ECE 7650: COMPUTER NETWORK SECURITY

COURSE OUTLINE

FALL 2014

COURSE DESCRIPTION:

This course investigates computer and network information security (CNS) systems. The course reviews fundamental principles of computer security, network security, and information security. It proceeds to investigate the current state of the provisions and policies adopted to monitor and prevent unauthorized access, misuse, and modification of computer network-accessible resources.

COURSE OBJECTIVE:

This course has the following objectives:

1. To understand the state-of-the-art protocols, architectures, and topological structures of CNS systems.
2. To understand how CNS research is done.
3. To investigate novel ideas in the area via research projects.
4. To learn how to write journal and conference papers in the area of CNS.

PRE-REQUISITES:

This course has the following pre-requisites:

- Basic computer networks, data networking and routing protocols
- Software languages for creating simulations of protocols: simulation tools would be beneficial (e.g., MatLab, NS2, OPNET)

CONTACT HOURS:

An equivalent of 3 lectures /week (3 credit hours).

COURSE CONTENT:

This course has the following content:

1. Introduction to computer, network, and information security.
2. Network security protocols, theory of secure message passing, methods of encryption, private networks, Data Encryption Standard, Public Key Cryptosystems, etc.
3. Current methods used for detecting threats and anomalies, evolution of computer security, types of security threats, hardware threats, software threats, physical threats, etc.
4. Industry viewpoint of computer and network security.

PAPER REVIEWS AND SEMINARS:

A student is required to review and give a presentation for three graduate-level research papers throughout the term. Students will be assigned papers to present approximately one week in advance of the presentation date. The format of the presentation will be given in the course notes.

PROJECTS:

Students are required to do a project in this course. The project must investigate a topic of research in CNS. Students must identify a problem with a current research paper, identify a method to improve it, design experiments to verify their conjectures, perform simulations of their improvements, compare their results with the results of the paper, and write a report.
TEXTBOOK:
This course provides online lecture notes and list of papers.

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:

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>NO</th>
<th>VALUE %</th>
<th>TOTAL VALUE</th>
<th>DETAILS / ADDITIONAL INFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars</td>
<td>3</td>
<td>30%</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>1</td>
<td>50%</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>1</td>
<td>20%</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

INSTRUCTOR INFO: LOS 3-AMIGOS SECURITAS:
Prof. K. Ferens, Ph.D., P.Eng.  Prof. B. McLeod, Ph.D., P.Eng.  Dr. P. Card
E1-544     E1-548     Research and Development Manager
474-8517     Seccuris Inc.
Ken.Ferens@umanitoba.ca  Robert.McLeod@umanitoba.ca  pcard@seccuris.com
Office Hours: TBA

VOLUNTARY WITHDRAW:
Nov. 12, 2014

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:** Attendance at lectures is essential for successful completion of this course. 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