# SYLLABUS

## NET 377 (Sections 901/910)
## Fundamentals of Network Security
## Spring 2023

**Class Meeting:**  Tuesdays 5:45 – 9:00 PM in person (Recordings available by next day)
Additional recordings before and /or after a class, if any, will be available
on d2l.

# Instructor Information and Communication

**Instructor :**  Dr. Anthony Chung (he/him)

**Office Hours :**  M 3:00-3:45 PM; Tu W 4:00-4:45 PM; F 8:45-9:00 AM
(via Zoom - Link to join in d2l, under Content->Course Syllabus
and Information)

**Email :**  achung@depaul.edu
**Phone :**  (312)-362-8724 (Note that I may not be on campus to pick up the phone.
However you may leave a voicemail)

**Class Engagement:**  We will stay engaged using the following tools:
- Announcements on d2l
- Zoom Office Hours
- Flip – a video discussion forum for weekly check-ins.
- D2l discussion forum in text
- Emails

It is highly recommended to subscribe to announcements and discussion
forums to get latest information/discussion. Consider using the Pulse app
https://resources.depaul.edu/teaching-commons/teaching-
guides/technology/desire2learn/tools/more-tools/Pages/notifications.aspx

**Course Home Page:**  https://d2l.depaul.edu (Open on or before March 23, 2023)

**Email and Other Forms of Communications:**
In order to manage emails to better serve both the students and the professor,
**pay attention to ALL of the following:**

o  **You MUST use the email account provided to you by DePaul (with depaul.edu
domain). See this link for information and the advantages of using the account -
https://offices.depaul.edu/information-services/services/email/student-
email/Pages/default.aspx**

- **You MUST include NET377 (case insensitive)** in the subject line of the email as they will be directed to the appropriate mailbox where I check for emails related to this course.

- I meet with students through Zoom, answer student emails, and respond to discussion forums etc **during my office hours.** In this way, you know exactly when you expect to hear from me by these means of communications. If you contact me close to the end of my office hours I may have to respond during the next office hours period. If you do not hear from me after two office hours periods, check to make sure that you include NET377 in the subject, email me again, or call to leave a message.

- **When you have a question, choose ONLY ONE appropriate means of communication (email, discussion forum, or meet me during office hours). Do not repeat the same question through multiple means to reduce unnecessary duplicates. If an issue is resolved, kindly let me and/or the class know using the same mean of communication.**

- I will be available through Zoom during the office hours. If I cannot make some office hours due to special circumstances, announcements will be made on d2l.

  Depending on the complexity of your questions, **sometime we can get more out of meeting by Zoom interactively rather then by emails.**

- Given my response time frame and office hours, you should **work on your assignments early so as to give yourself ample time to ask questions.**

- Please observe the following email etiquette which is appropriate in a professional setting.

  - Before sending questions via email or posting questions on the d2l discussion forum, make sure that your question is not already answered on the course syllabus, the d2l website (announcements, discussion forums, assignment information etc), or in the lecture recordings.

  - Questions that are of general interest to the entire class should be posted on the course discussion forum.

  - In addition to including NET377 in the subject line, **be specific about the subject of the email in the mail subject heading and use proper spelling, grammar, and punctuation, also include <u>your name</u> in the message body.**

# Course Information

**Prerequisites:**   NET 365
**Note: This is a STRONG prerequisite, Students are expected to have a good knowledge of TCP/IP including IP packet format, IP addressing, subnetting, IP routing, and TCP operation.**

**Required Text:**   (Available through DePaul's ebooks library – Safari)
**CCNA Security 210-260 Official Cert Guide**
**Santos & Stuppi, Cisco Press/Pearson, 2015.  ISBN: 978-1587205668 (IMPORTANT – Note that there is another book with similar title. Make sure that you refer to the ISBN number)**

**References:**        **Textbooks from NET365 (and NET363)**

## Required Software:

**Cisco Modeling Lab (CML) Version 2.2.3 –** we will be using this environment for four of the five labs. The NET program committee has decided that this is the best solution for students to be able to remotely perform labs that involve configuration of Cisco devices. This will be used in many NET courses. Students are responsible for purchasing a license ($199 a year). We have standardized to use version 2.2.3 across courses and in the Networking and Security Lab.

Note that even though the latest version we tested is 2.4.x (and 2.5 just came out in March), we had mixed experiences with 2.4.x because it 4 is more resource intensive, has a different core virtualization that is really aimed at starting integration in enterprise environments. Some symptoms include, CML "Freezing", console not available from browser and node just never finishing to boot.

## Course Description and Objective:

This course is an introductory class in network security and security applications. Both the theory behind security methods and their applications in today's business environments will be presented. Topics include: Review of components used in an enterprise security infrastructure including routers, firewalls, security auditing and assessment tools, Virtual Private Networks (VPN), and Intrusion Detection/Prevention Systems. The integration of the different components will be studied in detail, including IP addressing, Network Address Translation (NAT), design of firewall rule sets and performance considerations.

## Learning Outcomes:

After this course you should be able to:
- Explain the different network security threats
- Explain the technologies available to mitigate these threats
- ***Write appropriate firewall rules***
- Configure basic firewalls and VPNs.

- Design overall communication and security infrastructure
- Explain the basics of cryptography.
- Perform vulnerability assessments and based on results improve security posture

**NOTE: this is a <span style="color:red">CHALLENGING</span> course. This is NOT a course that approaches network security from a user or high-level management point of view. This course covers the technical details of technologies involved and requires students to have an in-depth understanding of the technical details. To do well you must apply yourself fully to the class from the beginning. It will be difficult to catch up once you fall behind on some concepts. Make sure that you can dedicate sufficient time outside of class to learn the materials.**

## Tips for online learning:

DePaul has created this document with tips to be a successful online student: https://drive.google.com/file/d/1qGG_cnVtqknOp9ENRMl5yt51_gtY6-cO/view

This is DePaul's general website for student success: https://resources.depaul.edu/student-success/Pages/default.aspx

## Grading:

| | |
|---|---|
| **4 Homework Assignments** | **28%** |
| **Lab Assignments (Using CML)** | **35%** |
| Lab 1 – Connectivity | |
| Lab 2 – Basic Firewall | |
| Lab 3 – Firewall with NAT | |
| Lab 4 – Site-to-Site VPN | |
| Lab 5 – Site-to-Site VPN with DMZ | |
| **Midterm** | **15%** |
| **Security Design Report** | **14%** |
| **Class Participation** | **18%** |

## Important Notes on Grading:

- The maximum total is 110 but will be capped at 100. This is like a 10% of extra credits.
- <span style="color:red">You must score at least 50% in the midterm to pass the course.</span>

## Grading Scale:

| A | 90-100% | B- | 77-79% | D+ | 64-66% |
|---|---|---|---|---|---|
| A- | 87-89% | C+ | 74-76% | D | 60-63% |
| B+ | 84-86% | C | 70-73% | F | < 60% |
| B | 80-83% | C- | 67-69% | | |

## About Class Participation:

a. **In-person section students** are required to attend class for the entire period, and view any additional videos.
**OL-Async students** are required to view COL recordings and any additional videos.

b. Weekly video check-ins on flip.com (see the welcoming announcement on d2l for details). The goal of this is to encourage students to be reflective about learning, to stay connected, and to keep up with the class schedule. It is also for me to get a sense of how students are doing in the class.

c. For every lecture module there will be a **participation quiz**. The questions will be on the "in class" exercises and certain points that we emphasized in the lectures and the recordings. Students are allowed to take the quiz **up to 10 times** before the quiz is due and the **highest** score will be used towards the final grade. To do well in the quiz you are recommended to

   i. Take notes while viewing the lectures, especially on points not in the slides but are filled in within the lecture videos, and points where I emphasize that students should write down.

   ii. When an "in class" exercise is given, students should work through the exercise before checking solutions.

   iii. Make sure that you get the answers of the in class exercises. Some quiz questions will be on the in class exercises.

d. Failure to do a and/or b, above will result in lowering of the participation grade by 1 point irrespective of the participation quiz score.

Here's a link from Columbia about the importance of note taking (and resources)
https://www.cc-seas.columbia.edu/node/31875

Although you can choose to take notes using computer or by hand, here's an article on recent research showing the advantage of taking notes by hand.
http://www.npr.org/2016/04/17/474525392/attention-students-put-your-laptops-away

## About the Midterm:

o **In-person section students**: Take the exam during class time.

**OL-Async students:** Take an **in person-proctored exam**.

Having exams proctored ensures the integrity of DePaul's programs is upheld. They are one of the quality features of online learning at CDM. Graduate schools and employers know if you earn a degree from CDM, we ensure you have learned the material and taken the assessments yourself.

See https://www.cdm.depaul.edu/onlinelearning/Pages/Exams.aspx for information on how to schedule a proctored exam.

o Study guides will be provided at least one week before the exam.

- Exam is closed books and notes. You are allowed to bring one crib sheet (8 ½" X 11") with any notes on both sides.
- You are given 2 1/2 hours for the exams.
- For **OL-Async students**:
  - **Midterm window: Monday April 24 to Wednesday April 26.**

# Course Policies

## On Campus Mask Policy:

DePaul University continues to monitor the pandemic and will release the latest policy. The latest policy pertaining to this course will be announced on d2l.

For more information, see https://resources.depaul.edu/coronavirus/guidance/for-students/Pages/default.aspx

## Changes to Syllabus:

This syllabus is subject to change as necessary during the quarter.  If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L.

## Late submissions policy:

- **Late homework assignments (HW1 to 4) and Participation Quizzes will not be accepted.** I am strict about this.  Homework solutions are available right after a homework is due and I cannot accept any assignments submitted after that. **All due dates and time are given in the submission boxes.** Please check the schedule and be sure of the due dates. You must use the homework submission system (drop box) through d2l. If there are problems with the submission system, you may email me a copy of the assignment BY the due time.

  - **Late lab assignments will be accepted with the following penalty:**
    - Up to one day late : -10%
    - Between one day and  two days late: - 30%
    - Between two days and  three days late: -50%
    - No lab assignments will be accepted after 3 days.

## Questions about Grading:

Any grading questions **must be directed to me by email within 1 week of the posting of the grade. No grade adjustments will be made more than a week after the grade is posted. You should email me with the following information:**

  - **The assignment**
  - **The problem in question**

- o **Why you think you should get a grade rather than the one given.**

## Last Day to Add/Drop/Withdraw:

- Check DePaul's academic calendar
  https://academics.depaul.edu/calendar/Pages/default.aspx   for important dates such as last day to add/drop/withdraw from classes.
- Contact me when you have concern about your course performance and we can determine a course of action.

## Zero-Tolerance Academic Integrity Policy:

**This course has a zero-tolerance policy for violation of academic integrity.**

If it is determined that a violation of the Academic Integrity Policy at DePaul University occurs, a violation of the Academic Integrity Policy report will be filed, and that a sanction ranging from failing the assignment, to failing the course will be imposed depending on the seriousness of the violation.

**Make sure that you read and understand DePaul's academic integrity policy:** https://offices.depaul.edu/academic-affairs/faculty-resources/academic-integrity/Documents/Academic%20Integrity%20Policy_Spring%202016.pdf

**For additional resources concerning academic integrity, please check here: http://academicintegrity.depaul.edu/Resources/index.html**

- o **All assignments are individual assignments. You should not work so close with another student as to produce solutions that are identical or almost identical.**

- o **Sharing your work with other students, in or out of this class, is also a violation of academic integrity (called "complicity").** While you are encouraged to help fellow students understand course materials, you should not help them with individual assignments. If you want to help, encourage them to ask questions about what they do not understand in the course materials presented, rather than asking questions directly about the assignment.

- o **Under no circumstances should you copy or use simple paraphasing of someone else's work, including course materials and lecture slides, without giving proper credits and references.**

- o **Please be aware that any written work (assignments and exams) submitted in this course may be verified using *Turn-It-In* technology in order to ensure that the work is the student's own creation and not in violation of the University's Academic Integrity Policy. Submission of work in this course constitutes a pledge that the work is original and consent to have the work submitted to verify that fact.**

- <span style="color:red">Publicly sharing or posting online any prior or current materials from this course is a violation of DePaul's academic integrity:</span>
**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.**

## Respect for Diversity and Inclusion at DePaul University as aligned with our Vincentian Values:

- At DePaul, our mission calls us to explore "what must be done" in order to respect the inherent dignity and identity of each human person. We value diversity because it is part of our history, our traditions and our future. We see diversity as an asset and a strength that adds to the richness of classroom learning. In my course, I strive to include diverse perspectives and teaching pedagogies. I also encourage open dialogue and spaces for students to express their unique identities and perspectives. I am open to having difficult conversations and I will strive to create an inclusive classroom that values all perspectives. If at any time, the classroom experience does not live up to this expectation, please feel free to contact me via email or during office hours.

## Student Attitude:
- A professional and academic attitude is expected throughout this course.  Measurable examples of non-academic or unprofessional attitude include but are not limited to: talking to others when the instructor is speaking, mocking another's opinion, cell phones ringing, emailing, texting or using the internet whether on a phone or computer.  If any issues arise a student may be asked to leave the classroom.  The professor will work with the Dean of Students Office to navigate such student issues.

## Civil Discourse:
- DePaul University is a community that thrives on open discourse that challenges students, both intellectually and personally, to be Socially Responsible Leaders.  It is the expectation that all dialogue in this course is civil and respectful of the dignity of each student.  Any instances of disrespect or hostility can jeopardize a student's ability to be successful in the course.  The professor will partner with the Dean of Students Office to assist in managing such issues.

# Course Schedule (Tentative)

**Note: All assignments are due at 11:59pm and <u>on Tuesday</u> of the week unless otherwise stated. .**

| Week: Date | Topics and Readings | Assignments |
|---|---|---|
| 1: 3-28 | Class overview, general security concept, threats and defenses; Security technologies.<br><br>- Chapters 1 and 2 | **Assigned:**<br>    non-graded, but required, assignments:<br>• **Academic Integrity Pledge Quiz; and**<br>• **"Getting to know more about you" – submission box**<br>**Week 1 Quiz and video check-in**<br>**(All the above due 4-4)**<br>• **Install CML 2.2.3 if you do not already have it (no submission)**<br>**Lab 1 (due on 4-11)** |
| 2: 4-4 | Firewalls I I Introduction; ASA (Adaptive Security Appliances) configuration<br><br>- Chapter 16 | **Assigned:**<br>    **Week 2 Quiz and video check-in (due on 4-11)**<br>    **HW 1 (due 4-18)**<br>    **Lab2 (due Friday 4-28)**<br><br>**Due 4-4:**<br>    **Academic Integrity Pledge Quiz; and**<br>    **"Getting to know more about you" in submission box**<br>    **Week 1 Quiz and video check-in** |
| 3: 4-11 | Firewalls II – Network Address Translation (NAT)<br><br>- Chapter 14 | **Assigned:**<br>    **Week 3 Quiz and video check-in (due 4-18)**<br>    **Lab 3 (due 5-9)**<br><br>**Due 4-11:**<br>    **Lab 1**<br>    **Week 2 Quiz and video check-in** |
| 4: 4-18 | Firewalls III – Firewall Architectures and Deployment<br><br>- Chapter 14 | **Assigned:**<br>    **Week 4 Quiz and video check-in (due 4-25)**<br>    **HW #2 (due 5-2)**<br>    **Design Report (due 6-6)**<br><br>**Due 4-18:**<br>    **HW 1**<br>    **Week 3 Quiz and video check-in** |
| 5: 4-25 | **In Class Midterm (OL Window: 4-24 to 4-26)** | **Due 4-25:**<br>    **Week 4 Quiz and video check-in**<br>**Due Friday 4-28:**<br>    **Lab 2** |

| | | |
|---|---|---|
| 6: 5-2 | Cryptography Systems<br><br>- Chapter 5 | **Assigned:**<br>    **Week 6  Quiz and video check-in (due 5-9)**<br><br>**Due 5-2:**<br>    **HW #2** |
| 7: 5-9 | Virtual Private Networks (VPN)<br><br>- Chapter 5 (Understanding VPNs and Why Use Them)<br>Chapters  6 and 7 | **Assigned:**<br>    **Week 7 Quiz and video check-in (due 5-16)**<br>    **HW 3 (due 5-16)**<br>    **Lab 4 (due 5-23)**<br><br>**Due 5-9:**<br>    **Lab 3**<br>    **Week 6  Quiz and video check-in** |
| 8: 5-16 | IPSec VPN Configuration<br><br>- Chapter 5 | **Assigned:**<br>    **Week 8 Quiz and video check-in (due 5-23)**<br>    **HW 4 (due 5-30)**<br>    **Lab 5 (due 5-30)**<br><br>**Due 5-16:**<br>    **HW 3**<br>    **Week 7 Quiz and video check-in** |
| 9: 5-23 | Authentication + Public Key Infrastructure (PKI)<br><br>- Chapter 3<br><br>Security policy development | **Assigned:**<br>    **Week 9 Quiz and video check-in (due 5-30)**<br><br>**Due 5-23:**<br>    **Lab 4**<br>    **Week 8 Quiz and video check-in** |
| 10: 5-30 | Introduction to Intrusion Detection/Prevention System (IDPS)<br><br>- Chapter 17 | **Assigned:**<br>    **Course Evaluation (due Saturday 6-3)**<br>    **Week 10 Quiz and video check-in (due 6-6)**<br><br>**Due 5-30:**<br>    **HW 4**<br>    **Lab 5**<br>    **Week 9 Quiz and video check-in** |
| 11: 6-6 | | **Due 6-6:**<br>    **Security Design Report**<br>    **Week 10 Quiz and video check-in** |

# University Policies and Resources

## Online Instructor Evaluation:

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 you 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 two weeks. Students do not receive reminders once they complete the evaluation.

## Email:

Email is the primary means of communication between faculty and students enrolled in this course outside of class time. Students should be sure their email listed under "demographic information" at http://campusconnect.depaul.edu is correct.

## Academic Integrity Policy:

This course will be subject to the faculty council rules on the Academic Integrity Policy

## Plagiarism:

The university and school policy on plagiarism can be summarized as follows: Students in this course, as well as all other courses in which independent research or writing play a vital part in the course requirements, should be aware of the strong sanctions that can be imposed against someone guilty of plagiarism. If proven, a charge of plagiarism could result in an automatic F in the course and possible expulsion. The strongest of sanctions will be imposed on anyone who submits as his/her own work a report, examination paper, computer file, lab report, or other assignment which has been prepared by someone else. If you have any questions or doubts about what plagiarism entails or how to properly acknowledge source materials be sure to consult the instructor.

## Withdrawal:

Students who withdraw from the course do so by using the Campus Connection system (http://campusconnect.depaul.edu.  Withdrawals processed via this system are effective the day on which they are made. Simply ceasing to attend, or notifying the instructor, or nonpayment of

tuition, does not constitute an official withdrawal from class and will result in academic as well as financial penalty.

## Retroactive Withdrawal:

This policy exists to assist students for whom extenuating circumstances prevented them from meeting the withdrawal deadline.  During their college career students may be allowed one medical/personal administrative withdrawal and one college office administrative withdrawal, each for one or more courses in a single term. Repeated requests will not be considered.  Submitting an appeal for retroactive withdrawal does not guarantee approval. College office appeals for CDM students must be submitted online via MyCDM.

## Incomplete:

An incomplete grade is a special, temporary grade that may be assigned by an instructor when unforeseeable circumstances prevent a student from completing course requirements by the end of the term and when otherwise the student had a record of satisfactory progress in the course.  CDM policy requires the student to initiate the request for incomplete grade before the end of the term in which the course is taken.  Prior to submitting the incomplete request, the student must discuss the circumstances with the instructor.  Students may initiate the incomplete request process in MyCDM.

- All incomplete requests must be approved by the instructor of the course and a CDM Associate Dean.  Only exceptions cases will receive such approval.
- If approved, students are required to complete all remaining course requirement independently in consultation with the instructor by the deadline indicated on the incomplete request form.
- By default, an incomplete grade will automatically change to a grade of F after two quarters have elapsed (excluding summer) unless another grade is recorded by the instructor.
- An incomplete grade does NOT grant the student permission to attend the same course in a future quarter.

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## 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:

Student Center, LPC, Suite #370
Phone number: (773)325.1677
Fax: (773)325.3720
TTY: (773)325.7296

\* Last updated on 3/10/2023