

COURSE OUTLINE

ECE 516 – Advanced Wireless Communications

Term – Fall 2019 (201909)

Instructor

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Office Hours

Days: Thursdays
Time: 11am-noon
Location: ELW 421

Course Objectives

To investigate various advanced techniques for wireless communications, including statistical fading channel model, digital communications over fading channel, diversity for fading mitigation, adaptive transmissions, MIMO systems and space-time coding, and multicarrier modulation/OFDM.

Learning Outcomes

- Categorize fading channels using the characteristics of transmitted signal and operation environment;
- Evaluate the performance of digital transmission over flat fading channels;
- Assess the performance benefits of fading mitigation techniques;
- Evaluate the spectral efficiency of adaptive transmission systems;
- Design multicarrier transmission systems for selective fading environment;
- Analyze the capacity of MIMO channels.

Syllabus

- Introduction to wireless communications.
- Wireless channel models: path loss, shadowing, and multi-path fading.
- Digital modulation techniques and their performance over fading channels.
- Fading mitigation techniques: diversity techniques and multicarrier modulation.
- Selected advanced topics: adaptive transmission, MIMO transmission, relay transmission, and cognitive transmission.

A-Section(s): A01, 02/ CRN 11012, 11013

Days: Mondays and Thursdays

Time: 1:00-2:20pm

Location: ECS 104

Required Text

Title: Introduction to Digital Wireless Communications
Author: Hong-Chuan Yang
Publisher: IET Press
Year: 2017

Optional Text

Title: Order Statistics in Wireless Commun.
Author: Hong-Chuan Yang/Mohamed-Slim Alouini
Publisher: Cambridge University Press
Year: 2010

References:

T. Rappaport, Wireless Communications, 2nd Ed, Prentice Hall, 2001;
A. Goldsmith, Wireless Communications, Cambridge, 2005;
R. Yates and D. Goodman, Probability and Stochastic processes, Wiley, 1999;
M. Simon and M.-S. Alouini, Digital Communication over Fading Channels, Wiley, 2000;
J. Proakis, Digital Communications, 4th Ed, McGraw-Hill, 2000.

Assessment:

Assignments:	30 %	Due Dates: TBD
Mid-term:	30 %	Date: November 7, 2019
Project:	40 %	

Course Homepage:

<http://coursespaces.uvic.ca/>: Log in with your University of Victoria Netlink ID and Password.

Assignments:

There will be five to six problem sets. Some problems may require use of mathematical software (such as Matlab, Mathematica and Maple) for calculation and/or plotting. The homework will be due before lectures on the due dates.

Exams:

There will be one midterm exam in the second half of the term. The exam counts 30% to the final grade.

Projects:

The project will be a research project on various emerging wireless communication techniques and systems. The project will be evaluated based on in-class presentation and final written report. During the presentation, to be held in the second half of the term, students should discuss the background, motivation, and expected finding, including literature review (10%). The final report should be a comprehensive summary of students' investigation and is due by email in the final weeks (25 pages maximum, 30%).

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 Graduate Calendar.

<https://web.uvic.ca/calendar2019-09/grad/academic-regulations/grading.html>

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 Secretary to set up an appointment.

Course Withdrawal Deadlines:

- September 17: Withdrawal with 100% reduction of tuition fees
- October 8: Withdrawal with 50% reduction of tuition fees
- October 31: Last day for withdrawal without penalty of failure (no fees returned)

Accommodation of Religious Observance:

<https://web.uvic.ca/calendar2019-09/grad/registration/Registration.1.17.html#>

Policy on Inclusivity and Diversity:

<https://web.uvic.ca/calendar2019-09/general/policies.html>

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.

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

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 Graduate Calendar for the UVic policy on academic integrity.

<https://web.uvic.ca/calendar2019-09/grad/academic-regulations/grading.html>

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 for appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and 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](https://uvicombudsperson.ca/) 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; Web: <https://uvicombudsperson.ca/>

