

THE UNIVERSITY OF WESTERN ONTARIO
FACULTY OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ECE 9308/9038 – WIRELESS COMMUNICATIONS: DESIGN AND SIMULATIONS
COURSE OUTLINE – 2016/2017 Fall

OBJECTIVE:

The objective of this course is to provide the students an in-depth understanding of the fundamental techniques, design principles and simulation skills for wireless communications. Upon completion of the course, students should be able to design and analyze advanced communication systems, and expand experience and knowledge for their future careers.

CONTACT HOURS: 3 lecture hours per week, half course (SEB 2099, Thursday, 6:30pm to 9:30pm)

ANTIREQUISITE: None

PREREQUISITES: Bachelor's degree in Electrical Engineering, with ECE4433/ECE4437 or equivalent. Background in probability & random processes, signal processing and MATLAB are required.

COURSE CONTENT:

- Introduction to wireless communications
- Channel models for wireless communications
- Rayleigh and Rician fading
- Digital transmission techniques
- ISI channel and equalization technique
- Cellular concept, frequency reuse and cognitive radio
- Spread spectrum communications
- Diversity techniques
- Multicarrier modulation techniques
- Co-channel and adjacent channel interference
- Spectrum allocation principles
- Simulations of wireless communication system using MATLAB
- Selected topics (wireless networks, 5G, MIMO, cooperative communications)

SPECIFIC LEARNING OBJECTIVES:

1. To learn the principles for wireless communication system design.
2. To understand the characteristics of wireless channel, including fading and various interferences.
3. To understand the techniques for efficient wireless system design.
4. To analyze and evaluate the performance of communication systems.
5. To develop the simulation skills for communication system design.

REFERENCE BOOK:

- [1] A. F. Molisch "Wireless Communications", Wiley, 2006.
- [2] J.G. Proakis and M. Salehi, "Digital Communications", 5th edition, 2008.
- [3] A set of class notes/slides.

OTHER REFERENCES:

A list of published papers and related wireless communication standards.

PROJECT AND ORAL PRESENTATION:

The students in the course will be required to perform a design and simulation project on an assigned topic related to communication system. An oral presentation along with the project-report submission is also required.

EVALUATION:

For the purpose of evaluation, the course is divided into three components, namely

- a. assignment
- b. project report
- c. project presentation

The final course grade will be determined from students' performance in the project and the final examination. The examination shall be semi-open book; calculators and formula sheets will be allowed.

In order to pass the course, a student must obtain a passing grade in each component. A student who fails either component shall receive a final grade not greater than 48%. The weighting of each of these components will be as follows:

M.E.Sc./Ph.D. (ECE9308)

Component	Value	Maximum Penalties*	
		English	Presentation
Assignment	20%	10%	10%
Project Report	50%	10%	10%
Project Presentation	20%	10%	10%
Participation	10%	N/A	N/A

M.Eng. (ECE9038)

Component	Value	Maximum Penalties*	
		English	Presentation
Assignment	30%	10%	10%
Project Report	30%	10%	10%
Project Presentation	30%	10%	10%
Participation	10%	N/A	N/A

*In accordance with the policy of the University, the grade assigned to all written and oral work presented in English shall take into account syntax, diction, grammar and spelling. In the professional life of an engineer, the manner in which oral and written communications are presented is extremely important. An engineering student must develop these skills as an integral part of the undergraduate program. To encourage the student to do so, the grades assigned to all written and oral work will take into account all aspects of presentation including conciseness, organization, neatness, use of headings, and the preparation and use of tables and figures.

All work will be marked first for content after which a penalty not to exceed the maximum shown above may be applied for lack of proficiency in English and/or presentation.

ATTENDANCE:

Any student, who in the opinion of the instructor is absent too frequently from class in this course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

Cheating and Plagiarism Policy:

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is attended by academic penalties which might include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be subject to submission for textual similarity review to commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

Use of Electronic Devices Policy:

Cellular phones, tablets, laptops, mp3 players, PDAs, handhelds and similar devices: please turn these off during class and keep them hidden from sight. These devices are expressly forbidden during an exam except when otherwise directed by the instructor.

Internet/Email/Bulletin Board Policy:

Students are responsible for regularly checking their Western e mail and the course web site (<https://owl.uwo.ca/portal/>) and making themselves aware of any information that is posted about the course. It is the student's responsibility to read the course website and/or bulletin board and be aware of any information that is posted about the course. If the student fails to act on information that has been posted on these sites and does so without a legitimate explanation (i.e., those covered under the illness/compassionate form), then there are NO grounds for an appeal.

Submission Policy:

Assignments/Project Reports: all submissions are due by 5:00PM on the due dates. Failure to submit on due dates will attract a penalty at the rate of 20% per day.

Accessibility:

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact

Services for Students with Disabilities (SSD) at 519-661-2111 ext. 82147 for any specific question regarding an accommodation.

Support Services:

Office of the Registrar, <http://www.registrar.uwo.ca/>

Student Development Centre, <http://www.sdc.uwo.ca/>

Engineering Undergraduate Services, <http://www.eng.uwo.ca/undergraduate/>

USC Student Support Services, <http://westernusc.ca/services/>

Students who are in emotional/mental distress should refer to Mental Health @ Western, http://www.health.uwo.ca/mental_health/, for a complete list of options about how to obtain help.

COURSE INSTRUCTOR:

Professor Xianbin Wang

TEB 355

Email: wang@eng.uwo.ca