Course Syllabus

Edit

MIAMI UNIVERSITY

CSE 470/570 Ethical Hacking
Department of Computer Science and Software Engineering

Course Information:

- **Instructor**: Dr. Suman Bhunia
  - E-mail: bhunias@miamioh.edu
  - Office: 380 McVey Data Science Building
  - Phone: (513) 529 0339
  - Office hours: Wednesday & Friday, 3-4 PM. If you can't make it to my office during hours, meet me after the class or send me an email to schedule a meeting.
- **Class Interaction:**
  - **Section A**: Wednesday & Friday 11:40 am to 1 pm - 365 McVey Data Science Building
  - **Section B:** Wednesday & Friday 1:15 to 2:35 pm. - 365 McVey Data Science Building
- **Course Site**: Canvas
- **TA help sessions**:
  - Owen Campbell (campbeo2@miamioh.edu) TBD.
  - Zoom Link:
- **Required Materials:**
  - **Textbook: CEH v10 Certified Ethical Hacker Study Guide by Ric Messier, Wiley (https://www.wiley.com/en-us/CEH+v10+Certified+Ethical+Hacker+Study+Guide-p-9781119533191)**

Available online at: https://learning.oreilly.com/library/view/ceh-v10-certified/9781119533191/f01.xhtml

- **Reference Book:**
  - **Computer Security: Principles and Practice by by William Stallings and Lawrie Brown (https://www.amazon.com/dp/0134794109/ref=cm_sw_em_r_mt_dp_eKTQFbCH5T585)**
  - **Hacking: The Art of Exploitation by Jon Erickson, 2nd Edition (https://www.amazon.com/Hacking-Art-Exploitation-Jon-Erickson/dp/1593271441)**
  - **Gray Hat Hacking: The Ethical Hacker's Handbook (https://www.amazon.com/dp/0071742557/ref=cm_sw_em_r_mt_dp_UkBQFb5TCSB9W)**

Important dates:

Wed 31 Jan	First day of class
Fri, Mar 8	Tentative midterm exam
Mar 25-31	Spring Break
Apr 22	Last day to withdraw from course (course grade will be “W”)
May 13-17	**Final exams**

Course Description

Overview:

This course is designed to provide students with the opportunity to gain hands-on experience in cybersecurity tools. The students will also learn the principle of ethical hacking. The course will cover the

exploitation of computer and network vulnerabilities, monitoring tools, and implementing defensive measures.

Prerequisites:

- CSE 278 (Systems I: Introduction to Systems Programming)
- CSE/CIT 262 (Technology, Ethics, and Global Society)

Student Learning Objectives:

1. Describe information security standards, guidelines, compliance, and policy.
2. Interpret professional and ethical responsibility and best practices of cybersecurity.
3. Demonstrate security threats, risks, vulnerabilities, safeguards, and countermeasures.
4. Apply security best practices to prevent malicious activities.
5. Develop ethical hacking techniques to assess and protect systems' resources.
6. Analyze and evaluate a system to find the vulnerabilities and security status.
7. Design and deploy safeguards and countermeasures to mitigate cyber threats.
8. Graduate Student extra outcome: Analyze and document a case study on a security breach.

Tentative topics:

(actual offering might be less)

1. Review of TCP/IP protocol stack
2. Security Basics
    - Security foundations
    - Ethics - Penetration testing agreement and legal issues
3. Reconnaissance
    - Open-source intelligence
    - Domain naming service
    - Kali Linux installation and overview
    - Packet manipulation tool
4. Vulnerability scanner
    - Ping sweeps

- Packet sniffing
- Port scanning

5. System Hacking
    - Metasploitable VM and framework
    - vulnerability database
    - Exploit application layer network protocols
    - Password cracking
    - Privilege escalation
6. Malware
    - Virus, worm, trojan
    - Botnet and DoS
    - Malware analysis
7. Wireless and mobile Security
    - WiFi WEP breaking
    - Bluetooth
    - Mobile device attacks
8. Attack Defense
    - Firewall
    - Intrusion detection
    - Intrusion prevention
9. Security architecture design
    - Security models
    - A guest lecture from industry personal.

Course Grading

Measures of Evaluation

Undergraduate		Graduate	
Deliverable	**Weightage**	**Deliverable**	**Weightage**
Midterm exam	25%	Midterm exam	25%
Final Exam	20%	Final Exam	20%
HomeWorks	20%	HomeWorks	15%
Labs	20%	Labs	15%
Quizzes	15%	Quizzes	15%
		Project	10%
Total	100%	Total	100%

Exams: There will be one midterm exam and one final exam. All exams are cumulative, closed-book. **No make-ups for missed exams**. If you are absent on an exam, your grade for that exam will be zero.

HomeWorks: There will be homework on alternate weeks throughout the semester.

Labs: The content covered will be applied through guided lab/ project assignments every alternate week.

Quizzes: Online quizzes are given using the course website.

Assignment Submission Policies:

- All assignments must be submitted through Canvas only. Submissions sent by e-mail, and so on will not be accepted.
- **Late Submission:** One day late submission will result in 15% grade reduction, Two day late submission will result in 30% grade reduction. No submission will be accepted two days after the due date.
- **Always back up your electronic work!** Computer/network failures are a fact of life and are not justification for an extension. WRITE YOUR ANSWERS ALONE…learn to help one another without sharing any code.
- If you are submitting a scanned copy of a handwritten page, please scan it properly and make sure all the contents are clearly readable.

Letter Grading Conversion:

Grade	Percentage Range	Grade	Percentage Range	Grade	Percentage Range

A+	97-100%	A	94-96.9%	A-	90-93.9%
B+	87-89.9%	B	84-86.9%	B-	80-83.9%
C+	77-79.9%	C	74-76.9%	C-	70-73.9%
D+	67-69.9%	D	64-66.9%	D-	60-63.9%
F	Less than 60%				

Class Policies

Code of Ethics

the students must read the following code of ethics and comply with it.

1. I agree to abide by all federal, state, and school laws.
2. I agree that my research and practice of techniques at this course are purely for academic and educational purposes. They will only be used responsibly in order to further my understanding of security.
3. Everything learned and used in this course will not be used maliciously unless there is consent from all parties involved. Malicious activity includes, but is not limited to, stealing information and data, accessing systems not owned by yourself, and attacking networks.
4. Respect personal privacy - do not use others' resources or view their information without their consent.
5. I will not become involved with any black hat societies during my time in this course.
6. I will fully acknowledge the intellectual property of others, and will never claim another's work as my own - whether it be from a cohort or from elsewhere.
7. Act with appropriate confidentiality when working on projects related to this course. Any information obtained from outside parties must be handled according to their wishes.
8. I will avoid and be alert to any circumstances or actions that might lead to conflicts of interest or the perception of conflicts of interest.
9. I will not advance private interests at the expense and/or detriment of others.
10. I will not withhold any knowledge of software/network vulnerabilities that may result in damage from the appropriate software authors/network administrators. In addition, I will withhold knowledge regarding these vulnerabilities to anyone else until they are rectified.

11. I understand collaboration regarding any cases violating these rules can potentially implicate me.
12. Should I choose to break any of the above rules, I understand that I may be passed to higher authorities for appropriate punishment in addition to being dropped out of this course. This will, of course, depend on a case-by-case basis.
13. I agree to cooperate with the instructor in an investigation if I am suspected of violating any part of the Code of Ethics. Should I feel the investigation is unwarranted in any way, I will report the instructor's actions to the office of Security, Compliance, and Risk Management.

Class Attendance Policy

Unexcused absences are not allowed in this course. In case of an absence, inform the instructor beforehand, if possible, and submit any work due on time. For more information, refer to Chapter 9 of the *Student Handbook.* Should a student become ill, it is the responsibility of the student to contact the instructor and keep the instructor appraised of the situation.

Taking notes

- You will sometimes be provided with electronic presentations to give you basic information. These are not a substitute for taking notes.
- Take notes during videos and activities.
- Lab activities often depend on using what you wrote in your notes.
- "Good notes" does not mean "Write everything". Be selective.
- Focus on writing sample code, diagrams, "notes to self".

Course Webpage & Communication

All course content (slides, videos, announcements, handouts, assignments, etc.) will be posted on the Canvas page for this course. We will use Canvas for all assignment submissions, as well as for the use of discussion boards, grading, and other means of communication. **You should ensure that your settings enable you to receive course announcements directly to your Miami email address so that you are immediately notified of any updates.**

Lecture Capture

Please be aware that classes might be recorded and shared only with students in this class. Students are not allowed to reshare the course lecture recordings.

Copyright Disclaimer

Course materials provided to you, including presentations, tests, outlines, and similar materials, are copyright protected by the faculty member(s) teaching this course. You may make copies of course materials solely for your **own use**. You may not copy, reproduce, or electronically transmit any course materials to any person or company for commercial or other purposes without the faculty member's

express permission. Violation of this prohibition may subject the student to discipline/suspension/dismissal under Miami's Code of Student Conduct or Academic Integrity Policy.

Usage of assistive AI tools

Using AI tools (e.g., ChaptGPT, Copilot, etc.) to write your code for your assignments is not permitted. You can, however, use these tools as a tutor. Appropriate questions include: "What tool is used for network scanning?." Please note that you will need to write answers and code without the aid of online resources on all assignments.

Student Resources

Support for Students

As an instructor, I have a **duty to report (https://www.miamioh.edu/policy-library/employees/general-employment/non-discrimination/duty-to-report.html)** . This means I am required to promptly report to the Deputy Title IX Coordinator (**titleix@miamioh.edu (mailto:titleix@miamioh.edu)**) any information a student shares with me regarding harassment, discrimination, sexual misconduct and interpersonal violence, or retaliation. **A report does not initiate an investigation. It engages a discussion of your resources, supportive measures, and options available.** If students want to speak with someone confidentially, the following resources are available on and off campus:

- Student Health Services, (513) 529-3000
- Student Counseling Services, (513) 529-4634
- Women Helping Women (WHW) Sexual and Interpersonal Violence Support Specialists are available to support all students and can be contacted by emailing mu@womenhelpingwomen.org. As well as calling/texting 513-846-8402 between 9AM-5PM. The 24-hour hotline is 513-381-5610. WHW supports ALL survivors of dating/domestic violence, sexual assault, and stalking, regardless of gender identity or sexual orientation.

Speaking with a confidential resource person does not preclude students from making a formal report to the University if and when they are ready.

https://miamioh.edu/diversity-inclusion/programs-resources/report-incident/index.html

For more information, please visit https://miamioh.edu/campus-safety/sexual-assault/ and https://www.miamioh.edu/diversity-inclusion/oeeo/index.html.

Accessibility Statement

Students with disabilities are encouraged to request reasonable accommodations. Student Disability Services (SDS) registration should be completed before the provision of accommodations. Please visit the Student Disability Services Website for more information. You can also contact SDS at 513-529-1541

or sds@miamioh.edu.
If you are eligible to receive accommodations, please schedule an office hours appointment at the beginning of the semester to discuss accommodation plans.

Mental Health Services

If you are a student experiencing mental or emotional distress, you are encouraged to call Student Counseling Service (513-529-4634). The Community and Counseling and Crisis Center (844-427-4747) has a 24-hour hotline for emergencies outside of business hours.

Academic Support

The following resources are available for you as a student:

- **Rinella Learning Center Academic Support. (https://miamioh.edu/student-life/rinella-learning-center/academic-support/index.html)**
- **Howe Center for Writing Excellence. (http://miamioh.edu/hcwe/)**
- **International Student Resources. (https://miamioh.edu/academics/intl-student-resources/index.html)**
- **Student Success Center. (https://miamioh.edu/emss/offices/student-success-center/about/index.html)**

Academic Integrity Information

You must read and understand the CSE department expectations for Academic Integrity,
http://miamioh.edu/cec/academics/departments/cse/academics/academic-integrity/index.html

The policy is copied below:

The Department of Computer Science and Software Engineering is committed to maintaining strict standards of academic integrity. The department expects each student to understand and comply with the **University's Policy on Academic Integrity (http://www.miamioh.edu/integrity/)** and the undergraduate student handbook and graduate student handbook. Students may direct questions regarding academic integrity expectations to their instructor or to the department chair. All work submitted must be original for that class. Submitting the same project for two different classes is grounds for charging a student with academic misconduct unless prior written permission is received from both instructors.

"Problem Solving Assignments" are assignments that involve programming, math, proofs, derivations, and puzzles.

The purpose of a problem solving assignment is for you to develop the skills necessary to solve similar problems in the future. \To learn to solve problems you must solve the problems and write your solutions independently.

It is worth reiterating that the important aspect of the assignment is that you actually create the solution from start to finish; simply copying a solution and then understanding it after the fact is not a substitute for actually developing the solution.

The notion of academic integrity can be confusing in courses with substantial problem solving because certain forms of collaboration and investigation are permitted, but you are still required to complete your assignment independently. The following scenarios are meant to help distinguish between acceptable and unacceptable levels of collaboration and research, but are not all-inclusive:

ACCEPTABLE:

- Consulting solutions from the current course textbook, but not from other published sources.
- Seeking help on how to use the programming environment such as the editor, the compiler, or other tools.
- Seeking help on how to fix a program syntax error or how a certain language feature works.
- Discussing strategies with a fellow student on how to approach a particular problem. This discussion should not include significant sections of completed work or source code (including printouts, email, viewing on a monitor). Discussions should begin with a clean sheet of paper and end with conceptual drawings and/or pseudo-code.

UNACCEPTABLE:

- Looking at another solution including those written by current students, past students, or outside sources such as code or solutions found on the Web or in publications other than the current class textbook.
- Using another solution as a starting point and then modifying the code or text as your own work.
- Providing a copy of your solution or a portion of your solution, in any form (electronic, hard copy, allowing another student to view your code on a monitor), to another student.
- Giving or receiving code fragments to fix a problem in a program.

If you are stuck on a problem, and you are tempted to search for a solution on the Web or to look at another student's solution, STOP and email or ask your instructor for help.

Penalty for Academic Dishonesty:

The default penalty for any instance of academic dishonesty in CSE will be a zero on the assignment, followed by a reduction of a full letter grade in the course. This will be the case whether the judgment is reached in the Office of Academic Integrity or by the department chair.

Miami University Learning Community

Miami University is committed to fostering a supportive learning environment for all students irrespective of individual differences in gender, race, national origin, religion, handicapping condition, sexual

preference, or age. Students should expect and help create a supportive learning environment free from all forms of prejudice. Disparaging comments, sexist or racist humor, or questioning the academic commitment of students based upon these individual differences undermines our learning community. If such behaviors occur in class, please seek the assistance of your instructor or department chair.