

**CYBR 615: Cybersecurity Vulnerability Assessment, Fall 2021**  
**Department of Computer Sciences and Electrical Engineering**  
**Marshall University**

**Course Information:**

- Instructor: Dr. Cong Pu (Ph.D., Assistant Professor)
- Office: Weisberg Applied Engineering Complex (WAEC) 3109
- Office Phone: (304) 696-6204
- Email: [puc@marshall.edu](mailto:puc@marshall.edu)
- Course meetings: Wed, 4:00 p.m. – 6:20 p.m., WAEC 3237
- Virtual office hours:
  - Important: All office hours will be held virtually during the COVID-19 pandemic.
  - Tentative office hours:
    - Mon, 8:00 a.m. – 11:30 a.m., 2:30 p.m. – 4:00 p.m.
    - Wed, 8:00 a.m. – 11:30 a.m., 2:30 p.m. – 4:00 p.m.
    - Or by appointment through email.
  - Students are expected to communicate with instructor to set up video meetings via Microsoft Teams.
- Course web page: MU Online (Blackboard) <http://www.marshall.edu/muonline/>.
  - It is important to visit MU Online (Blackboard) regularly for up-to-date course information.

**COVID-19 Related Information:**

- Marshall's official COVID-19 protocols are online at <https://www.marshall.edu/coronavirus>. Policies and protocols may change over time as we respond to changing conditions. The website will always contain the most recent information.
- Key policies at the start of the Fall 2021 semester include the following:

- **Masks are required for everyone in all public indoor spaces on university property, regardless of one's vaccination status.** These spaces include classrooms, labs, office suites, hallways, lobbies, stairwells, etc. Instructors may choose to teach either while wearing a mask or face shield or while standing behind the plexiglass barrier in the classroom.
- **In order to remain in in-person classes, students must sign the Marshall Return to Campus Student Agreement** that outlines public health expectations and University COVID-19 policies: <https://bit.ly/2VP3Naa>.
- **In order to remain in in-person classes for the Fall 2021 semester, students must submit their current vaccination status** in the online Student Vaccination Registry here: <https://mubert.marshall.edu/vaccinerecord.php>. The registry offers several possible responses, including an option to not disclose vaccination status.



- **Students will disinfect their personal workspaces and virtual learning hubs with disinfectant wipes provided nearby.**
- **Students who are unable to follow University requirements due to a disability** should seek reasonable accommodations from the Office of Disability Services (ODS) during the first week of class.

**Course Description: From Catalog**

- This course focuses on the complete cycle of Enterprise security from identifying vulnerabilities, detecting application exploitation and post exploitation mitigations and analysis for an enterprise level cyber infrastructure. (PR: None)

**Course Student Learning Outcomes:** The table below shows the following relationships: How each student learning outcomes will be practiced and accessed in the course.

<b>Course Student Learning Outcomes</b>	<b>How students will practice each outcome in this course</b>	<b>How student achievement of each outcome will be assessed in this course</b>
Students will be able to perform risk assessment.	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Example discussion</li> <li>• In-class exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Exam</li> </ul>
Students will be able to use various security testing and analysis tools.	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Example discussion</li> <li>• In-class exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Exam</li> </ul>
Students will be able to analyze common security loopholes and identify the cause.	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Example discussion</li> <li>• In-class exercise</li> </ul>	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Exam</li> </ul>

**Preferred Communication Method and Expected Response Time:**

- You can always meet with instructor via Microsoft Teams during virtual office hours, no appointment is required.
- Outside virtual office hours, 6 hours advance notice is required when scheduling an appointment. If you ask instructor to meet you on Microsoft Teams immediately, the answer will probably be “No”.
- You can generally expect an email response within 6 hours. If you do not get a response within 6 hours, please forward your previous email to instructor.
- You can generally expect the feedback on assignment and exam in one week after submission. If you do not receive the feedback in two weeks, please send an email to instructor.

**Required Textbooks, Additional Reading, and Other Materials:**

- A list of reference books will be used. For more information, please refer to the following resources:
  - Sean-Philip Oriyano. Penetration Testing Essentials. Pearson. 1st Edition. ISBN-10: 1119235308. ISBN-13: 978-1119235309.
    - Marshall Univ. has unlimited access to this book. Please visit Marshall Library, <http://www.marshall.edu/library/>

- Georgia Weidman. Penetration Testing: A Hands-On Introduction to Hacking. 1st Edition. ISBN-10: 1593275641. ISBN-13: 978-1593275648.
  - Marshall Univ. has unlimited access to this book. Please visit Marshall Library, <http://www.marshall.edu/library/>
- OWASP Testing Guide v4.
  - Download here, <https://www.owasp.org/images/1/19/OTGv4.pdf>
- William Stallings, Lawrie Brown. Computer Security: Principles and Practice. Pearson. 4th Edition. ISBN-10: 9780134794105. ISBN-13: 978-0134794105.
  - Marshall Univ. has unlimited access to this book. Please visit Marshall Library, <http://www.marshall.edu/library>
- William Stallings. Cryptography and Network Security: Principles and Practice. Pearson. 7th Edition. ISBN-10: 0134444280. ISBN-13: 978-0134444284.
  - Marshall Univ. has unlimited access to this book. Please visit Marshall Library, <http://www.marshall.edu/library>
- Important concepts/materials will be included in the lecture notes from various sources, and posted on MU Online (Blackboard).

#### **Course Requirements and Grading Policy:**

- **1<sup>st</sup> Exam: 10%**, Sep 29, Wednesday, 4:00 p.m. – 6:20 p.m., MU Online (Blackboard), WAEC 3237
- **2<sup>nd</sup> Exam: 10%**, Nov 03, Wednesday, 4:00 p.m. – 6:20 p.m., MU Online (Blackboard), WAEC 3237
- **3<sup>rd</sup> Exam: 10%**, Dec 08, Wednesday, 4:00 p.m. – 6:00 p.m., MU Online (Blackboard), WAEC 3237
  - All three (non-cumulative) exams are computer-based exams.
  - All three exams should be taken in the classroom (WAEC 3237). However, you can start exam wherever you want during exam time and SUBMIT on Blackboard.
  - Closed book and notes; Internet resources are not allowed.
  - There will be NO make-up for missing exam. Only university excused absences with appropriate and official DOCUMENTATION will be accepted for make-up exam. Please contact Student Affairs (<https://www.marshall.edu/student-affairs/>) for university excused absence documentation first, and then schedule make-up exam with instructor.
    - The make-up exam must be taken within two days after the scheduled exam.
  - If you take a conflict exam, you must talk to instructor and provide a valid document at least two weeks before the scheduled exam.
    - The conflict exam must be taken within two days after the scheduled exam.
- **Research Assignment: 30%**
  - Students are supposed to read the research paper, write a two-page report, and present the research paper.
    - Report and presentation should be prepared based on the provided criteria.
    - Presentation schedule and assigned research paper will be available on Blackboard.
  - Research assignment (two-page report and presentation slides) should be SUBMITTED on Blackboard before Due Date. *Other submission methods (i.e.,*

- email) will NOT be accepted.*
- LATE Submission will NOT Be Accepted on Blackboard since the submission link will be closed automatically after due date.
  - There will be NO re-submission for missing assignment. Only university excused absences with appropriate and official DOCUMENTATION will be accepted for assignment re-submission\*. Please contact Student Affairs (<https://www.marshall.edu/student-affairs/>) for university excused absence documentation first, and then contact instructor for re-submission.
    - \*The re-submission will be provided *if and only if* the duration of university excused absences is **equal to** or **longer than** the half of the time limit on the assignment.
  - Each student has unlimited submission attempts on Blackboard before due date. However, the instructor only grades the final submission attempt.
  - There will be NO re-submission if the student submitted the wrong assignment.
  - **Lab Assignment: 40%**
    - Lab assignment should be SUBMITTED on Blackboard before Due Date. *Other submission methods (i.e., email) will NOT be accepted.*
    - LATE Submission will NOT Be Accepted on Blackboard, since the submission link will be closed automatically after due date.
    - There will be NO re-submission for missing assignment. Only university excused absences with appropriate and official DOCUMENTATION will be accepted for assignment re-submission\*. Please contact Student Affairs (<https://www.marshall.edu/student-affairs/>) for university excused absence documentation first, and then contact instructor for re-submission.
      - \*The re-submission will be provided *if and only if* the duration of university excused absences is **equal to** or **longer than** the half of the time limit on the assignment.
    - Each student has unlimited submission attempts on Blackboard before due date. However, the instructor only grades the final submission attempt.
    - There will be NO re-submission if the student submitted the wrong assignment.
  - **Plagiarism:**
    - Plagiarism or cheating will not be tolerated in the class.
      - 1<sup>st</sup> plagiarism will result in zero point in the suspected work.
      - 2<sup>nd</sup> plagiarism will result in immediate dismissal (F grade).
  - **All grades will be posted on Blackboard:**
    - *You are highly suggested to check your grade on Blackboard frequently and notify instructor immediately if there is any grading error.*
    - Mid-term grade will be posted around October 11 (Monday)
      - October 22 (Friday), last day to drop an individual course.
      - Fall 2021 calendar: <https://www.marshall.edu/academic-calendar/fall-2021-semester/>
  - **Grade Scale:**
    - Actual points received in each category should be converted into category percentage.
    - For example, if you got 70/80 for 8 lab assignments, the percentage of assignment category will be  $(70 / 80) * 40 = 35 (\%)$ .
    - A (100 - 90), B (89 - 80), C (79 - 70), D (69 - 60), and F (59 - 0)
  - **Excuses**

- Because there is a degree of flexibility in completing items, it is your responsibility to keep track of dates and give yourself enough time for completion. If you wait until the last minute, there is no one to blame but yourself. With that said, I am also not heartless. If there is something that occurs which prevents your access to the course for a significant length of time (e.g., serious illness, death in the family, or personal tragedy) please contact me as soon as possible and we may be able to work something out. In this case, I will need verification, and it will be left to my discretion on its acceptability.

**Attendance and Classroom Policy:**

- Students are expected to attend punctually all class meetings, from the beginning of the semester until the end of the semester.
- If a student needs self-quarantine for 14 days due to COVID-19, make-up will be provided for exam or assignment that is due during self-quarantine period when the self-quarantine is over.
- If a student misses a class without university excused absence documentation, the student should not expect individualized instruction on what was missed. This will be effective from the beginning of semester.
- Students are expected to assist in maintaining a classroom environment that is conducive to learning. In order to assure that all students have the opportunity to gain from time spent in class, unless otherwise approved by the instructor, students are prohibited from engaging in any other form of distraction. Inappropriate behavior in the classroom shall result, minimally, in a request to leave class.

**Marshall University Policy:** By enrolling in this course, you agree to the University Policies. Please read the full text of each policy (listed below) by going to Academic Affairs: Marshall University Policies. (URL: <http://www.marshall.edu/academic-affairs/policies/>)

- Academic Dishonesty Policy
- Academic Dismissal Policy
- Academic Forgiveness Policy
- Academic Probation and Suspension Policy
- Affirmative Action Policy
- Dead Week Policy
- D/F Repeat Rule
- Excused Absence Policy for Undergraduates
- Inclement Weather Policy
- Sexual Harassment Policy
- Students with Disabilities (Policies and Procedures)
- University Computing Services Acceptable Use Policy

**Course Schedule and Important Dates:** Topics and/or dates may be changed during the semester at the instructor's discretion because of scheduling issues, developments in the discipline, or other contingencies.

- Aug 25: Welcome & Course Introduction
- Sep 01: Principles of Successful Testing and Testing Techniques

- Release Research Assignment 1
- Sep 08: Testing Framework and Penetration Testing
  - Research Assignment 1 Due
    - Report
    - Research Paper Presentation
  - Release Research Assignment 2
- Sep 15: Information Gathering
  - Research Assignment 2 Due
    - Report
    - Research Paper Presentation
  - Release Research Assignment 3
  - Release Lab Assignment 1 (Testing for Information Gathering)
- Sep 22: Identity Management Testing
  - Lab Assignment 1 (Testing for Information Gathering) Due
  - Research Assignment 3 Due
    - Report
    - Research Paper Presentation
  - Release Research Assignment 4
  - Release Lab Assignment 2 (Testing for Identity Management)
- **Sep 29: 1<sup>st</sup> Exam, 4:00 p.m. – 6:20 p.m.**
- Oct 06: Authentication Testing
  - Lab Assignment 2 (Testing for Identity Management) Due
  - Research Assignment 4 Due
    - Report
    - Research Paper Presentation
  - Release Research Assignment 5
  - Release Lab Assignment 3 (Testing for Authentication Testing)
- Oct 13: Authorization Testing
  - Lab Assignment 3 (Testing for Authentication Testing) Due
  - Research Assignment 5 Due
    - Report
    - Research Paper Presentation
  - Release Research Assignment 6
  - Release Lab Assignment 4 (Testing for Authorization Testing)
- Oct 20: Session Management Testing
  - Lab Assignment 4 (Testing for Authorization Testing) Due
  - Research Assignment 6 Due
    - Report
    - Research Paper Presentation

- Release Research Assignment 7
  - Release Lab Assignment 5 (Testing for Session Management)
- Oct 27: Client Side Testing
  - Lab Assignment 5 (Testing for Session Management) Due
  - Research Assignment 7 Due
    - Report
    - Research Paper Presentation
  - Release Research Assignment 8
  - Release Lab Assignment 6 (Testing for Client Side)
- **Nov 03: 2<sup>nd</sup> Exam, 4:00 p.m. – 6:20 p.m.**
- Nov 10: Input Validation Testing – Part 1
  - Lab Assignment 6 (Testing for Client Side) Due
  - Research Assignment 8 Due
    - Report
    - Research Paper Presentation
  - Release Research Assignment 9
  - Release Lab Assignment 7 (Testing for Input Validation)
- Nov 17: Input Validation Testing – Part 2
  - Lab Assignment 7 (Testing for Input Validation) Due
  - Research Assignment 9 Due
    - Report
    - Research Paper Presentation
  - Release Lab Assignment 8 (Testing for Input Validation)
- **Nov 24: Thanksgiving Break – Classes Dismissed**
  - Lab Assignment 8 (Testing for Input Validation) Due
- **Dec 01: “Dead Week” – Self Review; No Class**
- **Dec 08: 3<sup>rd</sup> Exam, 4:00 p.m. – 6:00 p.m.**

#### Notes:

- Everything you learn in the class is for securing your own applications, not to hack anybody else’s applications, because it is illegal.
- It is illegal to perform any type of penetration test without permission and authorization.
- Instructor is not liable for any special, direct or indirect damage or for any other damage resulting from the use of information/knowledge/technique presented in this class.
- In a nutshell, though, if you access any computer without its owner’s permission, and obtain any information from it or cause any damage (even accidentally), you’ve broken the law. See 18 U.S.C. § 1030, <https://www.law.cornell.edu/uscode/text/18/1030>