NET 362 Syllabus – Principles of Data Communications – Winter 2022

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Office Hours	Thursdays 9:30 – 11 am (or by appointment)	**Website**	d2l.depaul.edu
Class Location	**CDM 224**	**Lecture time**	**Tuesdays 5:45 pm – 9 pm**

--- Any changes made to this syllabus will be announced in class -- This is Version 1: Jan 1 ---

Course Overview

This course provides a clear theoretical and operational understanding of the fundamental principles of data communications networks, including data encoding, transmission, and compression. Error control, flow control and congestion control will also be considered in detail, along with the quality of service tradeoffs inherent in different transmission and switching formats.

PREREQUISITE(S): (NET 311 or CSC 373) and (IT 263 or NET 261) are prerequisites for this course. It will be assumed that you have already learned about OSI standards, topologies, transmission media, IPv4 addresses, switching and routing before this course.

Resources:

Optional text: **Data Communications and Networking**, 5th edition, Behrouz A. Forouzan, McGraw-Hill, 2012**.**

Grade distribution over required coursework

Task	% of final grade
3 Homework assignments	20 %
1 Quiz	10 %
Midterm exam	30 %
Final exam	30 %
Class participation	10 %

Coursework and participation

Course topics expected to be covered in each class are listed in the course schedule on page 3. Note that this is a tentative schedule, which may be adjusted as we advance through the course, depending – for example – on discussions arising in class. Class Participation will be earned as follows: students gain 0.5% credit towards their final grade for each lecture actively attended (up to 10% of final grade). Active attendance means responding to questions and/or contributing to class discussions.

Course policies & guidance

General 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. Note that January 16th, 2022 is the last date to drop the class with no penalty.

Mental Health and Academic Assistance

Balancing the hard work of achieving your educational goals with the other demands of life is difficult at the best of times. For many of us, for a variety of reasons, things are all the more difficult now. I want to make sure you feel comfortable, not embarrassed, reaching out to me for support. I will also point out where the University has great resources just a phone call or email away. These have been created and maintained for you, so use them. Sometimes people feel like their situation isn't the worst possible, so they assume they do not need help, but don't let that prevent you from reaching out!

- *DePaul University Counseling Services* – mental health is as important as physical health, and we have professionals just a call away: https://offices.depaul.edu/student-affairs/about/departments/Pages/ucs.aspx (call (773) 325-7779 or 911 for emergency).
- The kind people at the *Office of the Dean of Students* can help you with a wide range of topics, including figuring out if you should withdraw or apply for an incomplete: https://offices.depaul.edu/student-affairs/about/departments/Pages/dos.aspx.
- There are lots of additional, more specific resources listed here with the *Office of Student Affairs*, including crisis hotlines and sexual assault resources: https://offices.depaul.edu/student-affairs/support-services/counseling/Pages/Crisis-Hotlines.aspx.

Plagiarism

There is a "zero-tolerance policy" regarding plagiarism. This stands for both the plagiarizer and the person(s) facilitating plagiarism (e.g., allowing someone to plagiarize their work). There's a great resource put together by DePaul University, which you can find here: https://resources.depaul.edu/teaching-commons/teaching-guides/learning-activities/Pages/avoiding-plagiarism.aspx

Academic Integrity

One of the core principles of education is establishing Academic Integrity. It is a viable component in the classroom, one by which learning objectives could be honestly and efficiently met. The principles of academic integrity should span all of your learning endeavours, within and beyond this course. For more information on Academic Integrity, especially definitions and norms, please visit: https://resources.depaul.edu/teaching-commons/teaching/academic-integrity/Pages/default.aspx. This will be the basis of all of our interactions in this course. If you have any questions or concerns, feel free to drop by and see me. All students are expected to abide by the University's Academic Integrity Policy which prohibits cheating and other misconduct in student coursework. Publicly sharing or posting online any prior or current materials from this course (including exam questions or answers), is considered to be providing unauthorized assistance prohibited by the policy. Both students who share/post and students who access or use such materials are considered to be cheating under the Policy and will be subject to sanctions for violations of Academic Integrity.

Deadlines and submission policies

Assignments are due on D2L by 11:59 pm on the deadline day posted on each assignment, unless otherwise announced. All of your work (exams, assignments, report, etc) must be your original work. Any evidence of departure from Academic Integrity will be reported, and ensuing sanctions will be pursued. You are expected to read, understand and comply with DePaul's policy on Academic Integrity. Late submissions receive a 10% penalty for every 24 hour delay, starting from the minute past the deadline.

Missing exams and/or deadlines

Emergencies happen and that is quite understandable. If you miss an exam due to an emergency (e.g., accident, emergency hospitalization, etc) please communicate with me as soon as you can to resolve any outstanding issues. If a major illness hinders you from attending an exam or submitting a deliverable (assignment), you need to contact me beforehand via e-mail. Notices received after the deadline will not be accounted for (unless for an emergency as highlighted above). If the illness occurred after the deadline, even if accompanied with a doctor's note, you would receive a zero for that exam/deliverable. Otherwise, missing an exam without prior approval will warrant an automatic zero. Generally, all extensions are considered on a case-by-case basis. Falling sick prior to a deadline does not automatically warrant an extension. If you have any questions or concerns, please don't hesitate in contacting me.

Disability Accommodation

Feel free to speak to me as soon as possible regarding any difficulties you feel you might be encountering in this course, ideally within our first week of classes. If you feel that any given disability is hindering you, or you are not sure and wish for a consult, please reach out to CSD at csd@depaul.edu; they are trained to help out and point you to the appropriate resources.

Grade calculation

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%

Class schedule and topics

Week	Class date	Tentative Topics	Textbook readings
1	Jan 4	Course overview Introduction, standards & OSI Topologies & TCP/IP layers	Ch. 1 Ch. 2
2	Jan 11	Physical Layer: Data + Analog & Digital Signals Transmission impairments and Circuit capacity	Sec. 3.1 – 3.3 Sec. 3.4 – 3.7
3	Jan 18	**In-class Quiz** Digital Transmission & Line coding Modulation and Demodulation	Sec. 4.1 Sec. 4.2
4	Jan 25	Analog Transmission Multiplexing & Spread Spectrum	Ch. 5 Ch. 6
5	Feb 1	Transmission media **Midterm exam**	Ch. 7
6	Feb 8	Error Detection and Correction TCP Error & Flow Control	Sec 10.1 – 10.5 Sec. 23.1 – 23.2
7	Feb 15	TCP Congestion control and Transport layer services	Sec. 24.1 – 24.3
8	Feb 22	Data Compression HDLC and PPP Switching Vs. Routing	Sec. 28.1 – 28.2 11.3 – 11.4 8.1 – 8.3
9	March 1	Audio and Video Streaming DASH & Hybrid streaming	Sec. 28.3 DASH paper
10	March 8	Networking for Next Generation Systems Course review and Final Exam preparation	5G paper
11	March 15	**Final Exam (6 – 8:30 PM)**	

Learning Outcomes

After completing this course, students will be able to:

- Explain data communications foundations and synthesize operational mandates of each layer in the OSI stack.
- Determine information capacity of various types of channels
- Interpret encoded, modulated and multiplexed signals
- Apply various method of data compression
- Analyze TCP Error, flow and congestion control mechanisms, and identify their impact on network operation
- Distinguish basics of Dynamic Adaptive Streaming over HTTP (DASH) and video streaming.
- Explain and interpret impact of data management protocols on Internet operation and scalability.

Zoom Overview:

We're going to meet using **Zoom** for the <u>first two weeks of classes</u>, a video conferencing tool. Zoom allows people to gather in a virtual room and meet synchronously, as well as record the session for offline viewing. Please find the access info to join our Zoom classes in the "Welcome to Class" news item. During our sessions, I'll be speaking to you directly, and going over Power Points slides (sharing my screen). I'll also be recording our sessions and uploading them to our D2L course site.

You are expected to **actively** attend all classes via Zoom, in lieu of attending in person for an in-class session. You need to participate in the discussions, and demonstrate that you are engaged with the material. Throughout the classes, you will be called upon to answer questions and/or engage in discussions. Your participation grade is earned through these interactions. This is vital to sustain a lively "remote class" environment. You may be called upon during the class to answer a question.

Best Practices During our Zoom Session:

List your name: Please sign in with your full name, so I know who's who.

Muting your audio (and video): Unless you're actively speaking, please keep your audio muted. This will help prevent background noise in our discussion. If you need to get up and change locations, please mute your video before you move. You'd be surprised how distracting it is to see a camera in motion during the session!

Speaker View and Gallery View: There are two ways to view the Zoom participants:

- Speaker View: This view prioritizes the person speaking, so you'll see a large-screen view of the speaker and a handful of other participants right above.

- Gallery View: This is the "Brady Bunch" view, where you'll see a grid with small videos of all participants. A small green box will appear around the person speaking.

Screenshare and Full Screen View: If someone in the Zoom session starts sharing their screen, Zoom will automatically go into "full screen mode" on your computer. You can navigate out of full screen mode by hovering your mouse over the video, and at the top, clicking View Options > Exit Full Screen.

Muting notifications: If you un-mute your audio and you're speaking, remember that the class will be able to hear any audio coming through. So, if you get a text message or email notification, we'll hear it. You may want to mute your notifications when our Zoom session starts.

Chat option: Given that I'll be running multiple tasks, I **will not** be able to look at the chat window all the time. Please don't use it. If you need to say something, simply use the "*raise your hand*" option.

Video: Yes, I am planning to keep my video on. You are encouraged to do so as well, however that is totally up to you. If you do keep your video on, please conduct yourself as you would in a public place. I'd rather not make a lengthy list of Zoom etiquette here, but I trust you'll use your common sense :)

Video background: While it is tempting to use the "background" option, remember that it will (very) quickly eat up your battery power. Also, it can get distracting :) if you choose one, please make sure it is neutral/simple.

Additional Zoom Resources: Getting Started with Zoom | How to Join a Meeting

COVID-19 Health and Safety Precautions

Keeping our DePaul community safe is of utmost importance in the pandemic. Students, faculty and staff are expected to

(1) wear a mask as required at all times while indoors on campus;

(2) refrain from eating and drinking in classrooms;

(3) keep current with their COVID-19 vaccinations or exemptions;

(4) stay home if sick;

(5) participate in any required COVID-19 testing;

(6) complete the online Health and Safety Guidelines for Returning to Campus training; and

(7) abide by the City of Chicago Emergency Travel Advisory. By doing these things, we are Taking Care of DePaul, Together.

The recommendations may change as local, state, and federal guidelines evolve. Students who do not abide by the mask requirement may be subject to the student conduct process and will be referred to the Dean of Students Office. Students who have a medical reason for not complying with any requirements should register with DePaul's Center for Student with Disabilities (CSD).

Course evaluations and discourse

During the course, your feedback on how well the course is running (pace, difficulty, resources, etc) will be solicited. This is a vital component in improving and tailoring this course to your learning objectives. While all students are expected to achieve the learning outcomes highlighted above, each of us inevitably learn differently. This course is designed to meet the aforementioned learning outcomes, and I will endeavor to incorporate different activities (e.g., Kinesthetic learning) to improve the learning experience.

If you have any concerns about how the course is running, or would like to suggest an improvement, feel free to reach out to me. Also, on week 10, we will hold the official course evaluations in class.