



ECE 7440 – Game Theory for Wireless and Communication Networks

COURSE OUTLINE – SUMMER 2019

COURSE DESCRIPTION:

This course deals with the applications of game theory techniques for modeling, analysis, and optimization of wireless and communication networks.

COURSE OBJECTIVE:

The objective of this course is to expose the student different game theoretical techniques with their applications to modeling wireless and communication networking problems. The course materials (lectures, presentations, course projects) will consist of topics related to non-cooperative and cooperative games, Bayesian games, differential games, evolutionary games, mean field games, and auction theory and mechanism design along with their applications in different wireless and networking problems. As a graduate level course, it will combine extensive reading and in-class discussion of the research literature with research projects done by the students.

PRE-REQUISITES:

Background on digital communications and telecommunication networks, probability theory and stochastic processes, queueing theory

CONTACT HOURS:

- 3 hours per week
- Day and time: TBD

COURSE CONTENT:

- Part I (Fundamentals of game theory): Non-cooperative games, Bayesian games, differential games, mean-field games, evolutionary games, cooperative games, auction theory and mechanism design.
- Part II (Applications of game models in wireless and communication networking): Medium access control, resource allocation, and power control in wireless networks; dynamic spectrum management in cognitive radio networks; flow and congestion control in the Internet.

TEXTBOOK:

The following book will be used as the main reference book:

- Zhu Han et al., Game Theory in Wireless and Communication Networks: Theory Models and Applications, Cambridge University Press, 2012

EVALUATION:

Your final course grade is determined by your performance in assignments, term test, and a final examination. The weighting of each of these components is as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Seminars	4	40%		
Final Exam	1	40%		
Project	1	20%		
TOTAL		100%		

INSTRUCTOR INFO:

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VOLUNTARY WITHDRAW:

<http://umanitoba.ca/student/records/registration/Summer.html>

REQUIREMENTS/REGULATIONS

- **Student Responsibilities:** It is the responsibility of each student to contact the instructor if he/she is uncertain about his/her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, and attendance and withdrawal.
 - **Lectures:** Students must satisfy each evaluation component in the course.

ACADEMIC INTEGRITY:

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that **plagiarism* or any other form of cheating** is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university) regardless of media

- examinations
- assignments
- laboratory reports
- term exams

A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty

***Plagiarism:** to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source