

ECEC 357 Introduction to Computer Networks

Fall 2020 Syllabus

Course Meeting Times and Platform

- This course will be taught mostly synchronously on the scheduled course meeting times: Tuesday and Thursdays 9:30am–10:50am on Zoom. Some weeks may include asynchronous content (pre-recorded video). All synchronous lectures will be recorded and made available shortly after the lecture ends.
- Links for office hours and lecture Zoom meetings can be found on the course menu page.
- Course communication: students will receive an email with an invite to join the course Slack workspace. Except for this first email, course communications will happen on Slack.
- Course material (notes, assignments, solutions, grades) will be distributed in Blackboard Learn, which can be reached through DrexelOne.

Technology Requirements

- You will need a device for which you have administrator rights to install software.
- You will also need a built-in or external web cam and a built-in or external microphone or headset. These items are needed to participate in online lectures, office hours, and the exams.
- We will use Slack for course communication: you will need to use the web version or install the App on your device.
- You will need to scan and upload your homework and possibly quiz solutions. If you don't have access to a scanner, a free cell phone app capable of high contrast imaging, such as Adobe Scan, TinyScanner or CamScanner will do just fine. Don't upload something that is not legible.
- You may need to install the Respondus Lockdown Browser to access and take the course's synchronous Quizzes.

Instructor Information

Dr. Jaudelice de Oliveira
Associate Professor
Department of Electrical and Computer Engineering

Office hours: Mondays 9:00am–10:00am (or by appointment - please use DM on slack to request an appointment)
Email: Please use Slack for questions. You can DM the instructor, if you prefer a private message.

Teaching Assistant Information

Dubem Ezech
Ph.D. Student
Department of Electrical and Computer Engineering

Office hours: Wednesdays 9:00am-11:00am
Email: Please use DM on slack.

Course Catalog Description

ECEC 357 Introduction to Computer Networks 3.0 Credits

History of the Internet; introduction to packet switching, circuit switching and virtual circuit switching; statistical multiplexing; protocol layering; metrics of network performance including bandwidth, delay and loss; medium access protocols and

Ethernet; routing algorithms; end-to-end issues; flow and congestion control; an overview of application layer protocols.
Prerequisites: ECE 105 or ECE 203 or CS 171.

Course Objectives

The objective of this course, together with ECE-C432, is to provide students with a thorough introduction to a variety of important principles in networking, with a strong focus on the Internet. Specifically, the objectives of ECE-C357 are to develop in students a strong foundation in the following topics:

- History of the Internet; Circuit switching, packet switching, statistical multiplexing, and the principles behind protocol layering; performance metrics such as delay, bandwidth, and packet-loss ratio.
- Application layer protocols, algorithms and design principles focusing especially on the web and the Domain Name System.
- Pipelined transfer protocols including go-back-N and selective repeat; The Internet transport layer protocols: UDP and TCP, TCP's Flow and Congestion control.
- Packet forwarding at the network layer; the Internet Protocol (IP)
- Routing algorithms
- Medium access protocols and Ethernet

Statement of Expected Learning

ECEC 357 is a 3 credit course taught via two online lectures of 1 hour 20 minutes per week.

Course Outcomes

Upon completion of this course, students will be able to:

- compare and contrast circuit switching and packet switching.
- enumerate the main performance metrics used to analyze networks.
- describe the essential differences between connectionless and connection-oriented service and describe the Internet protocol stack.
- enumerate application layer protocols, transport layer functions and protocols, network layer principles and routing algorithms, and link layer protocols and functionalities.
- describe with some level of detail all the steps necessary (from the Internet stack) for a webpage to display on a device screen after a user has typed in its url and pushed "enter".

Textbook

Computer Networking: A Top-Down Approach

Authors: James F. Kurose and Keith W. Ross

7th edition (**6th also works well**), Addison Wesley

Please wait for an announcement on the first class before ordering the book.

Assignments, Assessments and Graded Activities

The grading in the course is based on homework assignments, short asynchronous content quizzes, breakout-room assignments and weekly quizzes (starting week 3). The grade distribution will be as follows:

Homework Assignments:	10%
Asynchronous Content Quizzes:	15%
Breakout Room Assignments:	15%
Synchronous Weekly Quizzes	60%

Grading Scale

Final grades will be calculated numerically with letter grades being converted from numerical scores according to the chart below (instructor may curve grades). Your course letter grade may be assigned as follows:

95 – 100	A
90 – 94	A-
87 – 89	B+
83 – 86	B
80 – 82	B-
77 – 79	C+
73 – 76	C
70 – 72	C-
65 – 69	D+
60 – 64	D
00 – 59	F

Syllabus and Class Schedule

The following is the topic list for the course. **This schedule is subject to change.**

Weeks 1-5:

- History of the Internet; circuit switching vs. packet switching; statistical multiplexing; virtual circuit switching.
- Performance metrics; bandwidth, delay, packet loss and their inter-relationships; application needs and network services.
- Connectionless vs. connection-oriented service.
- Protocol layering and the rationale behind it; the Internet protocol stack; service models in the Internet.
- Application layer protocols and principles; communicating processes, and ports; TCP/UDP ports and IP addresses.
- The Web and HTTP; persistent and non-persistent connections; web caching.
- The Domain Name System (DNS); DNS services and messages.
- Transport layer protocols; multiplexing and de-multiplexing; UDP.

Weeks 6-11:

- Go-Back-N and selective repeat.
- TCP segment structure; TCP flow control principles; round-trip time estimation and timeout.
- Causes and implications of congestion; TCP congestion control;
- Forwarding and routing at the network layer;

- Routing algorithms
- The Internet Protocol (IP)
- Medium access control, Ethernet protocol

Homework

- Due date: Homework is due at the beginning of class, one week following the class in which it was assigned.
- Submission: Your homework solution must be uploaded within Learn by the due date/time - If you don't have a scanner at home you can use a free smartphone app (CamScanner, Adobe Scan, Tiny Scanner) to make a multi-page PDF file of high quality images.
- Late homework: Late homework will not be accepted.
- Homework grade: **An honest attempt (show your work!)** at the homework problems must be turned in for you to receive 100% credit for the homework. Homework will not be graded. However, **turning in your homework on time gives you access to its quiz**. No homework = No quiz.
- Solutions: Solutions will be posted in Learn on the homework's due date.

Asynchronous Content Quizzes

A few weeks will include asynchronous content, short lecture videos, to be watched at the student's convenience. Each asynchronous content will be accompanied by a short asynchronous online quiz based on the content of the lecture. An asynchronous content quiz must be completed by its due date (prior to the next lecture) for you to receive 100% credit,.

Breakout Room Assignments

The course will include synchronous breakout room assignments (about 4-5 instances). The instructor will divide the class into smaller groups in Zoom breakout rooms to solve a problem as a group and submit a group solution for grading. Student will have the option to work on their own, but group work is highly encouraged.

Synchronous Weekly Quizzes

A synchronous quiz (scheduled during class time) will be issued a week after the homework is due (**starting on Week 3**). Turning in your homework on time gives you access to its quiz. The quiz will be based on the homework problems, that is, the quiz will be a question on the material that is being covered on that homework - not exactly the same problems.

Calculators are in general not permitted and the use of cell phones or any other devices capable of more advanced computing is prohibited.

Instructor Feedback

The instructor will make every effort to respond to slack posts within 24 hours (Do not expect to - although you might - hear from me on weekends). Quizzes will be graded promptly. The instructor will provide feedback on any assignment submitted on time within a week.

Policy on Absences

Failure to complete an examination will be excused only under extraordinary circumstances **with prior approval** of the instructor. A missed examination, assignment or a homework without prior approval and without legitimate reasons will be graded at zero points.

Policy on Academic Honesty

Each student is expected to complete the weekly quizzes independently; it is not acceptable to copy another student's work or to copy solutions from any other source. Barring action on flagrant violations, an honor system will be assumed.

The following is a partial list of activities that will be considered to constitute academic dishonesty:

- Presenting the work of another person (fellow student or not) as your own or providing answers to other students.
- Cheating in an examination such as through conversations/chats with other students, browsing the web, etc.
- Unauthorized use of technology such as browsers and cell-phones during an examination.
- Failing to take reasonable measures to protect your work from use by other students in assignments, projects or examinations.

Penalties for academic dishonesty will be strictly enforced and will include a lowering of the grade or a failing grade in the course.

University Policies

Add/Drop/Withdrawal: Please note that the add/drop period finishes at the end of week 1. Withdrawal period extends from week 2 through week 7.

Missed Classes: Absence from class will be based on the University's absence policy. Please review the link below:
<http://drexel.edu/provost/policies/absence/>

Academic Integrity, Plagiarism and Cheating Policy: Please review the University policy regarding academic integrity:

<http://drexel.edu/provost/policies/academic-integrity/>

http://drexel.edu/studentlife/community_standards/studentHandbook/

Course Drop Policy:

<http://drexel.edu/provost/policies/course-add-drop/>

Course Withdrawal Policy:

<http://drexel.edu/provost/policies/course-withdrawal/>

Course Change Policy: The instructor reserves the right to modify the course, as necessary, during the term: including policies, evaluations, due dates, course content, schedule, assignments or requirements. All changes will be communicated in lecture and/or via the course DrexelLearn page.

Weather, Emergencies and University Closing: University closing or delayed opening information will be posted on www.drexel.edu. In the event of the need to close or delay the daily opening of a campus, the University will provide notice via Web, telephone, and the DrexelALERT system. Closing or delayed opening information will be announced at 215-895-MELT (6358). The University determines whether to close or delay opening due to inclement weather, not the instructor. Therefore, please do not contact the instructor for this information.

Resources to Support Students and Student Learning

Additional Academic Support: The staff in the Center for Learning and Academic Success Services (CLASS) are ready to help: https://drexel.edu/studentlife/student_family_resources/class/). Students can reach out to their team of academic coaches by emailing academicsuccess@drexel.edu. Additional academic support and tutoring is also available online through the Office of the Learning Alliance: https://drexel.edu/studentlife/student_family_resources/learning-alliance/

Office of Equality and Diversity - Disability Resources: Students requesting accommodations due to a disability at Drexel University need to request a current Accommodations Verification Letter (AVL) in the ClockWork database before accommodations can be made. These requests are received by Disability Resources (DR), who then issues the AVL to the appropriate contacts. For additional information, visit the DR website at drexel.edu/oed/disabilityResources/overview/, or contact DR for more information by phone at 215.895.1401, or by email at disability@drexel.edu.

Drexel Counseling Center: Students experiencing stress and anxiety, should contact the Drexel Counseling Center: <https://drexel.edu/counselingandhealth/counseling-center/overview/>

Drexel COVID-19 Response: Further guidance regarding COVID-19 can be found at Drexel's Response Coronavirus website: <https://drexel.edu/coronavirus/>