CISC 3580 CYBERSECURITY AND APPLICATIONS
2018 Spring (Jan 16, 2018 - May 19, 2018)
Department of Computer and Information Science
Fordham University

Course Credits: 4.0
Prerequisite: Computer Networks, Computer Programming
Section: CISC 3580 R01
Instructor: Md Zakirul Alam Bhuiyan, PhD, SMIEEE (Alam for short)
Instructor Email: mbhuiyan3@fordham.edu, zakirulalam@gmail.com

Office Hours:

<table>
<thead>
<tr>
<th>@ RH, Room 328A:</th>
<th>@ LC, Room 610H:</th>
</tr>
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<tbody>
<tr>
<td>3:45pm - 5:30pm (T)</td>
<td>1:30 pm - 3:30pm (S)</td>
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<tr>
<td>3:45pm - 5:30pm (F)</td>
<td>1:00pm - 2:00pm (W) by appointment</td>
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<td>Other time: by appointment</td>
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COURSE DESCRIPTION

Rationale:
If a cyber-system is not secure, how valuable is it. With today’s increasing number of cyber threats and attacks, security becomes a critical issue and practical concern. This course provides an introduction to cybersecurity concepts, technologies, and related applications. It covers cybersecurity basics, public and private key cryptosystems, access control, firewalls, security protocols, malware detection, cyber-attacks, and related topics. The course features lectures, exams and case-based projects on cybersecurity in several areas including healthcare, finance, media, government, defense, critical infrastructure, and networks applications.

Outcomes:
1. Students will be able to identify the basics, terms, and definitions of cyber security
2. Students will be able to identify the elements of a cryptographic system.
3. Students will be able to describe the differences between symmetric and asymmetric algorithms.
4. Students will be able to describe potential system attacks and the actors.
5. Students will be able to describe cyber defense tools, methods and components.
6. Students will be able to describe different types of attacks and their characteristics.
7. Students will be able to describe appropriate measures to be taken should a system compromise occur.
8. Students will be able to describe common security models of malware detection systems.
9. Students will be able to identify and describe common security protocols.
10. Students will be able to learn major security issues in modern applications.

TOPICS

This course introduces essential cyber security topics, including:

- Lectures 1–3
  - Introduction
    - Course introduction
    - Introduction to cybersecurity
    - Cybersecurity basics
Lectures 4–6
- Cryptography Basics
- Public and private key cryptosystems

Lectures 7–10
- Cyber Threats and Attacks
- Methods and techniques

Lectures 11–12
- Cybersecurity and Access Controls
  - Database, OS

Lectures 13–17
- Cyber Defense
  - Firewalls and security protocols

Lectures 18–21
- Malware detection and protection

Lectures 22–the rest
- Cyber Security Applications

*Some topics ae subject to change

**Syllabus Change Policy:** The Syllabus is subject to change. This Syllabus is a guide for the course and is subject to change with advance notice. Mid-term, final, class engagement, and group discussion will be performed in the class.

**Textbook:**


**Homeworks/Quizzes:**
Homeworks/assignments are an important part of the class, and should be completed on time. Scores will be decreased for late submissions. There would be 4-6 homework assignments. These may take several forms: problem sets, MCQ type questions, short write-ups of supplemental readings, and in-class quizzes and in-class class participations. There may be several quizzes during the semester to ensure that the readings are completed on time. Some homework assignments may require the applications of cyber security related problems (will be introduced in the class). There can also be 1-2 lab/programming assignments.

**Exams:**
There will be mid-term exam and final exam during the semester.
COURSE PROJECT

**Project Overview:** The course will include a course project. Participants will identify and investigate problems of current interest in the scope of cyber security. The instructors may come up with some innovative project topics and related resources (paper, slides, source code, whatever available). If you agree with one of the topics, you are responsible for working and putting up on the topic. The instructor can also help you if you are having trouble to figure out how to work. Depending on the chosen topic, students will do an extensive survey on the topic, prepare taxonomies, compare state-of-the-art works/approaches, recommend future research issues and make result comparisons.

**Requirement:** You may work in a group of 3-4. Under the guidance of the instructor, each group will choose a project topic by the **third lecture day** of the semester and write their names at the field of their chosen topic in an **online topic-sheet**. Later, each group will send a progress report to the instructor around the **specified day**. Group discussion will be made in the class on a specified day. In addition, each team will submit a written project report, including documentation of any hardware or software systems developed as part of the project, at the end of the semester.

**Materials:** On the blackboard, the project guidelines, including the project writeup, samples, and templates will be given at some point of time, as required.

**Rewards:** Students with well-developed project works will be helped and invited to submit their works to an international forum, workshop, conference, or journal venue for publication/recognition. Having recognition of your work will be helpful for your professional career.

**Deliverables:**
- Project team will choose a topic or write their choice, and give their names in an online sheet.
- Project teams will send a rough progress report to the instructor by the specified day, including a) written component, b) milestones achieved to date, and c) roadblocks faced and how they affect the project goals.
- Project teams will send a draft of the project report (70-80%) to the instructor by the specified day.
- The final project deliverable at the end of the semester has two parts: 1) a written report, not to exceed 15 pages in length (in IEEE Journal format, not counting documentation) and source files used (images, figures, tools).

**Timeline (tentative):**
- Jan 23: Project topic & group name due (online) (will be removed after Jan 23)
- Feb 09: Open group discussion/participation class (ongoing project work)
- Feb 23: Mid-term exam
- March 20: Project work progress (to be sent to the instructor’s email)
- April 27: Final Exam
- April 30: Project report draft (~80%) (to be sent to the instructor’s email) (3.5 months)
- May 1: Comments and group discussion class on the printed draft
- May 08 (no extension): Final project report due
- May 12: Final grade submission to the BB (to be submitted to the BB)
- May 18-20: Invitation to improve good quality of project work for publication/recognition:
EVALUATION/GRADING

The percentages given below are guidelines for both the participant and instructor and may be changed as needed to reflect circumstances in the course. Any changes that occur during the semester are likely to be minor.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Quizzes/Participation</td>
<td>10%</td>
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<tr>
<td>Homeworks/Assignments (including lab/programming assignments)</td>
<td>15%</td>
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<tr>
<td>Mid-term Exam</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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<tr>
<td>Project Report (timely submission)</td>
<td>25%</td>
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<tr>
<td><strong>Total</strong></td>
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Grading of the Project Paper/Report will be based on the following criteria:

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<tr>
<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>Abstract &amp; Introduction</td>
<td>4</td>
</tr>
<tr>
<td>Taxonomies</td>
<td>3</td>
</tr>
<tr>
<td>Technical description (~2 Sections)</td>
<td>4</td>
</tr>
<tr>
<td>Evaluation/Result discussion/Conclusion</td>
<td>3</td>
</tr>
<tr>
<td>Recommend Research Issues/ Conclusions</td>
<td>2</td>
</tr>
<tr>
<td>Presentation &amp; Novelty</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
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COURSE POLICY

- **Attendance and class participation.** Students are expected to attend all classes and to actively participate in the classes since this will make the course more interesting for everyone. If a class is missed for any reason, the participant is responsible for finding out the material covered, any assignment and handouts given, and any other announcements made in the class (e.g., assignment). Late class attendance will be counted as half and missing class/quiz will be counted zero.

- **Homeworks/assignments.** These should be submitted at the beginning of the class on the corresponding due date. You may discuss homework assignments with classmates but all solutions must be original and individually prepared.

- **Late Work.** Late work (homeworks, proposal, final report) will generally not be accepted. If you are going to miss classes or will not have a work completed on time, whenever possible let the instructor know beforehand—the instructor tends to be more lenient in such cases (at least if you have a reasonable
excuse). Unless approved by the instructor in advance of the due date, late work will automatically be graded down by one step (i.e., 5%) for each day it is late.

- **Make Up:** Generally, no make-up exam will be allowed except in cases of emergencies for which prior permission of the instructor must be taken.

- **Academic Dishonesty:** All works produced in this course (including homework, exam paper, project) should be your own (in your own word) unless it is specifically stated that you may work with others. All ideas, paraphrases of other people's words must be correctly attributed in the body of the report and in the references. You may discuss the homework problems with other students generally, but may not provide complete solutions to one another; copying of homework solutions is always unacceptable and will be considered a violation of Fordham's academic integrity policy. Violations of this policy will be handled in accordance with the university policy which includes automatic failure of the assignment or failure of the course.

For the novelty check, course students agree that, by taking this course, all required reports/papers may go through similarity review (detection of plagiarism). Participant are responsible for any plagiarism (statement, paragraph, figure, etc.).

- **Project Concern.** Please let your instructor know immediately if you have any concern in not doing a course project that may requires special arrangements.

- **Participant with Disabilities.** Please talk to your instructor if you have a disability that requires special arrangements/accommodation. If you believe that you have a disability that may interfere with your ability to participate in the activities, coursework, or assessment of this course, you may be entitled to accommodations. Please schedule a meeting to speak with someone at the Office of Disability Services (Rose Hill - O’Hare Hall) Lower Level, x0655 or at Lincoln Center – Room 207, x6282).

**BLACKBOARD**

This course will make extensive use of blackboard and all assignments—and many supplemental readings—will be located there.

------------------------------------------ Good Luck! ------------------------------------------