

SYLLABUS
IT 263-801/810
Applied Networks and Security
Winter Quarter 2020

Instructor: Greg Brewster
Class Time: Tuesdays 5:45 pm – 9:00 pm
Office Hours: Tuesdays 4:00 pm – 5:30 pm or by appointment
Office CDM 850
Office Phone 312-362-6587 (x26587 from campus phone)
E-mail: gbrewster@cdm.depaul.edu
E-Text: Introduction to Networks: Cisco Networking Academy,
<https://www.netacad.com>.

Course Overview

This course introduces the networking and security technologies required to build and maintain a home or small-office network. Networking topics will include client/server application software configuration, network connectivity (cabling, switch and router configuration), basic IP addressing, network address translation and options for public Internet access services. Security topics will include typical threats and responses, firewalls, host hardening, password management and virtual private network (VPNs).
PREREQUISITE(S): None.

Coursework, Exams, & Grading

Required coursework components and their contribution to the final grade will be:

- 4 homework assignments (25%)
- 4 lab exercises (25%)
- Midterm Exam (15%)
- Technology report (10%)
- Class Participation (5%)
- Final Exam (20%)

Further details on each assignment will be distributed in class. Assignments received late will be penalized as follows: up to 1 day late is 20% penalty; between 1 day and 2 days late is 30% penalty; between 2 days and 1 week late is 40% penalty; more than 1 week late results in no credit for the particular assignment.

Homework assignments, papers and exams must be completed individually. Grade reductions and other sanctions may be imposed on anyone who submits as his/her own

any work which has been prepared by someone else. I expect all students to read and understand DePaul's policy on Academic Integrity.

Class Schedule and E-Text Readings:

Class dates, topics, readings on Cisco Networking Academy (CNA), and Assignments are shown below. Each student is enrolled in an online CNA course - CCNAv7 Intro to Networks (ItN) – which is accessible at <https://www.netacad.com>. Note: students are not required to complete any of the Quizzes or Labs in the CNA course modules, since they are not a part of IT 263 grading. But students are welcome to complete them on their own to strengthen networking skills.

| <i>Date</i> | <i>Topics</i> | <i>NetAcad ItN Readings</i> | <i>Assignments</i> |
|--------------------|---|---|---|
| Jan. 7 | Course Goals and Overview Network Basics, Cabling | 1.1-1.7, 3.1-3.8, 4.1-4.5 | |
| Jan. 14 | Wired Ethernet and Wi-Fi Ethernet Switching | 4.6, 5.1-5.2, 6.1-6.3, 7.1-7.4 | HW 1 out Lab 1 out |
| Jan. 21 | IPv4 addressing TCP and packet analysis | 8.1-8.2, 9.1-9.2, 11.1-11.7, 14.1- 14.6 | HW 1 due 1/23 Lab 2 out |
| Jan. 28 | IP subnets and routing IP Subnetting | 8.4-8.5, 9.1-9.2, | HW 2 out Lab 1 due 1/30 |
| Feb. 4 | Routers and Switches | 6.3-6.4 | HW 2 due 2/4 5:30 pm |
| Feb. 11 | Midterm Exam | | Lab 2 due 2/10 |
| Feb. 18 | Internet Applications IPv6 | 8.3, 9.3, 12.1-12.5, 15.1-15.4 | HW 3 out Lab 3 out |
| Feb. 25 | Network Security Encryption, Integrity and Authentication | 16.1 | HW 3 due 2/27 Lab 4 out |
| Mar. 3 | Network Vulnerabilities Firewalls | 16.2-16.4 | Lab 3 due 3/5 HW 4 out |
| Mar. 10 | Virtual Private Networks Network Address Translation | | HW 4 due 3/10 at 5:30 pm Lab 4 due 3/12 |
| Mar. 17 | Final Exam: | | |

The Technology Report will consist of an individual report on a relevant networking or security topic. More details on this assignment will be provided in Week 3.

The Class Participation grade will be based mainly on class attendance (section 801) or participation in online discussions (section 810). Attendance will be taken in each class session. Active attendance means that you will respond if I call on you in class.

Final grades will be calculated as follows: points earned divided by possible points in each category will be multiplied by the contribution percentages shown to yield a total course percentage score between 0% and 100%. Letter grades will be assigned as:

| | | | |
|----------------|----------------|---------------|----------------|
| A = 90% - 100% | A- = 88% - 90% | B+ = 86%-88% | B = 80% - 86% |
| B- = 78% - 80% | C+ = 76% - 78% | C = 70% - 76% | C- = 68% - 70% |
| D+ = 66% - 68% | D = 60% - 66% | F = 0% - 60% | |

Liberal Studies Domain Information

IT 263, Applied Networks and Security, is included in the Liberal Studies program as a course with credit in the Scientific Inquiry domain. Courses in the Scientific Inquiry domain are designed to provide students with an opportunity to learn the methods of modern science and its impact in understanding the world around us. Courses are designed to help students develop a more complete perspective about science and the scientific process, including: an understanding of the major principles guiding modern scientific thought; a comprehension of the varying approaches and aspects of science; an appreciation of the connection among the sciences and the fundamental role of mathematics in practicing science; an awareness of the roles and limitations of theories and models in interpreting, understanding, and predicting natural phenomena; and a realization of how these theories and models change or are supplanted as our knowledge increases.

Course Learning Outcomes

After completing IT 263, students will be able to:

- Describe network components, such as hubs, switches and routers, and how each of them forward and modify data packets.
- Describe packet forwarding through each network component
- Calculate IP address assignments using subnetting
- Discuss various types of security attacks and how to mitigate them
- Understand how to secure a network from common attacks
- Describe components of public key infrastructure (PKI) for web security
- Describe how secure web services (HTTPS) and virtual private network (VPN) services are provided using encrypted content and site authentication provided via PKI.
- Use tools such as Wireshark to analyze network traffic

Learning Outcomes for Scientific Inquiry courses

1. Students will understand the major principles guiding modern scientific thought. Students will demonstrate a mastery of the science content knowledge of their SID courses.
2. Students will know that science, technology, and math serve as mechanisms for inquiry into the nature of the universe. Students will:

- a. identify questions that can be answered through scientific investigations;
 - b. design and conduct a scientific investigation to test a scientific hypothesis;
 - c. use appropriate tools and techniques together, analyze, and interpret data to support or refute a scientific hypothesis;
 - d. develop descriptions, explanations, predictions, and models using evidence;
 - e. describe relationships between evidence and explanations using critical and logical thinking;
 - f. recognize and analyze alternative explanations and predictions;
 - g. communicate scientific procedures and explanations;
 - h. use mathematics in all aspects of scientific inquiry.
3. Students will understand and appreciate the interrelationships among science, technology and math. Students will:
 - a. use technology and mathematics to identify a problem or design a solution to a problem;
 - b. give examples of how science and technology inform and influence each other.
 4. Students will understand and appreciate the role of science in society and in their lives. Students will:
 - a. Provide examples of how science and technology impact our lives, and how social needs and concerns impact our development of technology and scientific investigation;
 - b. develop positive attitudes towards science, technology, and mathematics;
 - c. establish an ongoing experiential/service-learning interest in science, technology, and mathematics.
 5. Students will understand the nature of science, technology, and mathematics. Students will:
 - a. provide examples of the abuse of science, including the representation of unfalsifiable claims as science and other forms of pseudoscience;
 - b. explain the strengths and limits of scientific inquiry;
 - c. explain the difference between evidence and inference, and the ^{[[L]]}_{SEP}provisional nature of scientific explanations by providing examples of how our understanding of the workings of the world has changed in the past;
 - d. explain the difference between probability and certainty, and describe what is meant by uncertainty in the context of science, technology, and mathematics.

How SI Learning Outcomes Will Be Met

These Scientific Inquiry learning outcomes will be met through homework and lab assignments that will include: short answer questions that will require the application of networking concepts covered in class, labs in which the student will observe and analyze how data packets pass through a network, situational problem-solving, and researching recent security hacks and vulnerabilities.

Writing Expectations

Writing is integral for communicating ideas and progress in science, mathematics and technology. The form of writing in these disciplines is different from most other fields and includes, for example, mathematical equations, computer code, figures and graphs, lab reports and journals. Courses in the SI domain must include a writing component where that component takes on the form appropriate for that course

How Writing Expectations Will Be Met

In this course, students will submit many short-answer responses for homework assignments. They will be required to provide a discursive analysis of the data network design factors relevant to each homework problem. In addition, they will complete a larger writing project in the Technology Report, where they will review recent media reports on advances in network or security technologies or incidents, and synthesize these materials using comparative analysis and predictions for future technology directions.

Online Course Evaluations

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. They are a requirement of the course and are key to continue to provide students with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Students complete the evaluation online in [CampusConnect](#).

Academic Integrity and Plagiarism

This course will be subject to the university's academic integrity policy. More information can be found at <http://academicintegrity.depaul.edu/>. If students have any questions, they should consult their professor.

Academic Policies

All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the [University Academic Calendar](#). Information on enrollment, withdrawal, grading and incompletes can be found at: cdm.depaul.edu/enrollment.

Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential. To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at: csd@depaul.edu.