**New York University Tandon School of Engineering**

Computer Science

Course Outline CS-GY-6843 Computer Networking

**Fall 2021**

**Professor Rafail Portnoy**

**Live Lectures Saturday 8:30 am – 10:30am**

To contact professor: rp1912@nyu.edu

Office hours: on Request only

**Course Pre-requisites**

CS 2134 (CS2134 Data Structures and Algorithms) or equivalent

Knowledge of binary addition and multiplication system.

**Course Description**

This course takes a top-down approach to computer networking. After an overview of computer networks and the Internet, the course covers the application layer, transport layer, network layer and link layers. Topics at the application layer include client-server architectures, P2P architectures, DNS and HTTP and Web applications. Topics at the transport layer include multiplexing, connectionless transport and UDP, principles for 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, ALOHA, CSMA/CD, Ethernet, CSMA/CA, wireless 802.11 networks and link-layer switches. The course includes simple quantitative delay and throughput modeling, socket programming and network application development and Ethereal labs

**Course Objectives**

Understand state-of-the-art in network protocols, architectures, and applications

Process of networking research - Constraints in thought process of networking research

**Course Structure**

The Class will be comprised of recorded lectures and online discussions. The lectures will focus on the OSI Model Layers in detail.

**Readings**

The required text for the course is: Computer Networking, Kurose and Ross, 8th edition, Pearson, ISBN: **9780136681557**

You can access NYU’s central library here: <https://library.nyu.edu/>

The book, *Computer Networking* by Kurose will be delivered to you digitally. The **cost of the book is $27.75**, which will be added as a “book charge” to your bursar bill**,** this is a savings of $143.85 over the publisher’s price.

To ACCESS your book:

• A BryteWave (RedShelf) account will be created using your school email address

• An email will be sent to you with a link to your shelf.

• This emailed link will take you to your BryteWave Discover Shelf account where you can log in using your school email address and find your preloaded material on your Shelf.

• Additional support for email can be found here: **customerservice@brytewave.com**

Should you choose to remove yourself from the program and find your course materials elsewhere, you must login [here to the student portal](https://includedcp.follett.com/2015) and opt out of having the course materials provided to you by **September 17t**h.

***Information you should know:***

* Your username is your school email address.
* If you have opted out of a course, you can opt back in.

Happy studying and best of luck in class!

***Questions? Contact the bookstore:***

***email -***[*wsq.text@nyu.edu*](mailto:wsq.text@nyu.edu)

***phone -****212-998-4656*

**Course requirements**

You will typically have something due every week

**Online Access**

All students are required to have access to the https://brightspace.nyu.edu/ online environment.

**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 (CSD) at 212-998-4980 or [mosescsd@nyu.edu](mailto:mosescsd@nyu.edu).  You must be registered with CSD to receive accommodations.  Information about the Moses Center can be found at <https://www.nyu.edu/csd>. The Moses Center is located at 726 Broadway on the 2nd floor.

**NYU School of Engineering Policies and Procedures on Academic Misconduct** *(from the School of Engineering Student Code of Conduct)*

* + 1. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School’s rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School’s Policy on Academic Misconduct.
    2. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:
       - 1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person’s work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
         2. Fabrication: including but not limited to, falsifying experimental data and/or citations.
         3. Plagiarism: intentionally or knowingly representing the words or ideas of another as one’s own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
         4. Unauthorized collaboration: working together on work that was meant to be done individually.
         5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.
         6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.

Access the entire School of Engineering Student Code of Conduct here: https://engineering.nyu.edu/academics/code-of-conduct

**Collaboration**

Students are allowed (encouraged) to discuss the homework and programming assignments with each other. However, except for team projects, your written solutions must be your own work. Furthermore, if you worked with other people you must write down with whom you worked. The first violation of this policy will result in a 0 on that assignment and a reduction in your final grade (for example, from B+ to B). A second violation will result in an F. For additional information see the CIS policy on Collaboration and Programming Assignments.

**Learning Time Rubric**

*You may choose your own weekly breakdown, such as live webinar sessions.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Learning Time Element** | **Asynchronous\* / Synchronous\*\*** | **Time on Task for Students (weekly)** | **Notes** |
| Reading Assignments / Recorded Lecture | Asynchronous | 2.5 hours | Video format. Expect quizzes throughout the module or weekly chapter readings |
| Weekly Discussion Board | Asynchronous | 1.5 hours | Students are expected to post initial response to weekly topic questions. See Interaction Policy. |
| Assessment (Labs and Programming assignments) | Asynchronous | 2 hours | Students submit their assignment by [the end of the week] |
| Reading Assignment | Asynchronous | 2 hours | Reading assigned textbook chapters and journal articles. |
| Live webinars | Synchronous | 2 hours | Group discussion in class, live, overly weekly chapter |

\*Asynchronous learning is defined as any non-real time student learning, such as recorded lecture, podcast, interactive module, articles, websites, etc. This also includes any student-to-student or faculty-to-student communication that may happen with an asynchronous tool, such as discussion board, chatroom, e-mail, text, etc.

\*\*Synchronous learning is defined as any real-time student-to-student and/or faculty-to-student learning, such as a live webinar session or other video/audio communication service.

**Course Communication**

***Announcements*** -

Announcements will be posted on NYU Brightspace on a regular basis. You can locate all class announcements under the *Announcements* tab of our class. Be sure to check the class announcements regularly as they will contain important information about class assignments and other class matters.

***Email*** *–*

You are encouraged to post your questions about the course in the Forums discussions on Slack Channel. This is an open forum in which you and your classmates are encouraged to answer each other’s questions. But, if you need to contact me directly, please email me at [rp1912@nyu.edu](mailto:rp1912@nyu.edu). All homework, labs or programming assignments related questions must be researched first on their own time, then posted on Slack, then discussed with TAs during weekly reviews, and then can be forwarded to me. Typically, you can expect a response within 48 hours.

***Weekly Virtual Meetings*** *–*

Once a week, we will hold a virtual class meeting through the *Zoom* tool on NYU Classes. This weekly meeting is an opportunity for you to ask questions and gain clarification about the course content from myself and your peers. You are highly encouraged to attend these meetings. I understand that not all students will be available to attend these virtual meetings. Due to this fact, the meetings will be recorded so you can watch them when you are available.

**Interaction Policy**

You are required to be an active online learner in this course and expected to participate in the Active Learning Modules, weekly discussion boards, weekly virtual meetings, etc.

**Syllabus and Schedule of Lectures and Assessments**

**Topics**

 We'll be covering Chapters 1 through 6 of the 8th edition of the textbook:

* Overview of computer networking
* Application layer
* Transport layer
* Network layer – Data Plane
* Network layer – Control Plane
* Link layer

**Extra Credit**

All homework questions should be directed to the class forum online. Everyone is encouraged to participate. Top 2 most active students with most correct responses to questions will receive 2 additional points towards their Final course grade. No extra credit is given on labs and programming assignments, but students are encouraged to do extra credit, as it will be counted towards final assignment grade if there are errors in the submission.

**GRADING:**

**Quiz Assignments, (10% of final grade)**There will be a quiz after completion of each chapter and will be based on that chapter

**Wireshark Assignments, (15% of final grade)**

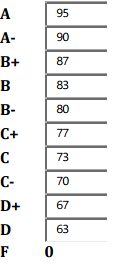
**Programming assignments, (15% of final grade)**

**Midterm, (30% of final grade)**

This will be a timed examination which will cover the materials of the first 3 chapters of required reading.

**Final Examination, (30% of final grade)**

**Grade Minimum %**



**Lecture and Assignment Schedule**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Week** | **Date** | **Chapter** | **Assessment is due by end of day Saturday of the lecture week. Quizzes are at the end of each chapter (every other Saturday)** | | |
|  |  |  | **Suggested Exercises** | **Wireshark** | **Programming Projects** |
| 1 | 9/4 | 1 | Ch. 1 R4, R12, R18, R19 |  |  |
| 2 | 9/11 | 1 | Ch. 1 R20, P6, P25, P27, P28 | Getting Started |  |
| 3 | 9/18 | 2 | Ch. 2 R4, R10, R11, P1, P4 |  |  |
| 4 | 9/25 | 2 | Ch. 2 R12, R18, R21, R25, P6 | HTTP | Web Server |
| 5 | 10/2 | 3 | Ch. 3 R3, R4, R7, R13 |  | SMTP Mail Client |
| 6 | 10/9 | 3 | Ch.3 R5, R10, R14, P4 | UDP |  |
| 7 | 10/16 |  | Fall BREAK | TCP |  |
| 8 | 10/23 | Midterm Chapters 1,2,3 Assessments | | | |
| 9 | 10/30 | 4 | Ch.4 R3, R4, R7, R13 |  |  |
| 10 | 11/6 | 4 | Ch.4 21, R22, R27, R31, P15 | IP |  |
| 11 | 11/13 | 5 | Ch.5 R4, R6, R13, P3 |  | Traceroute |
| 12 | 11/20 | 5 | Ch.5 R16, R17, R19, R23 | Ethernet |  |
| 13 | 11/27 | 6 | Ch.6 R7, R8, R9, R11, R15 |  |  |
| 14 | 12/4 | 6 |  | NAT |  |
| 15 | 12/11 | 8 |  |  |  |
| 16 | 12/18 | Final  Examination |  |  |  |

**Note:** The assignments (Wireshark and Programming Projects) must be submitted on Gradescope by 11:55PM on their respective due dates. Late assignments will be accepted until 12/11 SHARP!!! Programming assignments will consist of code uploaded to a GitHub repository; you will need to provide Gradescope permission to access your repository. Wireshark assignments will consist of a packet capture uploaded to Gradescope combined with a Google Form that will be linked on the Brightspace class page. (The packet capture can either be captured directly by the student or use one of the pre-recorded captures supplied by the textbook authors.)