IS 8055556: Data and Computer Networks
Department of Economics and Management
Tel Hai Academic College

Instructor: Michael J. May

Semester 2 of 5786

1 Course Details

The course lecture meets **8:45am - 10:15am** on Tuesdays (**2** hours of lecture).

2 Overview

The course is an introduction to the physical, link, network, and transport layers of the standard computer network model. Significant time will be spent on Ethernet, Wi-Fi, IPv4, RIP, OSPF, switching techniques, UDP, and TCP. IPv6 and TCP congestion control algorithms will be covered at a high level. By the end of the course, students will have a good algorithmic understanding of the OSI seven layer model and various technologies have been used to implement the first four layers. Some time will be spent on network programming in Python.

The course assumes no prior knowledge of networks or communications protocols.

2.1 Course Goals

At the end of the semester, the student shall be able to:

1. Define and explain the differences between the following concepts: size, packet, bandwidth, round trip time (RTT), sending time. The student shall be able to also perform calculations based on them.
2. Read and understand the packet formats of the following protocols and technologies: Ethernet (classical, fast, and gigabit), Wi-Fi, IPv4, IPv6, TCP, and UDP.
3. Explain the roles of each layer in the OSI seven layer model.
4. Perform basic hand executions of routing protocols, CRC, sliding window, and IPv4 assistive protocols: *e.g.* DHCP, ARP, DNS, ICMP.
5. Plan an IPv4 network which uses subnetting, including assigning addresses, subnet numbers, and subnet masks.
6. Use Wireshark to examine and analyze network traces of Ethernet, Wi-Fi, UDP, and TCP traffic.
7. Read and write simple networking communication programs using sockets.

The schedule for the course is as shown in the following table. Lecture contents are correlated with the books for the course: Tannenbaum (T) (Tanenbaum, Feamster, & Wetherall, 2021), Kurose and Ross (KR) (Kurose

& Ross, 2020), and Dordal (D) (Dordal, 2023) by showing the chapter or section number in the respective book for each lecture.

3 Lecture Schedule

#	Subject	T	KR	D
1	Overview, Links, Bandwidth	1.3–1.4, 2.1	1	1
2	Bandwidth and Delay Sending Calculations	1.3–1.4, 2.1	1	1
3	Layers and OSI Model, Physical Data Link Layer: Framing	 3.1–3.3, 3.6	1.5 6.1–6.3	1.1 6.1
4	Error Detection and Correction ARQ Protocols Stop and Wait, Sliding Window	3.1–3.3, 3.6 3.4	6.1–6.3 3.4	7.4 8
5	Sliding Window Ethernet Intro		 6.4.2	 2
6	Ethernet and Fast Ethernet	4.3		2
7	Switching Algorithms	5.1, 5.5	4.2	2.4
8	IP Basics Fragmentation	5.5	4.3	9
9	Subnetting IPv6	5.6 5.2.4	4.3 4.3.4,5.2	9.6 11,13.1
10	Routing: RIP, OSPF UDP	5.2,5.7.6 5.2.4	5.2,5.3 3.3	13.5 16
11	TCP I	6.4–6.5	3.5	17
12	TCP Flow Control	6.5–6.6	3.5	19
13	DHCP, ARP, DNS, ICMP	6.5–6.6	3.5,6.4,2.4,5.6	10

Students **are expected to come to class having read the material listed above in the lecture schedule**. Students who do not come prepared will find themselves at a significant disadvantage.

4 Assignments

There will be Moodle based calculation and theory assignments and programming assignments during the course of the semester. They will involve a fair amount of work, either by hand or programming.

More details of the assignments will be distributed during the course of the semester.

5 Recitation and Laboratory Assignments

Exercise sessions are a combination of recitation and hands on experimentation sessions. Students may ask questions during the session and the instructor will answer all questions and issues posed.

Some exercise sessions will include a laboratory assignment due at the end of the session. Some will include a laboratory assignment due at the beginning of the following lecture period. Any laboratory assignment

will be based on material covered in previous lecture or readings, not new material. They will not be taken into consideration in the final grade.

6 Attendance

Attendance of lectures and targil sessions is expected and required for this course. As per College policy, a student who misses 20% or more of the lectures of targil sessions may not be permitted to take the final exam. Students who miss lectures do so at their own risk and expense and will be expected to make up missed material on their own.

Since the course is scheduled to take place virtually (via Zoom), digital attendance will be taken automatically at each lecture and targil. Students are required to turn on their web cameras when asking questions and interacting with the lecturer. Students who do not actively participate, arrive significantly late, leave significantly early, or are absent for significant periods will be marked as absent even if they technically appear in the attendance list.

Penalties for Absence Students who are marked absent for 3 or more sessions will be penalized 3% of their final course grade for each session missed, up to a maximum of 12% penalty.

6.1 Decorum

Students who attend lecture are expected to give their full attention to the material. Reading newspapers, talking on cellular phones, text messaging, or other distracting behavior will not be tolerated.

Students must arrive to lectures **on time, within the first 10 minutes of class.** After ten minutes into class, the door will be locked and no student will be allowed entry. The door will be opened at the next break in the lecture (approximately every 50 minutes). Students who need to leave during lecture for some urgent matter must leave quietly and may return at the next break.

As per college policy, the instructor reserves the right to expel from the classroom any student who is disturbing the lecture or others.

7 Submissions

7.1 How to Submit Work

Each assignment will be given a specific submission target - either Moodle (written assignments) or GitHub (programming assignments). Materials not submitted via the correct system will not be graded.

Materials sent via email will be ignored without consideration of their merits. Technical issues with the Moodle software should be directed immediately to the information technology support staff in Kinneret College who will address them in a timely manner.

When an assignment is turned in by a group, **every member** of the group must submit a copy of the submission. Students who do not submit a copy **will not** be given a grade for the submission, even if their names appear on others' submissions.

7.2 Late Submission Policy

Students are expected to be on time with their assignment submissions. Each assignment must be turned in by the date it is due. As a rule, late homework submissions will not be accepted. There are two exceptions to the rule:

1. Each student may turn in **one** assignment 7 days late without penalty. After 7 days, the work will not be accepted.
2. Students who are called up to Miluim duty will have their assignment deadlines extended in accordance with college policy.

Any work submitted not in accordance with the above rules will not receive a grade.

8 Cheating

Cheating of any sort will not be tolerated. Student collaboration is encouraged, but within limits as set forth in the college's rules on academic integrity. Any students caught cheating will be immediately referred to the office of the Deacon and may receive a failing grade for the course.

Cheating includes:

- Copying information, content, or verbatim text to answer questions, solutions, or aid in programming projects from other students, internet sites, books (other than the ones listed in the bibliography), other unaffiliated individuals.
- Submitting work that is identical or substantially identical to work submitted by other teams, whether from the current academic year or from previous academic years.
- Working in groups when working in groups is not permitted or working in groups larger than the maximum size permitted by the instructor.
- Submitting someone else's work in your name.
- Copying source code **without attribution** from other students, **web sites**, online repositories, text books, open source programs, or other unaffiliated individuals.
- Other forms of academic misconduct as described on the site: `https://catalog.upenn.edu/pennbook/code-of-academic-integrity/` or as reasonably assessed by the instructor, program head, or dean.

9 Exams

There will be an exam at the end of the semester. The exam will be worth 60% of the final grade.

10 Grading

The instructor will not address questions about specific individual grades during the lecture or review sessions. Students may contact the instructor *in person* during office hours or after the lecture/review sessions at the instructor's convenience.

Final grades will be calculated by combining grades from assignments and exams. The grades are weighted as follows:

40%	Assignments (required)
60%	Final Exam

11 Books

The following books are used in the class. They are shown below in the bibliography as well: Tanenbaum, Feamster, and Wetherall (Tanenbaum et al., 2021), Kurose and Ross (Kurose & Ross, 2020), and

Dordal (Dordal, 2023).

12 Contact Information

Instructor: Michael J. May
Web site: `https://mjmay-kinneret.github.io/`

References

Dordal, P. L. (2023). *An introduction to computer networks* (2.0.11 ed.). Shabbona, IL, USA: Online. (http://intronetworks.cs.luc.edu/current/ComputerNetworks.pdf)

Kurose, J. F., & Ross, K. W. (2020). *Computer networking: A top-down approach* (8/E ed.). Addison-Wesley.

Tanenbaum, A. S., Feamster, N., & Wetherall, D. J. (2021). *Computer networks* (6th ed.). Pearson.