Jackson State University
Department of Computer Science
CSC 435 – 01   Computer Networks
Spring 2014

Instructor: Dr. Natarajan Meghanathan   **Class Room:** ENB 212
Office: JAP 115   **Class Time:** MWF 1 to 1.50 PM
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Catalog Description
CSC 435 (3) Computer Networks; Prerequisites: CSC 323, 325. The CSC 435 course will primarily focus on the following five layers of the TCP/IP protocol stack: Physical, Link, Network, Transport and Application layers. Topics to be covered include: Physical Layer – encoding and decoding data for short-distance and long-distance communications; Link Layer – local area network technologies and their extension using interconnection devices; Network Layer – routing protocols, IP addressing, subnets, datagram forwarding, fragmentation and other auxiliary network-level communication protocols; Transport Layer – UDP and TCP and Application Layer – Socket programming. The course will also cover appropriate security aspects for each of the above layers. (F, S).

Course Outcomes
Each student who successfully completes this course should be able to:
   CO-1: Analyze the different aspects of physical layer such as encoding standards, transmission order, modulation and multiplexing techniques
   CO-2: Develop unicast and multicast programs using connectionless and connection-oriented sockets
   CO-3: Describe the working of local area network (LAN) technologies for wired and wireless networks as well as analyze the working of virtual LANs and different networking devices
   CO-4: Construct and use routing tables for datagram forwarding and study the different categories of Internet routing protocols
   CO-5: Describe the responsibilities of the different layers of TCP/IP protocol stack as well as the use of different fields in the packet headers corresponding to these layers
   CO-6: Explain the different classes of IP addresses as well as apply strategies such as subnetting and CIDR for efficient IP address assignment
   CO-7: Analyze end-to-end transport layer protocols like TCP and UDP, including the flow control and congestion control algorithms
   CO-8: Explore the classical network attacks, their causes and analyze solutions to combat those attacks

Course Textbook
J. F. Kurose and K. W. Ross, "Computer Networking: A Top-Down Approach," 6th Edition, Prentice Hall, 2013, ISBN: 0132856204.

Socket Programming Reference Book
N. Meghanathan, "A Tutorial on Java Socket Programming and Source Code Analysis: Complete Java Source Code Examples and Practice Exercises: Supplement for Computer Networks & Software Security Courses," LAP LAMBERT Academic Publishing, 2012. ISBN: 3659314455.

Course Website
http://143.132.8.23/cms/tues/html/CSC435-Spring2014.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://www.jsums.edu/cms/nmeghanathan and then click on the CSC 435 Course link in the list of courses for Spring 2014 posted at the right side.

Evaluation

Exams - 52% (3 Exams; 16% for Exam 1, 16% for Exam 2, 20% for Exam 3): Tentative exam dates (subject to change):

          Exam 1 on Friday, February 28, 2014
          Exam 2 on Wednesday, April 9, 2014
          Exam 3 on Wednesday, April 30, 2014

All the three exams are required and considered for the final grade. The syllabus for each exam will be announced at least a week before the exam. Typically, an exam will focus more on topics on which you were not tested in the previous exam(s). However, the instructor could question on any topic from the syllabus assigned for the exam.

Quizzes – 20% (5 Quizzes; 4% for each Quiz): All 5 quizzes will be required/considered for the final grade. The syllabus for each Quiz will be announced at least a class before the quiz.

Regular Lab Projects – 20% (5 Projects; 4% for each Project): The lab projects will involve socket programming as well as working with some hands-on simulation and virtualization software.

Term Project – 8%: Students would have to pick one of the two project topics assigned and do that chosen project.

The regular lab projects and term project will involve socket programming as well as working with some hands-on simulation and virtualization software. Certain projects would need to be conducted in a virtual machine environment.
Unless otherwise specified, all exams and quizzes are closed notes.

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.

	Monday	Wednesday	Friday
Week 1	01/13	01/15	01/17
Week 2	01/20 **MLK Holiday**	01/22	01/24
Week 3	01/27	01/29	01/31
Week 4	02/03	02/05	02/07, **Quiz 1**
Week 5	02/10	02/12	02/14, **Quiz 2**
Week 6	02/17	02/19	02/21, **Project 1**
Week 7	02/24	02/26	02/28, **Exam 1**
Week 8	03/03	03/05	03/07, **Quiz 3**
Week 9	03/10-03/14: **Spring Break**		
Week 10	03/17, **Project 2**	03/19	03/21
Week 11	03/24	03/26, **Project 3**	03/28
Week 12	03/31	04/02, **Project 4**	04/04
Week 13	04/07, **Quiz 4**	04/09, **Exam 2**	04/11
Week 14	04/14	04/16, **Project 5**	04/18 **Holiday**
Week 15	04/21 **Holiday**	04/23, **Quiz 5**	04/25, **Term Project**
Week 16	**Exam 3**: Wednesday, April 30, 2014: 1 PM to 3 PM		

Project Report Submissions: All project reports should be sent to <u>natarajan.meghanathan@jsums.edu</u> 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 through GoogleDrive (using your JSU student account) or in a CD or DVD.

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 435 Course Outcomes to Program Outcomes

	CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
(a)								
(b)								
(c)								
(d)								
(e)								
(f)								
(g)								
(h)								
(i)		X	X	X	X		X	X
(j)	X			X		X		
(k)								

Course Outline (Tentative)

Week #	Topics to be Covered	Course Outcomes	Program Outcomes
Week 1	Module 1: IP/MAC Addresses and TCP/IP Suite 1.1: MAC Address; 1.2: Class-based IP Addresses and Private IP Address; 1.3: Subnetting	CO-6	J
Week 2	Module 1: IP/MAC Addresses and TCP/IP Suite	CO-6	J

	1.3: CIDR 1.4: End-to-end Packet Transmission in the Internet; 1.5: ISO/OSI Model and TCP/IP Model	CO-5	I
Week 3	Module 2: Socket Programming in Java: Connectionless Sockets, Connection-Oriented Sockets; Multicast Sockets	CO-2	I
Week 4	Module 3: Physical Layer 3.1: Signal Levels; Baud rate and Bit rate; 3.2 Channel Encoding Standards; 3.3 Transmission Order of Bits and Bytes	CO-1	J
Week 5	Module 3: Physical Layer 3.4: Modulation Techniques; 3.5 Multiplexing Techniques	CO-1	J
Week 6	Module 4: Local Area Networks (LANs), VLANs and Networking Devices 4.1: LAN Topologies, Ethernet and Wireless LANs; 4.2 Networking Devices: Repeater, Hub	CO-3	I
Week 7	Module 4: LANs, VLANs and Networking Devices 4.2 Networking Devices: Bridge, Switch, Router, Virtual LANs	CO-3	I
Week 8	Module 5 Routing Protocols 5.1 Principles of Routing in the Internet; 5.2 Distance Vector Routing; 5.3 Link State Routing Protocol	CO-4	J
Week 9	Spring Break		
Week 10	5.4 Routing across Autonomous Systems; 5.5 Multicast Routing Protocols	CO-4	I
Week 11	Module 6 Internet Layer 6.1 IP Header; 6.2 IP Datagram Forwarding; 6.4 IP Datagram Fragmentation	CO-5	I
Week 12	Module 6 Internet Layer 6.4: IP Auxiliary Protocols and Technologies	CO-5	I
	Module 7 Transport Layer 7.1: User Datagram Protocol	CO-7	I
Week 13	Module 7 Transport Layer 7.2: TCP Header and Connection Establishment; 7.3: TCP Flow Control and Congestion Control	CO-7	I
Week 14	Module 8 Network Security 8.1: Classical Denial of Service Attacks; 8.2: Defense using Cryptography	CO-8	I
Week 15	Module 8 Network Security 8.3: IPSec; 8.4: Firewalls	CO-8	I

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	Peterson and Davie	Morgan Kaufmann	0123705487

	2007			
2	Computer Networks, 4th Edition, August 2002	A. S. Tannenbaum	Prentice Hall	0130661023
3	Computer Networking: A Top-Down Approach, 5th Edition, March 2009	J. F. Kurose and K. W. Ross	Addison Wesley	0136079679
4	TCP/IP Illustrated, Vol. 1: The Protocols, January 1994	W. Richard Stevens	Addison Wesley	0201633469
5	Internetworking with TCP/IP, July 2005	D. E. Comer	Prentice Hall	0131876716
6	Interconnections: Bridges, Routers, Switches, and Internetworking Protocols, 2nd Edition, September 1999	Radia Palmer	Addison Wesley	0201634481
7	Network Analysis, Architecture and Design, 2nd Edition, May 2003	James D. McCabe	Morgan Kaufmann	1558608877
8	TCP/IP Sockets in Java, 2nd Edition: Practical Guide for Programmers, February 2008	K. L. Calvert and M. J. Donahoo	Morgan Kaufmann	0123742551
9	Java Network Programming, 3rd Edition, October 2004	E. R. Harold	O'Reilly	0596007213
10	Distributed Computing: Principles and Applications, June 2003. (for Socket programming)	M. L. Liu	Addison Wesley	0201796449

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:	January 24, 2014
The last day to drop a course with "W" grade:	March 28, 2014

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.
• For some of the projects, you may need to have an account on the redhat3.jsums.edu machine. If you do not have an account on the redhat3.jsums.edu machine, give your J# and name to the instructor within one week of the beginning of classes.
• **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 January 24, 2014. The last date to drop the course with a "W" grade is March 28, 2014.
- 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