

## CISc 661-90-O-2017– Principals of Cybersecurity and Cyberwarfare - Syllabus

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**Instructor**

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**Office Location**

Online

**Office Hours**

By Appointment

**Course Overview**

This course provides a systematic approach to understanding the principles of cyberwarfare and cybersecurity. Students will learn how to identify the elements of war and security, the art of offense and defense.

Students will learn about, and use, tools and penetration testing methodologies used by war planners and cyber defenders.

Students will also learn about the ethical and legal issues pertaining to penetration testing, including federal and state computer crime laws, as well as penalties for illegal computer hacking.

**Course Goals and Learning Objectives:**

The objective of this course is to provide the student with an understanding of what the cyber world is, the causes for cyberwar, the tools for protection, attack and defense methods and protect cyber infrastructure.

- Describe the role of an attacker
- Understand war and war objectives
- Plan network and infrastructure foot-printing and reconnaissance exercises
- Scan networks to discover potential weakness and vulnerabilities, and identify exploitable weaknesses
- Enumerate systems in an infrastructure
- Understand the ways to plan exploitation of MS Window and \*nix systems
- Explain the way Trojans and backdoors work, and be able to design and inject simple backdoors (using Metasploit)
- Identify viruses and worms by analyzing system behavior, and exploit them to gain access to systems
- Describe network and system sniffers in detail
- Plan social engineering attacks
- Explain how denial-of-service attacks work, and protection mechanisms against such attacks
- Describe session hijacking attacks
- Enumerate different ways to attack web servers and web applications, and demonstrate at least a few successful attacks against default-configured web servers and web applications
- Detail the functionality of SQL injection attacks and demonstrate how they work through live (in lab) examples
- Enumerate the various methods in prevalence to hack wireless networks
- Explain buffer overflow attacks
- Describe firewall technology and firewall configuration tools.
- Describe intrusion detection and prevention systems and Web filtering technology

- Explain the purpose of honeypots.

**Note students with disabilities:** It is Harrisburg University's policy is not to discriminate against qualified students with documented disabilities. It is also your instructor's policy to try and help students learn by whatever reasonable means necessary. If you have a disability related need that requires a modification in your testing situation, please notify your instructor a week before the first test or quiz so that your need can be accommodated. You may be asked to present documentation that describes the nature of your disability and the recommended remedy.

### Preferred Text

Cybersecurity and Cyberwar: What Everyone Needs to Know by *P.W. Singer and Allan Friedman*  
ISBN-13: 978-0199918119

### Supplemental Text

1. TCP/IP Tutorial and Technical Overview. IBM.Com/Redbooks. By *Britt, David, Davis, Chuck, Forrester, Jason, & Liu, Wei, Parziale, Lydia. (2006).* ISBN 0738494682  
<http://www.redbooks.ibm.com/redbooks/pdfs/gg243376.pdf>
2. Mastering Kali Linux for Advanced Penetration Testing by *Robert W. Beggs* ISBN 978-1-78216-312-1
3. Mastering Metasploit by *Nipun Jaswal* ISBN 978-1-78216-222-3

### Required Hardware and Software

#### • Hardware

Laptop with minimum 4 GB (recommended 8 GB), dual core CPU, 250GB free hard drive space, capable of running multiple virtual machines, additional external USB wireless network adapter

#### • Software

- Metasploit with Armitage
- Kali Linux (current version – currently 2.x)
- The remaining tools will be discussed and detailed during class

## Assignments and Grading Policy

Your grade is based on 100 possible points. You earn points with your participation, assignments, quizzes, essays and projects (see below).

**A:** 93 to 100; **A-:** 90 to 92; **B+:** 87 to 89; **B:** 83 to 86; **B-:** 80 to 82;  
**C+:** 77 to 79; **C:** 73 to 76; **C-:** 70 to 72; **D:** 60 to 69; **F:** 0 to 59

**A:** exceeded expectations, work above what is required, superior  
**B:** met all expectations as specified for the class in a professional manner  
**C:** met minimum class requirements  
**D:** did not meet minimum requirements but shows evidence of improvement  
**F:** did not meet minimum requirements and must repeat the course.

## Policy for Determining Final Grades

Because of the nature of this class, a holistic grading routine will be used. It is expected that a student will improve throughout the semester. Therefore, growth is an important consideration. Additionally, the grade will be based upon both individual and team efforts. You earn your grade but I will assign it. The criteria for each assignment will be discussed in detail, as well as the grading scheme. Each written assignment will be evaluated on how well it addresses the questions posed, the clarity of thinking, the organization and presentation of the material, the quality of writing, and its timeliness. In fairness to all students, grading is based on output, not input.

## Policy on Participation

Regular attendance and participation in class discussions is expected. Classes will begin on time and students are expected to attend all classes and to have fully prepared all assignments prior to class. **Failure to do so will have negative grading consequences.** Research on college success demonstrates that class attendance is a significant factor in student success. Considerable material will be covered during each class session. There will be discussion of assignments and handouts may be distributed. Therefore, lecture attendance will be calculated into your participation grades. If a student must miss a class, it is his/her responsibility to get the notes and assignments and any handouts, etc. from a classmate preferably prior to the next class period.

## Policy on Extra Credit

I do not offer extra credit.

## Policy on Late Assignments

Due dates are listed on the attached Course Schedule. Reading assignments that are pertinent to individual units are listed on the Course Schedule. It is your responsibility to keep current and read all relevant assignments before they are used in class. **Late assignments will NOT be accepted - Absolutely no exceptions.** I would rather you tell me you need more time for an assignment than attempt to turn it in late with no forewarning from you.

## Extreme Event Contingency

In the event of an extreme event (weather, power, etc.) that would cause the official closing of the University and normally result in the cancellation of classes, I may choose to move class activities online. Check the Moodle course page for specific directions on when and how to participate in class during extreme events.

Online, synchronous courses will be held regardless of extreme events, unless the event interrupts electricity for me, and/or for a majority of students. Check the Moodle course page for specific directions on how to participate in an online, synchronous class during extreme events.

Online, asynchronous courses are not impacted by extreme events unless otherwise indicated.

In the case of any doubt, please DO NOT presume – call/email me, check the Moodle page or contact the University office for the proper course of action.

## COURSE PRINCIPLES

Course delivery may include the following: classroom lecture, out of classroom experiential learning, individual and group research, peer review, group discussion, weekly quizzes, midterm examination, final examination and a final lab practical examination.

This course requires both team and individual work. Students are expected to:

- Actively participate in classroom discussions;
- Actively work as a team when required;
- Actively participate in group discussions on Moodle covering weekly topics covered in class;
- Actively participate in laboratory assignments;
- Do additional research and reading as needed for the project work.

## Writing Genres

All essays and citations should be in APA style. I will deduct points from any submissions that deviate from the APA style. **For any written assignment that has a misspelling, the grade for that assignment will be a zero.** For some help in determining APA style, see:

- An excellent APA crib sheet.
- The official APA Style website from the APA.

## HU CORE COMPETENCIES

At the conclusion of this course a student will have met the following core competencies that reflect HU's mission:

**Critical Thinking and Problem Solving** skills are demonstrated by the student's ability to:

- Identify and clarify the problem
- Gather information
- Evaluate the evidence
- Consider alternative solutions
- Choose and implement the best alternative.

**Communications** skills are demonstrated by the student's ability to:

- Express ideas and facts to others effectively in a variety of formats, particularly written, oral, and visual formats
- Communicate effectively by making use of information resources and technology

**Teamwork and Collaboration** The ability to work effectively with others in a concerted effort toward a common goal. Those showing effective skills at collaboration will demonstrate an aptitude in:

- Recognizing how to maximize a group's efficiency through the strengths of individual group members
- Planning and realistic goal setting
- Displaying individual responsibility to the whole
- Recognizing inter-individual skills to find best solutions

**Ethical Decision Making** The realization and inclusion of the moral dimension for personal decision-making. An ethical citizen will demonstrate the ability to -

- Evaluate the consequences of fair and unfair actions.
- Demonstrate awareness of diverse opinions and dissimilar viewpoints

## STUDENT ASSESSMENT TECHNIQUES

The following forms of assessment will be used to determine your grade in this course:

Assignments, Projects and Exams		
Activity	Weight	Due Date
Homework, Labs, Discussions	25%	Throughout Semester
Quizzes	25%	Throughout Semester

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Mid-Term Examination	25%	Monday, 10/27/2014
Final Examination	25%	Wednesday, 12/17/2014

### STUDENT SUPPORT

Problems happen to people when they are least expected. If any problems arise that you expect could impact your work in this course -- **PLEASE CONTACT ME AS SOON AS POSSIBLE! I want to see every student succeed -- but I can only help if I know as soon as possible!**

### Other Resources

- **Research resources and Library** (Contact [Library@HarrisburgU.edu](mailto:Library@HarrisburgU.edu))
- **Academic Success Services** (Contact [Tutoring@HarrisburgU.edu](mailto:Tutoring@HarrisburgU.edu)) Smarthinking® online tutoring, University Seminars, Campus Toolkit, Group study sessions, Individualized tutoring with student tutors, GRE study groups, Lynda.com online software tutorials
- **Advising** (Contact [Advising@HarrisburgU.edu](mailto:Advising@HarrisburgU.edu)) Individualized advising: time management, study skills, goal setting; Student advocacy; Grade appeal/grievance process
- **Career Services** (Contact [CareerServices@HarrisburgU.edu](mailto:CareerServices@HarrisburgU.edu)) Resume and cover letter review, Mock interviewing (scheduled events), Job search tips, Internship information, Junior and senior project referrals, Career counseling, Business mentor program, Assistance with graduate and professional school applications
- **Personal/Health Issues** (Contact [Counseling@HarrisburgU.edu](mailto:Counseling@HarrisburgU.edu)) Referrals to counseling and other services, Student Health 101, Information about ADA accommodations
- **Student Life** (Contact [StudentLife@HarrisburgU.edu](mailto:StudentLife@HarrisburgU.edu)) Information on student clubs, Club charter/formation information, Campus jobs

### STATEMENT ON ACADEMIC INTEGRITY - THE HU HONOR CODE

According to the University's Student Handbook: Academic integrity is the pursuit of scholarly activity free from fraud and deception, and is the educational objective of this institution. Academic dishonesty includes, but is not limited to cheating, plagiarism, fabrication of information or citations, facilitating acts of academic dishonesty by others, unauthorized possession of examinations, submitting work of another person, or work previously used without informing the instructor, or tampering with the academic work of other students. Any violation of academic integrity will be thoroughly investigated, and where warranted, punitive action will be taken.

Students should be aware that standards for documentation and intellectual contribution may depend on the course content and method of teaching, and should consult the instructor for guidance in this area.

We as members of Harrisburg University community pledge not to cheat, plagiarize, steal, or lie
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in matters related to academic work. As a Community of Learners, we honor and uphold the **HU Honor Code**.

**Any violation of the HU Honor Code will result in your immediate failure in this course.**

**IGNORANCE IS NO EXCUSE FOR VIOLATION OF THE HU HONOR CODE.**

## STUDENT CONDUCT

A few rules will help you to get the most of your investment in this course:

- Classes will start on time and end as scheduled. Please take your seat prior to the start of class.
- You will attend each class and actively participate in the discussions during class. If you are uncomfortable with public speaking, or if English is not your native language, please talk to the instructor in the first two weeks of the course to establish ways to make you more comfortable in speaking and interacting with other students (your peers).
- For every hour of class time, I anticipate that you will need to budget about 2-3 hours of out-of class time. This implies that you need to budget about 120 hours of out-of-class time over the course of the semester. This time estimate is a guide and you may need to budget more or less based on your individual performance. For example, if the material is new to you or difficult to comprehend, it will require more of your time.
- You are responsible for all the readings, even if the material is not explicitly covered in class. You should read the class materials prior to class and be prepared to discuss and ask questions about the readings and quiz materials. You should also re-read the material after class as not every topic will be covered during class time. Many passages in the text may need to be read several times to gain clarity. Also, taking notes on the material you are reading and reflecting on the reading and these notes will help you better understand the issues, concepts and techniques that are being presented.
- All work must be completed and turned in on or before the assigned date. No late work will be accepted. Late means after the class has begun. Note that a computer's failure is not an excuse (it represents poor planning on your part).
- All work must be done using a word processor. Carefully proofread your work, since mistakes, which include spelling errors, grammatical errors, and typos will affect your grade.

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- Your work should be properly referenced and adhere to standards of both academic integrity and proper form. Generally, I prefer the APA style (see [www.apastyle.org](http://www.apastyle.org)).
- All class credit-related electronic mail must be done using Harrisburg's electronic mail service and the student's assigned Harrisburg University ID. Students are welcome to use Yahoo mail, Hotmail or any other service for their private non-class-related use. By 'credit-related' I mean all work to be evaluated for credit. Any work submitted through a different mail system will not be accepted.

***NOTE: If you use a friend's computer - be sure to change the identity information so that the work comes through YOUR account! Work will not be accepted if it does not come from the student's Harrisburg University account.***

- When individual work is assigned, you should do it, alone.
- Students who participate in University-sanctioned events (such as athletics or clubs) must make prior arrangements and give the instructor ample notice. Missing class for practice is not advised.

## COURSE SCHEDULE

This list represents the initial plan for CISc 370. Please note that it is merely a ***plan***. **Actual dates may change due to weather, illness or other unforeseen problems.** Please use this as a guide.

### Important Notes:

- All quizzes delivered via Moodle will be completed outside of class with a cutoff time of 11:45 pm on the quiz due date. All quizzes will have a time limit of 30 minutes.



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- You may use ANY resource available to you (except another person) when taking a quiz.
- In the 'Readings' section, reading assignments are what you need to read prior to that class. I have been known to give un-announced pop quizzes, so I highly recommend that you read any required readings prior to class.
- For homework, case projects and/or group discussions in Moodle, the cutoff time will always be 11:45 pm on the due date.
- You **WILL** need the textbook for this class. (Electronic version is fine if it is available)
- Most chapters will have a corresponding lab exercise, which will utilize virtual machines. The mid-term and final exams may have a practical examination component, so you will need a reliable and capable computer for this course.
- Read your book. PowerPoint slides are NOT enough to let you understand the concepts of ethical hacking.
- I may omit or only briefly discuss some material. However, you will be responsible for knowing all the assigned material for the quizzes and tests unless I make explicit announcements excluding some material.
- Check Moodle and your e-mail account at least once a day on weekdays. The e-mail sending will be minimized unless it is very urgent. Therefore, make sure you access Moodle and download the files/information on a regular basis.
- Submit homework, quizzes, and/or tests on time. Late submissions will NOT be accepted.
- Show your etiquette (sometimes called 'netiquette') for online discussions, email, and other forms of communication, such as appropriate interaction on cyberspace like in a face-to-face learning environment. For more information, please check <http://www.albion.com/netiquette>
- Be responsible and courteous. Your email should start with my title and last name ahead of your concerns or questions. I will not respond to any email with only 'Hi' or 'Hello' nor will I reply to any email asking me about information (e.g., submission dates) given in the syllabus.
- I will appreciate any feedback regarding the course any time. If you have any suggestions, comments, complaints, or compliments about the course, please let me know. I promise that your feedback will not be used in any way to your detriment. If you do not want to reveal your identity, you may send me an anonymous note.

**Please let me know if you do not understand something that is covered in the text or in any other required reading!**

<i><b>Week</b></i>	<i><b>Date</b></i>	<i><b>In Class</b></i>	<i><b>Activity</b></i>
<b>1</b>	Jan 9 2017	Information Gathering The definition of cyber infrastructure	1 <sup>st</sup> assessment

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<b>2</b>	Jan 16 2017	Vulnerability Analysis The cyberworld – knowledge gap, and its importance	Assignment 1
<b>3</b>	Jan 23 2017	Web Application Analysis Understanding the full world-wide-web	Quiz 1/Project 1
<b>4</b>	Jan 30 2017	Database Attacks Internet Governance	Assignment 2
<b>5</b>	Feb 6 2017	Password Attacks Understand cyber threats	Assignment 3
<b>6</b>	Feb 13 2017	Wireless Attacks Establishing trust in cyberspace	Quiz 2, 2 <sup>nd</sup> assessment
<b>7</b>	Feb 20 2017	Review of learning	Assignment 4
<b>8</b>	Feb 27 2017	<b>Open discussion and Midterm Review</b>	Midterm Exam
<b>9</b>	Mar 6 2017	Reverse Engineering Hacktivism	Assignment 5
<b>10</b>	Mar 13 2017	Exploitation tools RATs	Quiz 3/Project 2
<b>11</b>	Mar 20 2017	Sniffing and spoofing Cyber terrorism	Assignment 6
<b>12</b>	Mar 27 2017	Post Exploitation Cyber counter-terrorism	Assignment 7
<b>13</b>	Apr 3 2017	Forensics Policy and world politics	Quiz 4 3 <sup>rd</sup> assessment
<b>14</b>	Apr 10 2017	Reporting tools Reframing the legal debate	Assignment 8
<b>15</b>	Apr 17 2017	Review	
<b>16</b>	Apr 24 2017	<b>Final examination</b>	<b>Final Exam</b>