

REFERENCE ONLY

****Syllabus is subject to change****

****Students currently enrolled in this course should reference NYU Classes syllabus only****

New York University Tandon School of Engineering

Computer Science

CS-GY 6843 Computer Networking

Fall 2020

Professor Thomas Reddington

To contact professor: trreddington@nyu.edu

Office hours: by Zoom, email

Graduate Assistants

Prerequisites

Grad Status and CS-UY 2134 Data Structures and Algorithms

Be familiar with Linux, c and Python.

Course Description

This course takes a bottom-up approach to computer networking. After an overview of computer networks and the Internet, the course covers the link layers, network layers, routing protocols, transport layers (TCP, UDP), application layers and network services. As part of this class you will be given a (virtual) network of four routers and two PCs to configure and install network services. See <https://github.com/vital2/vital-development/wiki/Computer-Networks-Labs>

Topics at the application layer (network services) include client-server architectures, DNS, DHCP and HTTP and Web applications. Topics at the transport layer include multiplexing, connectionless transport and UDP, principles of reliable data transfer, connection-oriented transport and TCP and TCP congestion control. Topics at the network layer include forwarding, router architecture, the IP protocol and routing protocols including OSPF and BGP. Topics at the link layer include multiple-access protocols, CSMA/CD, Ethernet, CSMA/CA, wireless 802.11 networks and link layer switches. At the end of this course you will have a fully configured and functional IP network.

Course Objectives

This course is a lab-based course using **Vital** (<https://vital.engineering.nyu.edu>). Throughout the course the student will:

- 1) Design and configure an IP network of four routers and two PCs
- 2) Configure routing protocol OSPF
- 3) Implement and configure many of the services such as DHCP, DNS.
- 4) At the end of this course the student should be familiar with how to design and configure an IP network and services.
- 5) Be able to diagnosis and fix a misconfigured network.

Course Structure

- 1) Lectures
- 2) Class discussions
- 3) Homework (key to success in this course.)
- 4) Lab assignments that are done in the **Vital** Virtual Machines (VMs).
- 5) There may also be writing assignments.

Textbooks (Supplied as pdf)

(T) Tannenbaum & Wetherall, Computer Networks 5th ed., Prentice Hall, 2011

http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html

(P) Panvar, TCP/IP_Essentials_-_A_Lab-Based_Approach

(K) Kurose & Ross

(P) Peterson & Davie, Computer Networks 5th ed.

References

IETF RFC (<https://www.ietf.org/standards/>)

<https://www.iana.org>

<https://www.arin.net>

Grade Calculation

30% Homework

35% Midterm exam

35% Final exam

Course Requirements

- 1) reading before class
- 2) class participation
- 3) assignments
- 4) exams

Policies:

The exact topics listed in this syllabus are subject to change. As the class progresses, we will gauge where your interests lie and may adjust topics and schedules appropriately.

All homework and laboratory assignments are due on the date indicated on the course website. **Late assignments will not be accepted** so don't ask for an extension if you are late. Failure to submit an assignment will result in a grade of zero for that assignment. You will have ample time from the time an assignment is given until it is due. We will not consider a network outage, unavailability of your computer or a computer in the lab (whether a specific computer or any computer in general), or other computer problem that occurred the night before the due date to be a justification for submitting an assignment late. You may assume that there will be one lab and/or homework for each lecture.

In preparing your submissions for homework and laboratory projects you are authorized to use the textbook, your notes, web sites, on-line documentation and any other reference materials to which you have access. You may also discuss the assignment in general with other members of the class or with anyone else whom you believe can be of assistance (including possibly the instructor).

The work that you submit for grading **must**, however, be exclusively your own work. If you do obtain assistance from another individual, you must include an explicit note to that effect in your submission for the assignment. Further all references used must be cited. This means that if you are using various web sites for assistance in laboratory assignments and/or homework you must cite the exact URLs. In addition, any other printed material used must be explicitly cited.

NYU School of Engineering Policies and Procedures on Academic Misconduct

See: <https://engineering.nyu.edu/campus-and-community/student-life/office-student-affairs/policies/student-code-conduct>

Cheating & Plagiarism

Cheating or plagiarism on a lab or homework will result in a zero and the Computer Science department will track you going forward for subsequent infractions. Cheating on an exam is a much more serious infraction and may result in a lower grade for the course or an F.

Moses Center Statement of Disability

If you are student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities at [212-998-4980](tel:212-998-4980) or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway, New York, NY 10003

NYU School of Engineering Policies and Procedures on Excused Absences – complete policy is found [here](#) with associated [form](#):

- A. Introduction: An absence can be excused if you have missed no more than **10 days of school**. If an illness or special circumstance has caused you to miss more than two weeks of school, please refer to the section labeled Medical Leave of Absence.
- B. Students may request special accommodations for an absence to be excused in the following cases:
 1. Medical reasons
 2. Death in immediate family
 3. Personal qualified emergencies (documentation must be provided)
 4. Religious Expression or Practice

Deanna Rayment, deanna.rayment@nyu.edu, is the *Coordinator of Student Advocacy, Compliance and Student Affairs* and handles excused absences. She is located in 5 MTC, LC240C and can assist you should it become necessary.

NYU School of Engineering Academic Calendar – complete list is [here](#):

The final exam is on December 18, 2020. Final exams for graduate courses will be held on the last day of class. Do not make any travel plans until the exam schedule is finalized.

Also, please pay attention to notable dates such as Add/Drop, Withdrawal, etc. For confirmation of dates or further information, please contact Susana M. Garcia-Henriquez at sgarcia@nyu.edu.

Schedule

Lectures	Date	Reading	Topics
1	9/4/20	(T) 1.3, 1.4, 1.5, 1.6, 2.2	Introduction; VLAB, Wireshark, Physical Layer
2	9/11/20	(T) 3, 4.3, 4.8	Ethernet, IEEE 802.2, IEEE 802.3, switches
3	9/18/20	(T) 5.1, 5.5,5.6	Networks; IP Protocol, ICMP, ARP, ICMP, netmasks, IP Fragmentation
4	9/25/20	(T) 6	TCP & UDP Protocol
5	10/2/20	(T) 6	TCP Flow Control, Socket Programming
6	10/9/20	Midterm	Midterm
7	10/16/20	5	Routing Protocols, Distance Vector, Link State, OSPF, default route
8	10/23/20	(T) 5.2	DHCP, Subnets
9	10/30/20	7.1, 7.3	Network Services; DNS, HTTP,
10	11/6/20	8.10, 5.6.9	Onion Skin Routing, Mobile IP
11	11/13/20	1.5.3, 4.4,	Wireless, 802.11 MAC, 802.11 Frame
12	11/20/20	3.5, 5.1.2, 5.6.5	ATM, MPLS
13	11/27/20	Thanksgiving	Break
14	12/4/20	8.6,8.9.3	IPSec, TLS
15	12/11/20	5.2.8, 5.6.8, 5.6.7	IP Multicast, BGP
16	12/18/20	Final Exam	Final Exam