Spring 2020
CIS 419: Computer Networks and Internet Applications
Department of Computing Sciences
The College at Brockport
State University of New York

Instructor Contact Information:
- Instructor: Ning Yu, PhD, Assistant Professor
- Office: 103 Albert W. Brown Building
- Phone: (585) 395-5187
- Fax #:   (585) 395-2304
- Email: nyu@brockport.edu
- Class Hours:
  - M-W-F   2:30 PM – 3:20 PM, Hartwell 026
- Office Hours:
  - M-W-F   11-11:30AM, 1:20 – 2:20 PM @ Brown 103
  - Or by appointment

Textbook
- K. Barker, K. Wallace, and M.D. Taylor, CompTIA Network+ N10-006 Cert Guide, Deluxe Edition, Pearson, Indianapolis, IN, 2015 (ISBN: 978-0-7897-5473-8)

Reference
- A.S. Tanenbaum and D.J. Wetherall, Computer Networks, 5th Edition, Prentice Hall, Boston, MA, 2011 (ISBN: 978-0-13-212695-3)
- W. Odom, Cisco CCENT/CCNA ICND1 100-101 Official Cert Guide, Academic Edition, Cisco Press, Indianapolis, IN, 2013 (ISBN: 978-1-58714-485-1)

Course Description
Provides a comprehensive study of the field of computer communications, local area networks, and internetworking. Includes these topics: the OSI and TCP/IP models, protocols, topologies, data communication issues, error detection and correction, local area networks, network hardware, Ethernet and wireless technologies, WAN, packet-switching, routing, datagrams, Internet addressing, home networking and security. Includes hands-on experience with network hardware and software. Closed to students who have received credit for CIS 419. 3 credits.

Prerequisite
- CSC 303: Computer Systems Hardware and Software
- CSC 311: Computer Organization and Software Interface

Course Objectives
- Study of basic principles in data communications, local and wide area networking
- Study of network applications, business information, and doing business on the Internet

- Study of Ethernet and wireless networks
- Study of communication protocol TCP/IP, network programming, and network security

Nature of the Course

This course provides an introduction to data communication, local and wide area networks, and internet applications. It is meant to be a preparation as a computer network analyst and beyond as a computer network technician. With some additional preparation, students will be able to seek CompTIA Network+ certification.

Hardware and Software Environment

We will do some hands-on work with network configuration and troubleshooting in both Microsoft Windows and UNIX environment. **Wireshark** is a free and open-source packet analyzer. It is used for network troubleshooting, analysis, software and communications protocol development, and education. **Cisco Packet Tracer** is used for the course project to design and implement networks. Also a small client-server socket program for network programming is an open option for the course project.

Course Learning Outcomes

- Understand goals of networking, reference models, and role of standards
- Understand business requirements for communication and explore network technology as an enabler of organizational performance
- Perform computations relating to multimedia file sizes, raw and effective data rates, propagation time, etc.
- Understand characteristics of various communication media, physical and data link layer issues, error detecting/correcting codes and related tradeoffs
- Understand IEEE 802.03 (Ethernet) and IEEE 802.11 (wireless) protocols
- Understand Internet addressing, IPv4/v6, subnets, and TCP/IP protocol characteristics
- Understand network hardware such as hubs, switches, routers (both wired and wireless), NAT devices, and DHCP servers
- Learn to configure LAN and TCP/IP networks; explore network troubleshooting commands such as ping, traceroute, nslookup, netstat, etc.
- Analyze network traffic using Wireshark software
- Understand and implement client-server code
- Understand network security issues

Student Outcomes (ABET)

CSC-AC Track:

A. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

A5. Demonstrate an understanding operating system fundamentals to help identify hardware and software resources needed to carry out the solution

F. Apply computer science theory and software development fundamentals to produce computing-based solutions.

F4. Demonstrate an ability to apply an understanding of number systems, data encoding, and graph theoretic algorithms to solve problems related to computer networks and security

Only **F4** data is collected in this course for the assessment of overall CSC-AC student outcomes.

CIS Track:

A. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

A5. Demonstrate an ability to analyze information technology infrastructure issues and identify communication and networking resources needed to support a solution for a computing problem

B. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

B1. Demonstrate competency in recognizing security vulnerabilities in information systems and evaluating ways to secure vulnerable systems

B2. Demonstrate competency in configuring and troubleshooting LAN and TCP/IP networks

A5 and **B2** data are collected in this course for the assessment of overall CIS student outcomes.

Workload
- 8 assignments/labs (**40%**)
- 1 project (**6%**)
- 3 In-class Examinations, 50 minutes each, (**30%**)
- Comprehensive Final Examination, 120 minutes, (**20%**)
- Class attendance and participation. (**4%**)

Grading Policy

	A is >= 90%	**A-** is >= 87% but < 90%
B+ is >= 83% but < 87%	**B** is >= 80% but < 83%	**B-** is >= 77% but < 80%
C+ is >= 73% but < 77%	**C** is >= 70% but < 73%	**C-** is >= 67% but < 70%
D+ is >= 63% but < 67%	**D** is >= 60% but < 63%	**D-** is >= 57% but < 60%
	E is < 57%	

Passing Grade

The passing grade in this course is **C** (required for CSC-AC and CIS).
The passing grade in this course is **D-** (elective for CSC-SD and other majors).

Reading Schedule and Timeline (Tentative)

	Weeks	Chapter / Topics	Assignments / Deliverables
Network Fundamentals	Jan 27	Chapter 1: Introductions; networks basics, classification, topology	
	Feb 3	Chapter 2: Reference models (OSI, TCP/IP), standards, and Internet	ASGN 1 Due
	Feb 10	Chapter 5: IPv4 & IPv6 Addresses; IP Subnetting	
	Feb 17	Network metrics: Computation of network data rates, propagation time, etc.	ASGN 2 Due
		First In-class Exam: Wednesday Feb 19	
Local Networks and Switching	Feb 24	Chapter 10: Basic network tools; understanding business requirements; network applications In-class lab: Network Troubleshooting	
	Mar 2	Chapter 3: Network components – media and devices	ASGN 3 Due
	Mar 9	Chapter 4: Ethernet technology – hubs and switches Hands-on Lab 1: Small Business LAN	Hands-on Lab 1
	Mar 16	Spring Break	
	Mar 23	Chapter 8: Home networking and wireless LAN	ASGN 4 Due
		Second in-class Exam: Wednesday Mar 25	
WAN, Wireless & Routing	Mar 30	Chapter 8: WLAN and Wireless Networks Hands-on Lab 2: WLAN and Wireless Router	Hands-on Lab 2
	Apr 6	Chapter 7: WAN issues and Internet	ASGN 5 Due
	Apr 13	Chapter 6: Routing IP Packets	
		Third in-class Exam: Wednesday April 15	
Advanced Topics	Apr 20	Transport layer protocol; UDP/TCP protocol	ASGN 6 Due
	Apr 27	Network programming & Internet applications	
	May 4	Chapter 8: Wireless network security	
	May 11	**Comprehensive Exam Monday, May 11 10:20AM-12:20PM at classroom** ***This Exam is Timed***	

Ver. 12022019, revised by N.Yu

Policy on Assignments and Academic Integrity

Academic Integrity: Students are required to observe all college regulations concerning academic integrity. It is important for students to understand that the College faculty and staff value student honesty and integrity. Academic dishonesty, "cheating" and other forms of misrepresenting others' work as your own, such as plagiarism, are considered serious breaches of academic integrity and are major violations of the standards of ethical behavior that the College expects from all its students. When detected, as it often is, academic dishonesty can result in a range of disciplinary actions including failure on an assignment, failure of a course, or even Conduct Dismissal from the College. Records of disciplinary actions for dishonesty are kept and conduct dismissals are noted on College transcripts. The best rule is to assume that instructors expect all work (exams, papers, projects, etc.) submitted for grading to be entirely your own, done without collaboration. If the instructor allows or desires collaboration, you should assume that the instructor will make that clear in the assignment. If the instructor has not explicitly stated that collaboration is permitted, all work submitted should be entirely your own.

Definitions of Academic Dishonesty Covered by this Policy: Violations of the Student Academic Dishonesty Policy refer to actions related to the standards of honesty required in submission and evaluation of coursework in any undergraduate or graduate course bearing The College at Brockport credit. These violations include, but are not limited to the following:

A. Plagiarism — presenting as one's own, the exact words of another, not properly indicated by quotation marks, paraphrased text too similar to the original, ideas, or creative products of another without providing an adequate standard form of documentation to identify the source — such as footnotes, endnotes, or bibliographic documentation. Students are advised to scrupulously acknowledge and properly cite all sources to give appropriate credit for borrowed materials.

B. Fabricating facts, data, statistics, or other forms of evidence included in papers, laboratory experiments, theses, or other assignments.

C. Presenting someone else's examination results, paper, computer work, or other material as one's own work. This includes work done as part of group/team effort unless collaboration has been specifically approved by the instructor for any particular assignment. Students should always assume that any out-of- class assignments or take home examinations are to be done individually and without help or collaboration unless the instructor specifically states otherwise. Students should not generalize from one assignment to another as instructors may permit collaboration on some assignments but not on others.

D. Representing one's own performance as another's or knowingly allowing such misrepresentation to occur, e.g., signing another student into class; taking an exam for another student; writing or attempting to write an examination, paper, computer work, or other material for another student.

E. Buying and selling, or sharing of examinations or assignments; being in possession of examinations or answers to examinations without the instructor's permission.

F. Using "cheat sheets," looking onto another's paper, talking to someone other than the instructor or proctor during an examination, or using any other method of communication (e.g. cell phones, text messaging) during an examination without the instructor's permission.

G. Failing to follow the rules of conduct for taking an examination as stipulated by the instructor prior to the examination or as stated in a written course syllabus.

H. Presenting work for a current course (e.g. papers, projects, research) that is substantially the same as a previous submission for another course without obtaining the current instructor's prior consent to do so. When the courses are taught in the same semester, informing and obtaining prior approval of both course instructors is required to avoid a possible dishonesty charge.

The following Web site has additional information about this policy.
https://www.brockport.edu/support/policies/adopted/aa_vprovost_academicaffairs_academic_dishonesty.html

Late Assignments: All assignments are to be completed on individual basis, i.e., on your own. Late assignments will be accepted within 4 days beyond the deadline with a penalty of 10-15% per day (including weekends and other holidays). If you have problems meeting the deadlines, you are encouraged to consult me prior to the due date. Being absent from class for one reason or another is not an excuse for submitting assignments late. When acts of academic dishonesties occur, college policies and procedures will be followed, often leading to severe penalties.

Policy on Attendance and Conduct in Classroom
The student is responsible for all assigned course work and cannot be absolved of this responsibility. When enrolled in a particular course, the student is obligated to do all of the work assigned. Punctual and regular attendance is vital to the discharge of this obligation. Absences, excused or not, do not alter this responsibility.

The following Web site has additional information about this policy.
https://www.brockport.edu/support/policies/adopted/aa_vprovost_academicaffairs_attendance_guidelines.html

Faculty Senate legislation mandates student attendance in all classes. Students who are unable to attend the examinations or meet deadlines for assignments on particular days due to religious beliefs, must contact me ahead and work out alternate arrangements. Students are expected to behave as reasonable adults, motivated to explore the subject matter with proper guidance from the instructor. Late arrivals and early departures disturb the entire class and should be avoided. As per Senate policy, students whose unexcused absences exceed 15 percent of the scheduled classes and laboratories (8 classes/labs) may receive a lowered grade or failure at the instructor's discretion.

Disability Statement

Students with documented disabilities may be entitled to specific accommodations. The College at Brockport's Office for Student with Disabilities makes this determination. Please contact the Office for Students with Disabilities at (585) 395-5409 or osdoffic@brockport.edu to inquire about obtaining an official letter to the course instructor detailing any approved accommodations. The student is responsible for providing the course instructor with an official letter. Faculty work as a team with the Office for Students with Disabilities to meet the needs of students with disabilities.

Title IX Compliance
Sex and Gender discrimination, including sexual harassment, are prohibited in educational programs and activities, including classes. Title IX legislation and College policy require the College to provide sex and gender equity in all areas of campus life. If you or someone you know has experienced sex or gender discrimination, sexual harassment, sexual assault, intimate partner violence, or stalking, we encourage you to seek assistance and to report the incident through resources available at https://brockport.edu/about/title_ix/. Confidential assistance is available on campus at Hazen Center for Integrated Care and RESTORE. Faculty are NOT confidential under Title IX and will need to share information with the Title IX & College Compliance Officer. For these and other policies governing campus life, please see https://www.brockport.edu/support/policies/student.php.

Emergency Alert Statement
In case of emergency, the Emergency Alert System at The College at Brockport will be activated. By signing up for RAVE, you can receive warnings and emergency information via the web, your cell phone, email and other technologies. Students can sign-up for RAVE using the link on the College's Emergency Information website. Included on the website are detailed information about the College's Emergency Action Plan, Classroom Emergency Preparedness, Official Evacuation Procedures, Emergency Communication, and Contacts (phone numbers, email addresses, etc.). In addition, students are encouraged to familiarize themselves with the Emergency Procedures posted in classrooms, halls, and buildings and all college facilities.

https://www.brockport.edu/support/emergency.

Weather Conditions and Class Cancellations
I have no authority to cancel classes, no matter what the weather condition is. Only the President of the College makes that decision. On days of severe weather conditions, please listen to WBSU (89.9 FM) and WHAM (1180 AM) for class cancellations. You may also call (585) 395-COLD at the College. If I have any information, I will try my best to send email, leave voice mail, or post messages.

Statement of Non-discrimination
The College is committed to fostering a diverse community of outstanding faculty, staff, and students, as well as ensuring equal educational opportunity, employment, and access to services, programs, and activities, without regard to an individual's race, color, national origin, religion, creed, age, disability, sex, gender identity, sexual orientation, familial status, pregnancy,

predisposing genetic characteristics, military status, domestic violence victim status, or criminal conviction. Employees, students, applicants or other members of the college community (including but not limited to vendors, visitors, and guests) may not be subjected to harassment that is prohibited by law, or treated adversely or retaliated against based upon a protected characteristic.

Statement of Equity and Open Communication

I recognize that each class I teach is composed of diverse populations and am aware of and attentive to inequities of experience based on social identities including but not limited to race, class, assigned gender, gender identity, sexuality, geographical background, language background, religion, disability, age, and nationality. This classroom operates on a model of equity and partnership, in which we expect and appreciate diverse perspectives and ideas. If anyone is experiencing exclusion, intentional or unintentional aggression, silencing, or any other form of oppression, I encourage open communication with myself and/or the class as a whole.

Help

- See me during office hours. There is no need for appointments. But, if you want to meet with me outside of office hours, please call or email and make an appointment.
- Call me at (585) 395-5187. If I cannot be reached, leave a voice mail. Alternatively, if you have a touch-tone phone, call (585) 395-5100, type 5187# when prompted for the mailbox number, and then leave a message.
- Frequently check your email that I send to you via BlackBoard system. Send your email to me via the address nyu@brockport.edu if you have any issue.
- Blackboard® is used for posting class notes and messages. You are also advised to access Blackboard® on a regular basis. Please frequently use Chrome, Firefox or Internet Explorer, access BlackBoard® system to see if I have posted any information of use to you. All PCs in campus laboratories provide access to Chrome. For information regarding our curriculum, other courses, faculty, etc., use the URL http://www.brockport.edu/cs/, and follow appropriate links

Laboratory Work

- Some laboratory work will be in Smith 111 computer laboratory. Suitable announcements will be made in class ahead of time.

Ver. 12022019, revised by N.Yu