, PSK, FSK.

- Definition of telecommunications
- Idea of carrier wave, real and complex signals
- Link budget
- Baseband message signals
- General amplitude/phase modulation
- General demodulation and receiver structures
- software defined radio
- AM, FM, SSB, ASK, PSK, FSK QAM as special cases
- Noise
- Matched filtering

A-Section(s): A01 / CRN 10962

Days: MR

Time: 10:00-11:20

Link: bright.uvic.ca

Required Text

Online notes and online lab manual

Online Course Delivery:

As this course will be conducted online during this term, students will need to complete assignments/labs online. The students will require access to a computer which has the following software installed:

- Matlab with RTL hardware support <https://www.mathworks.com/hardware-support/rtl-sdr.html>
- GNU Radio <https://wiki.gnuradio.org/index.php/InstallingGR>

Students will also need specialized hardware:

- RTL-SDR software defined radio USB dongle. This hardware may be purchased directly from the ECE department technical staff or ordered online at [AliExpress](https://www.aliexpress.com) or RTL-SDR.com

References:

Assessment:

Assignments:	10%	
Worksheets	10%	
Forum participation	10%	
Labs	10%	
Mid-term	10%	Date: 22 October
Project	10%	
Final Exam	40%	

Important: All deadlines and schedules for this course will reference Pacific Daylight Time until November 1, 2020, and then Pacific Standard Time.

Note: Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.
Failure to pass the final exam will result in a failing grade for the course.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/S1AAgoGuV?bc=true&bcCurrent=14%20-%20Grading&bcGroup=Undergraduate%20Academic%20Regulations&bcltemType=policies>

There will be no supplemental examination for this course.

Note to students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Assistant to set up an appointment.

Course Withdrawal Deadlines:

- September 22, 2020: Withdrawal with 100% reduction of tuition fees
- October 13, 2020: Withdrawal with 50% reduction of tuition fees
- October 31, 2020: Last day for withdrawal (no fees returned)

Accommodation of Religious Observance:

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/r1q0gofdN?bc=true&bcCurrent=10%20-%20Accommodation%20of%20Religious%20Observance&bcGroup=Undergraduate%20Academic%20Regulations&bcltemType=policies>

Policy on Inclusivity and Diversity:

Engineering: <https://www.uvic.ca/engineering/about/equity/index.php>

Academic Calendar:

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/HkQ0pzdAN?bc=true&bcCurrent=%20General%20University%20Policies&bcGroup=General%20University%20Policies&bcltemType=policies>

Standards of Professional Behaviour:

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<https://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

Academic Integrity

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the entry in the current Undergraduate Calendar for the UVic policy on academic integrity.

https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/Sk_0xsM_V?bc=true&bcCurrent=08%20-

[%20Policy%20on%20Academic%20Integrity&bcGroup=Undergraduate%20Academic%20Regulations&bcltemType=policies](#)

Equality:

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum, and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging an appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building. <https://www.uvic.ca/services/cal/>. The University of Victoria is committed to promoting, providing, and protecting a positive, supportive, and safe learning and working environment for all its members.

Course Lecture Notes:

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

Sexualized Violence Prevention and Response at Uvic:

UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting www.uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

Where: Sexualized violence resource office in EQHR; Sedgewick C119

Phone: 250.721.8021

Email: svpcoordinator@uvic.ca

Web: www.uvic.ca/svp

Office of the Ombudsperson:

The [Office of the Ombudsperson](#) is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on an appeal, investigate and make recommendations. Phone: 250-721-8357; Email: ombuddy@uvic.ca, Website: <https://uvicombudsperson.ca/>