University of Victoria Engineering

Faculty of Engineering

COURSE OUTLINE

ECE 516 – Advanced Wireless Communications

Term – Fall 2018 (201809)

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 / CRN 11027
Days: Mondays and Thursdays
Time: 1:00-2:20pm
Location: ECS 108

Required Text

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

Optional Text

Title: Order Statistics in Wireless

Author: Hong-Chuan Yang and 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: TBD
Project:	40 %	

Prerequisites:

ELEC 500 Random Signal and ELEC 456 Mobile Communications or equivalent.

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 plots. 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. Students are supposed to study one of the suggested papers and related references for the project. The project will be evaluated based on in-class presentation and final written report. During the presentation, to be held in the middle of the term, students should discuss the background and motivation of the project, including literature review (10%). The final report should be a comprehensive summary of students' investigation and is due by email on Dec. 15, 2017 (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/calendar2018-09/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 Assistant to set up an appointment.

Accommodation of Religious Observance:
https://web.uvic.ca/calendar2018-09/grad/registration/Registration.1.16.html

Policy on Inclusivity and Diversity:
https://web.uvic.ca/calendar2018-09/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/calendar2018-09/grad/academic-regulations/academic-integrity.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 Resource Centre for Students with a Disability 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.