Jackson State University
Department of Computer Science
CSC 437-01 Computer Security
Fall 2013

Instructor: Dr. Natarajan Meghanathan **Class Room:** ENB 212
Office: JAP 115 (near Lab 117) **Class Time:** TR 7.30 PM to 8.50 PM
Phone: 601-979-3661 **Office Hours:** TR 4.30 PM to 6 PM
Email: natarajan.meghanathan@jsums.edu

Course Description

CSC 437 (3) Computer Security. Prerequisites: CSC 325. This course will examine the risks of security in computing, consider available countermeasures, controls and examine some of the uncovered vulnerabilities. Topics covered will include: Cryptography, Program Security, Operating System Security and Network Security. (D).

Course Outcomes

Each student who successfully completes this course should be able to:
CO-1: Explain the working principles of cryptographic mechanisms (symmetric and asymmetric ciphers as well as hash functions) and apply them for key distribution and management to provide confidentiality, integrity and authentication.
CO-2: Describe the various user authentication and access control mechanisms for computer security
CO-3: Describe how a stack buffer overflow works in detail and evaluate various defenses against buffer overflow attacks
CO-4: Explore classical network attacks, their causes and analyze solutions to combat those attacks
CO-5: Analyze the various categories of firewalls and intrusion detection and prevention mechanisms to detect attack traffic and protect individual computers as well as networks.
CO-6: Launch inference attacks on database systems and analyze the various control mechanisms to prevent information leakage
CO-7: Explain the different classes of malware: their basic operations, propagation mechanisms, payloads, threats, countermeasures and detection mechanisms.

Required Textbook

W. Stallings and L. Brown, "Computer Security: Principles and Practice," 2nd Edition, Prentice Hall, 2012.

Course Website

http://143.132.8.23/cms/tues/html/CSC437-Fall2013.html
Students are required to attend every class and frequently check the course website for latest updates regarding the course. All announcements, lecture materials for all chapters, lab projects, reading assignments, sample questions and quiz solutions will be posted in the course website. Note that the course website can also be accessed by visiting the website http://143.132.8.23/cms/nmeghanathan and then click on the CSC 437/539 Course link in the list of courses for Fall 2013 posted at the right side.

Evaluation

Lab Projects (25%) - 5 projects, 5% each
Quizzes (24%): 6 Quizzes [Each Quiz is worth 4%]
Exams (51%): Exam 1, Exam 2 and Exam 3 (each 17%).

Project Report Submissions: All project reports should be sent to natarajan.meghanathan@jsums.edu from your JSU email address, with the subject indicating the Project # and the title. The project report should be attached to the email as a Word document (that includes all the programs and the submission items stated in the project description). In addition, the program code has to be also attached separately. For some projects, you will probably have to record a video of your presentation to demonstrate the working of the project and submit the video in a CD or DVD.

Quiz, Projects and Exam Calendar: Unless otherwise notified, we will stick on to the following dates for the quizzes and exams. A Quiz could be conducted any time during the class. So, students need to be present on-time at the beginning of the class and stay till the end of the class.

	Tuesday	**Thursday**
Week 1	08/27	08/29
Week 2	09/03	09/05
Week 3	09/10	09/12, Quiz 1
Week 4	09/17	09/19
Week 5	09/24, Quiz 2	09/26, **Exam 1**
Week 6	10/01, Quiz 3	10/03
Week 7	10/08, Project 1	10/10
Week 8	10/15	10/17, Quiz 4
Week 9	10/22, Project 2	10/24
Week 10	10/29	10/31, **Exam 2**
Week 11	11/05	11/07, Project 3
Week 12	11/12	11/14, Quiz 5
Week 13	11/19	11/21, Project 4
Week 14	**Thanks giving break (11/25, 11/27)**	
Week 15	12/03, Quiz 6	12/05, Project 5
Week 16	12/12, **Exam 3:** 6 PM to 8 PM	

Course Outline (Tentative)

Week #	**Module Name/ Topics**	**Course Outcome**
1	Module 1: Terminologies Module 2: Cryptographic Tools: Symmetric Ciphers	CO-1
2	Module 2: Cryptographic Tools, Key Distribution and Management: Cipher Block Chaining; Message Authentication Code; Secure Hash Functions; Certificates; Needham-Schroeder Protocol	CO-1
3	Module 2: Cryptographic Tools, Key Distribution and Management: Diffie-Hellman Key Exchange; PGP Module 3: User Authentication: Passwords; UNIX Password schemes	CO-1 CO-2
4	Module 3: User Authentication: Bloom Filters; Tokens and Biometrics	CO-2
5	Module 4: Access Control Mechanisms: ACLs, Access Control Matrix, UNIX Access Control, Role-based Access Control	CO-2
6	Module 5: Buffer Overflow Attacks: Overview; Buffer Overflow (C Program Illustration); Stack Layout of a Process; Stack Smashing Attack	CO-3
7	Module 5: Stack Smashing Attack (Examples); Preventive Techniques	CO-3
8	Module 6: Classical Network Attacks: Spoofing attacks; Flooding Attacks; Distributed Denial of Service Attacks	CO-4

9	Module 7: Firewalls: Packet Filter; Stateful Inspection; Application-level gateway; Personal Firewall; DMZ networks; VPNs	CO-5
10	Module 7: Intrusion detection/prevention systems: Basic Principles; Host-based (Audit records, Anomaly detection, Signature detection; Distributed mechanisms); Network-based detection; Honeypots	CO-5
11	Module 8: Database Security: Access Control; Inference Attacks; Statistical Databases	CO-6
12	Module 8: Database Security: Query Size Restriction; Tracker; Query Set Overlap Control; Partitioning; Perturbation; Database Encryption	CO-6
13	Module 9: Malware: Basic operations and propagation mechanisms of viruses and worms; categories	CO-7
14	Thanksgiving Break	
15	Module 9: Malware: Payload based; Threats, countermeasures and detection mechanisms	CO-7
16	Final Exam on Thursday, December 12: 6 PM to 7.50 PM	

Grading Scale

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
Below 60	F

Reference Books

No.	Book Title/ Edition, Year	Authors	Publisher	ISBN
1	Computer Networks: A Systems Approach, 4th Edition, March 2007	Peterson and Davie	Morgan Kaufmann	0123705487
2	Database and Applications Security: Integrating Information Security and Data Management, 1st Edition, 2005	B. Thuraisingham	Auerbach Publishers	0849322243
3	Cryptography and Network Security: Principles and Practice, 5th Edition, January 2010	W. Stallings	Prentice Hall	0136097049
4	Digital Watermarking and Steganography, 2nd Edition, November 2007	I. Cox, M. Miller, J. Bloom, J. Fridrich and T. Kalker	Morgan Kauffman	0123725852
5	Handbook of Information and Communication Security, 1st Edition, April 2010	P. Stavroulakis and M. Stamp (Eds.)	Springer	3642041167
6	Security in Computing, 4th Edition, October 2006	C. P. Pfleeger and S. L. Pfleeger	Prentice Hall	0132390779
7	CERT Oracle Secure Coding Standard for Java	F. Long, et. al	Addison-Wesley	0321803957
8	Mastering VMware Infrastructure 3, 1st Edition, May 2008	C. McCain	Sybex Publishers	0470183136

9	24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them, September 2009	M. Howard, D. LeBlanc, J. Viega	McGraw Hill	0071626751
10	Introduction to Computer Security, 1st Edition, October 2010.	M. Goodrich and R. Tamassia	Addison Wesley	0321512944

Program Outcomes

Each student who graduates from the Undergraduate program in Computer Science will be able to:

(a) Apply knowledge of computing and mathematics appropriate to the discipline
(b) Analyze a problem, and identify and define the computing requirements appropriate to its solution
(c) Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
(d) Function effectively on teams to accomplish a common goal
(e) Understand professional, ethical, legal, security and social issues and responsibilities
(f) Communicate effectively with a range of audiences
(g) Analyze the local and global impact of computing on individuals, organizations, and society
(h) Recognize the need for and an ability to engage in continuing professional development
(i) Use current techniques, skills, and tools necessary for computing practice.
(j) Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
(k) Apply design and development principles in the construction of software systems of varying complexity.

Mapping of CSC 437 Course Outcomes to Program Outcomes

	CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7
(a)							
(b)							
(c)							
(d)							
(e)							
(f)							
(g)							
(h)							
(i)	X	X	X	X	X	X	X
(j)							
(k)							

ADA Statement

Compliance with the Americans with Disabilities Act: "It is the university policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact their instructors to discuss their individual needs for accommodations."

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and ADA Coordinator (as early as possible in the term) located in the Jacob L. Reddix Building (old student union), rooms 101 and 102. The office hours are: 8:00 a. m. to 5:00 p.m.,

Monday through Friday. The telephone number is (601) 979-3704 or (601) 979-6919 (TTY) and the facsimile number is (601) 979-6918. The mailing address is: Office of Support Services for Students and Employees with Disabilities, P.O. Box 17156, Jackson State University, Jackson MS 39217.

Diversity Statement

Jackson State University is committed to creating a community that affirms and welcomes persons from diverse backgrounds and experiences and support the realization of their potential. We recognize that there are differences among groups of people and individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language religion, sexual orientation, and geographical area. All persons are encouraged to respect the individual difference of others.

Collegiate Code of Conduct

Jackson State University students are expected to dress in a manner representative of higher education institution. More information on Dress Code; Verbal and/or Physical Harassment; Indecent, Obscene, Immoral Behavior and/or Profanity is available in the JSU Student Handbook. The JSU Student Handbook is available at http://www.jsums.edu/~studentlife/handbook.pdf

Dropping a course

The last day to drop a course with no grade:	September 13, 2013
The last day to drop a course with "W" grade:	October 28, 2013

Course Policies

Note: The course policies will be strictly adhered to. Students are expected to be aware of the course policies throughout the semester.

Exam/ Quiz Dates

- Unless otherwise notified, we will stick on to dates for the quizzes and exams listed in Page 2 of this syllabus. A Quiz could be conducted any time during the class. So, students need to be present on-time at the beginning of the class and stay till the end of the class.

Lab Projects

- All of the lab projects given in the course may or sometimes will require the use of the Computer Networks Lab (AT&T lab) at the J. Y. Woodard Building in the Main Campus.
- **Late submission of lab projects will not be accepted.**
- It is the responsibility of the student to make sure he/she can print the lab reports before the due date /time. No excuse will be given for lack of computer access, printers to print the document.

Sample Questions and Quiz Solutions

- For every week, the instructor will give out the list of sample questions that can be expected in the quizzes and exams on the topics discussed during the week.
- The instructor may even tell some sample questions while teaching the class. Students are expected to add these questions to the list of sample questions distributed for that week.
- Students will be distributed the solutions for a quiz within a week after the quiz.
- Solutions for all sample questions will not be discussed or distributed in class. Students are strongly encouraged to solve those questions by themselves based on the instructor's lecture, lecture slides, textbook and class notes.
- The instructor will discuss solutions for some of the sample questions in class, on a need-by basis. Students are strongly encouraged to make use of the instructor's office hours to discuss any of the sample questions or doubts they may have.

- NOTE: Not all questions in the Quizzes and Exams will be from the list of sample questions. The Quizzes and Exams will still have some questions that are not from the list of sample questions.

Make-up Quizzes and Exams

- No Make-up Quizzes will be given. If a student misses a quiz for ANY reason, the student gets a score of 'zero' for the quiz and no make-up quiz will be given.
- **No make-up examinations will be given except for emergencies such as death in the family or serious illness. The instructor must be informed, through e-mail or a written request, BEFORE the time of the examination that is to be missed.** The instructor will make a decision on the make-up examination after verifying the appropriate written documentation. Failure to furnish, written, verifiable documentation will result in a grade of zero for the missed examination.
- **Any make-up exam for a missed exam has to be taken before the next class meeting time.**
- **A make-up exam will be different and will be relatively tough compared to the actual missed exam.**
- **NO MAKE-UP EXAM WILL BE GIVEN FOR THE FINAL EXAM. Students are required to take the final exam during the date and time specified by the university.**

Contesting Grades

- Grades for a particular exam or quiz can be contested only within a week after the grades for that exam/quiz are announced.
- Grades for the final exam will have to be contested within two days after the exam.
- The grade for the overall course will have to be also contested within two days after the final exam. Any change of grade requested by the student 48 hours after the completion of the final exam will not be considered.

Maintaining Registration Status

- It is the duty of the student to make sure that he/she stays registered in the course throughout the semester. If a student sees he/she is dropped from the course without his/her knowledge, the student should notify the instructor before the next meeting of the class.
- A student cannot attend a class or take an exam/quiz if the student is not registered for the course at that point of time.

Dropping the Course

- The last date to drop the course without any grade is September 13, 2013. The last date to drop the course with a "W" grade is October 28, 2013.
- The instructor will not assist in any way to get the student dropped with no grade or "W' grade after the above dates.

Anticipated Leave

- If a student is anticipating any medical emergency (like surgery, pregnancy, etc.), conference participation, game participation, etc. during the course of the semester, the student should furnish the appropriate medical documents, conference registration receipt, letter from the coach, etc, and discuss with the instructor within the first two weeks of the course on how to make up for the classes/exams/assignments that will be missed.
- The instructor will make a decision on the make-up examination after verifying the appropriate written documentation. Failure to furnish, written, verifiable documentation will result in a grade of zero for the missed examination.
- The instructor will give a different set of assignments, projects and make-up exams than the ones given in class.

- **The student is responsible for the materials covered in a class that he/she misses.**

Other Course Policies

- Turn off your cell phone in class. Use of a cell phone or a laptop computer is not allowed in class.
- If a student leaves the classroom during a quiz or exam for any reason, the student's exam paper will be collected, and thus he/she will not be able to resume the testing after coming back to the room. Inform the instructor if any health problem prevents you from remaining in the classroom until you complete the quiz or exam.

Student Conduct and Class Attendance Policy

Students at Jackson State University must fully commit themselves to their program of study. One hundred percent (100%) punctual class attendance is expected from each student for all the scheduled classes and activities. The instructor will be maintaining the attendance record and any absence of a student without providing any written official excuse, is counted as an unexcused absence. Irrespective of the type of excuse (i.e., official or unofficial), the student is responsible for the work required during their absences.
The instructor will call the roll at the beginning of the class. Also, the instructor will pass an attendance sign-up sheet to each student. Students coming late to the class by more than 10 minutes will be marked "Absent". Students may be officially excused from class for attendance at University approved functions provided the sponsor properly executes a Student Affairs Leave Form. The instructor shall accept such excuses. The Dean of the School or the Vice President for Academic Affairs may also officially excuse students for certain campus activities. Students must submit written documentation to Student Affairs to obtain official excuses for absences due to illness or other emergency situations. Students who willfully miss class face serious consequences. After being absent four times in a 80-minute class, one time immediately before or after a scheduled recess/holiday, the instructor shall report the next unexcused absence to the Dean of University College for freshmen and sophomores and to the School Dean and Department Chair for Juniors and Seniors. The Dean/Chair or designee will counsel with the student and in concert with the instructor, may require the student complete complimentary course assignments. If a student does not respond well to the counsel or with the assignments, the instructor may impose a grade penalty on the student. Unexcused absences that exceed the equivalency of four 80-minute sessions may lead to an "F" for the course.

Academic Honesty

All acts of academic dishonesty (e.g., cheating on exams, plagiarizing – presenting another person's work as one's own, having another person write one's paper, making up research data, presenting excuses which are untrue for failing to meet academic and professional standards) are a violation of engineering values, ethics, and University policy, which will entail appropriate penalties.

Policy Regarding Course Incompleteness

Incomplete is the designation used to indicate failure to complete assignments or other course work including final or other examinations, by the end of the term in which the student is enrolled. The grade of incomplete "I" is recorded when the student has not completed the course due to some unavoidable reason that is acceptable by the instructor. An incomplete grade "I" is to be considered only when the majority of the course requirements and the assignments have been successfully completed and there is a documented crisis situation of illness, accident, or other occurrence which prevents a student from completing the remaining requirements before the school term ends. The incomplete grade "I" is not a substitute for the failure grade "F".

The instructor is required to indicate on the grade sheet the grade the student should receive if the incomplete is not removed within the prescribed time. If the student fails to complete the course requirements satisfactorily within the specified time, the alternate grade will be recorded as the grade of record.

Computer Network Lab Hours

All of the lab projects given in the course may require (at least for submission purposes) the use of the Computer Networks **Systems and Security Lab** (Room 110) at the **base floor of J. Y. Woodard Building** in the Main Campus. The lab used to be also called AT&T Lab.

Monday to Friday: 10 AM to 12 Noon; 2 PM to 4 PM