

# CPSC 317: Introduction to Computer Networking

Winter Term 1, 2025

## Course Staff

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### Instructors and Office Hours

Instructor	In-person office hour	Online office hour
Norman Hutchinson <a href="mailto:norm@cs.ubc.ca">norm@cs.ubc.ca</a>	Tuesday 11:00am - 12 noon Friday 12:00 noon - 1:00pm	
Ibtissem Bouacheria <a href="mailto:ibtissem.bouacheria@ubc.ca">ibtissem.bouacheria@ubc.ca</a>		Mon, 10:30AM - 11:30AM <a href="#">Zoom link</a>

### Teaching Assistants

- Saurav Banna
- Kori Huen
- Kyle Jones
- Venkata Alekhya Kusam
- Horton Lai
- Ted Lee
- Pedram Monzavi Tabrizi
- Yasmin Suzani
- Kimberly Tran
- Satvik Vemuganti
- Kelly Wong
- Layla Zarins

### Course Coordinator

- Carol Feng: [cpsc317-admin@cs.ubc.ca](mailto:cpsc317-admin@cs.ubc.ca)  
(For requesting academic concessions due to extenuating circumstances)

## Lectures Days, Time, and Place

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Section	Days	Time	Location
101	Mon/Wed/Fri	9:00AM - 10:00AM	<a href="#">MCML 360</a>

102	Mon/Wed/Fri	3:00PM - 4:00PM	<a href="#">MCML 360</a>
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## Course Calendar

Week #	Date	Topic	Who	Reading	In-class work	Tutorial	Quiz	Assignment
1	2025-09-03	Introduction	Both			<a href="#">Playing with the Internet</a>		
	2025-09-05	Design of the Internet	Norm	Ch 1 Intro, 1.1, 1.2, 1.3, 1.5, 1.7	<a href="#">ICA11 Circuit vs Packet Switching</a>			
2	2025-09-08	Switching Protocols	Norm		<a href="#">ICA12 Protocol Layers</a>	<a href="#">TCP Sockets in Java</a>		
	2025-09-10	Network Performance	Ibtissem	1.4.4	<a href="#">ICA21 Network Performance Metrics</a>			
	2025-09-12	Network Delay	Ibtissem	1.4	<a href="#">ICA22 Network Delay</a>			
3	2025-09-15	Application Layer Protocols	Norm	2.1, 2.7	<a href="#">ICA31 Application Architecture and Transport Protocols</a>	<a href="#">Understanding DICT RFC</a>		PA1 (deadline on Prairie Learn)
	2025-09-17	Application Layer Protocols: The Web	Norm	2.2	<a href="#">ICA32 HTTP</a>			
	2025-09-19	Application Layer Protocols: DNS	Norm	2.4	<a href="#">ICA33 DNS</a>			
4	2025-09-22	Application Layer Protocols: E-mail	Norm	2.3	<a href="#">ICA34 Email and its protocols</a>	<a href="#">Office Hours</a>	Quiz 1 (weeks 1-3)	

	2025-09-24	Application Layer Protocols: peer-to-peer	Norm	2.5	ICA35 <a href="#">Peer to Peer Applications</a>			
	2025-09-26	Transport: Introduction and UDP	Ibtissem	3.1, 3.2, 3.3	ICA41 <a href="#">Transport</a>			
5	2025-09-29	Transport: State Machines and Reliability	Ibtissem	3.4.1	ICA42 <a href="#">Finite State Machines</a>	DNS		PA2 (deadline on Prairie Learn)
	2025-10-01	Transport: Lost Segments and Timeouts	Ibtissem	3.4.1, 3.5.3	ICA43 <a href="#">Timeouts and Reliable Data Transfer</a>			
	2025-10-03	Transport: Windowing Protocols	Ibtissem	3.4.2, 3.4.3, 3.4.4	ICA44 <a href="#">Go-Back-N</a>			
6	2025-10-06	Transport: Selective Repeat	Ibtissem	3.4.4	ICA45 <a href="#">Selective Repeat</a>	DNS part 2		Quiz 2 (weeks 4-5)
	2025-10-08	Transport: Flow and Congestion Control,	Norm	3.5.2, 3.5.4, 3.5.5	ICA46 <a href="#">TCP</a>			
	2025-10-10	Transport: TCP-1	Norm	3.5.4, 3.7 before 3.7.1	ICA47 <a href="#">TCP Congestion Management</a>			
7	2025-10-13	Thanksgiving day						
	2025-10-15	Transport: TCP-2	Norm	3.5.6	ICA48 <a href="#">TCP Connection Management</a>			

[Sockets in C](#)

PA3 (deadline on Prairie Learn)

	2025-10-17	Transport: Alternate Protocols	Norm	Search Google: QUIC SIGCOMM				
8	2025-10-20	Network Layer: History and ASes	Ibtissem	Ch 5 Intro, 5.3, 5.4	ICA51 <a href="#">Networks and Autonomous Systems</a>	<a href="#">Debugging with GDB</a>		
	2025-10-22	Network Layer: IP and Address Forwarding	Ibtissem	4.3, 4.3.1, 4.3.3 (Before obtaining a Host Address: DHCP), 4.3.5	ICA52 <a href="#">IP addresses</a>			
	2025-10-24	Network Layer: IP Address Ranges	Ibtissem	4.3 (upto 4.3.2)	ICA53 <a href="#">IP address segregation, splitting, and forwarding</a>			
9	2025-10-27	Network Layer: Routing	Norm	5.1, 5.2, 5.2.1, 5.2.2	ICA54 <a href="#">Link State Routing</a>	<a href="#">TCP review</a>	Quiz 3 (weeks 6-8)	PA4 (deadline: 2025-xx-xx, 23:59:59h)
	2025-10-29	Network Layer: Distance Vector Routing	Norm	5.1, 5.2, 5.2.1, 5.2.2	ICA55 <a href="#">Distance Vector Routing</a>			
	2025-10-31	Network Layer: Inter-domain routing	Norm	5.4 (5.4.2)				

10	2025-11-03	Network Address Translation (NAT)	Norm	4.3.4	ICA61 <a href="#">Network Address Translation</a>	Getting started with PA4		
	2025-11-05	Link Layer: Introduction, Error Detection	Ibtissem	6.1, 6.2	ICA71 <a href="#">MAC addresses, and error detection and correction</a>			
	2025-11-07	Link Layer: Access control and ARP	Ibtissem	6.3 Intro, 6.3.2, 6.3.3, 6.4 Intro, 6.4.1	ICA72 <a href="#">Switches and ARP</a>			
11	2025-11-10	Mid Term Break						
	2025-11-12							
	2025-11-14	Link Layer: DHCP	Ibtissem	4.3.3 (obtaining a host address)	ICA73 <a href="#">DHCP</a>	PA4 OH		PA5 (deadline: 2025-xx-xx, 23:59:59h)
12	2025-11-17	Link Layer: Physical and Link Layer Issues	Ibtissem	1.2.1, 1.2.2, 6.4.4, 6.6		Longest Prefix Match review and PA5 intro	Quiz 4 (weeks 9-11)	
	2025-11-19	Security: Introduction	Norm	8.1, 8.2	ICA81 <a href="#">Breaking encryption</a>			
	2025-11-21	Security: Encryption	Norm	8.3	ICA82 <a href="#">Advanced encryption</a>			
13	2025-11-24	Security: Asymmetric Encryption	Norm	8.4	ICA83 <a href="#">Asymmetric encryption</a>	Security		
	2025-11-26	Security: Authentication and TLS	Ibtissem	8.6	ICA84 <a href="#">Protocol security</a>			

	2025-11-28	Security: IPSec, VPN, Firewall and IDS	Ibtissem	8.7	<a href="#">ICA85 VPNs and Secure Protocols</a>			
14	2025-12-01	Security: Availability	Ibtissem	8.1, 8.2	<a href="#">ICA86 Security Costs</a>	Office Hours	Quiz 5 (weeks 11-14)	
	2025-12-03	Wrapup	Both					
	2025-12-05	Zoom Office Hour						
	2025-12-09 through 2025-12-20 (CBTF self-scheduled)	Final Exam						

# Prerequisites

## CPSC 213, CPSC 221

Instructors cannot waive these prerequisites, if you do not have them please see the [Rules for Appeals about Prerequisites](#).

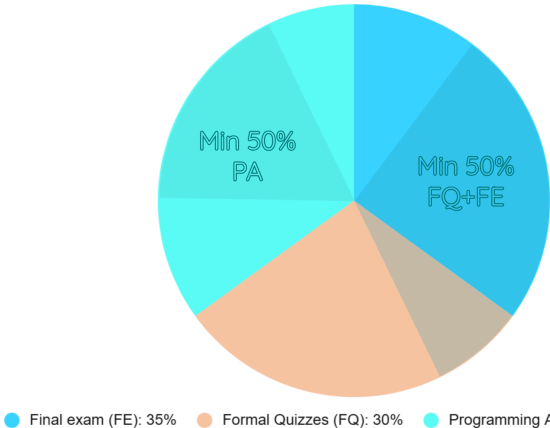
# Waiting List

**Do not contact the instructor or course staff about the waiting list or about admission into the class.** Waitlists are processed in priority order by the department. Instructors have no knowledge or control over the class composition, waitlists, and who gets into the course. We cannot sign course registration forms. If you have any questions about registration, please contact the [CS advisors](#).

**If you are on the waiting list and expect to enroll, you are required to keep up with all the course work.** If you are on the waiting list, attend any lecture section and tutorial that works for you until you are able to get in the course.

# Grading Scheme

The final grade will consist of:



- Assignments (5): 35%
- Quizzes (5): 30%
- Final exam: 35%
- Participation (Bonus): 5%

In order to pass the course, you must:

- Get  $\geq 50\%$  in the weighted average of the quizzes and the final exam (i.e.  $(0.3 * \text{Quizzes} + 0.35 * \text{Final exam}) \geq 32.5\%$ ).
- Get  $\geq 50\%$  in the overall average of the assignments.

The lower of the computed grade or 45% will be assigned if the above conditions are not met.

**Class participation:** In each lecture class, there will be **iClicker questions** worth a small number of points. These points will be calculated and can contribute up to a 5% bonus to your final grade.

**Quizzes:** There will be 5 quizzes roughly at two weeks intervals.

If you are going to miss a quiz, write to [cpssc317-admin@cs.ubc.ca](mailto:cpssc317-admin@cs.ubc.ca) as soon as you are aware of the situation. If you miss one quiz, the remaining 4 quizzes will be considered for your final grade. If you miss more than one quiz, we will move the weights to other quizzes.

**Assignments:** All assignments will be released on the Monday of a given week and will span two or three weeks. Exact submission deadlines are specified on Prairie Learn but will always fall on Sundays at 23:59:59.

You can submit your assignments multiple times on PrairieLearn. There is a cooldown period of one hour after each submission, so please plan accordingly to allow yourself time to submit the assignments and make changes as needed. The latest submission on PrairieLearn (per deadline) will be considered for evaluation.

Students are expected to complete the assignment by the first deadline unless extenuating circumstances apply, but two late deadlines have also been provided with scaled scores (see calendar above).

For example, PA1 will be released on September 15, 2025, and the deadline is September 28, 2025 at 23:59:59. Submissions for PA1 received between September 29 through October 5 will receive at most 70%. PA1 submissions received between October 6 through October 12 will receive at most 50%. After October 12 PA1 submissions will receive no credit.

PA grades will be calculated with the different deadlines and scaling in mind. Your grade on PrairieLearn will not be reflective of this scaling. You can refer to the equation below when considering your finalized PA grade, where  $g_1$  is your grade with no cap,  $g_2$  is your grade with a 70% cap, and  $g_3$  is your grade with a 50% cap:

$$g1 + \max(0, 0.7 \cdot (g2 - g1)) + \max(0, 0.5 \cdot (g3 - \max(g1, g2)))$$

Ex. If you receive 30%, 40%, then 60% on the three respective deadlines, you will receive a total of 47%.

This formula was derived with the expectation that students are completing the assignment by the first deadline, and rewards students who may not have initially received full marks, but continued to work on the assignment.

Please be noted that the **extended deadline for PA5 is altered** as we need time to wrap up the course and grading.

If you have extenuating circumstances, or if you cannot finish the assignment given the extra hours, please reach out to [cp317-admin@cs.ubc.ca](mailto:cp317-admin@cs.ubc.ca) to provide further information. If you are exempted from the assignment, the weight of the assignment will be shifted to your remaining assignments.

**Regrades:** You have 1 week from when a piece of graded work is handed back to request a review. Review requests must be submitted through PrairieLearn as reported issues: click on the

[Report an issue with this question](#)

button. After 1 week the mark stands. We may review the marking of other questions as well as the question that you have pointed out as containing an issue.

**The instructors reserve the right to make minor modifications to the rules above.**

## Computer Based Test Facility (CBTF)

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CBTF portal: <https://us.prairietest.com/>

### Quizzes

The quizzes will be conducted in the Computer Based Test Facility, which allows you the flexibility of taking the quizzes at your convenient date and time.

Each of the five quizzes will be run for several days in the week they are scheduled. You will be able to register for a 1-hour slot on the CBTF portal two weeks before the week of a quiz. Students must ensure timely completion within this window, as the deadline cannot be extended except for valid reasons such as illness or university-related activities, which require prompt notification to the instructor or course coordinator with supporting documentation. In cases where a student misses a quiz due to a valid reason and provides timely notification with supporting documentation, the weight of the missed quiz will be redistributed to other quizzes or the final exam, as determined by the course grading policy.



Inside the CBTF, you will be giving the test on a computer via PrairieLearn. The CBTF only supports exams that are closed book and closed notes; our quizzes will comply with this requirement. No electronic devices, such as laptops and tablets will be allowed.

Please refrain from sharing any information or posting questions about the quizzes until the end of the quiz period (end of day Wednesdays). This is considered academic misconduct, and actions will be taken if you violate this policy.

## **Final exam**

We will use the CBTF for the final exam as well. The exam format will be announced well ahead of time.

# **Overview of Course Content**

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Computer networks are pervasive and we use them daily yet we often do not give a lot of thought to how they are put together, how they work, how applications use them, and what the underlying fundamental principles are that allow us to build and design applications using computer networks. In this course you should:

- Become comfortable with writing and working with different programs that use computer networks.
- Learn the terminology associated with networking.
- Learn the key paradigms and strategies used in developing applications that use computer networks.
- Be able to apply the key paradigms and strategies to write programs and/or explain the operation of the Internet.
- Become familiar with the basic concepts of how the Internet is put together and operates and basic protocols that are used.

The material will be framed by looking at the key strategies and models for addressing:

- Design strategies for scalability and reliability in distributed systems.
- The use of layers and abstractions to understand and simplify designs.
- Routing, naming and addressing
- Isolation, data loss and performance
- Privacy and Security

# **Textbook and References**

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There will be assigned reading from the textbook along with pointers to relevant practice problems in the text.

## **Textbook**

The course textbook is:

**Title:** *Computer Networking: A Top-Down Approach – seventh edition* (get 8th edition if buying new or if you plan on taking 417)

**Authors:** James Kurose and Keith Ross

**ISBN-13:** 978-0-13-359414-0

We are officially using the 7th/8th edition, and all references to assigned readings and problems will be based on those editions. If you have the 6th edition, you are welcome to use it, but you are responsible for any material that is in the 7th edition but not in the 6th.

If you need to purchase a copy of the text don't forget to check sites like Amazon and Chapters/Indigo as they are sometimes cheaper. If you just want an online version, [Vital Source](#) offers textbook rental as well as a Lifetime Access option. (Please note that I am **NOT** endorsing Vital Source but simply pointing out the option; should you choose to use this service it is your responsibility to ensure that the various access methods and restrictions meet your needs and that you are comfortable with their privacy commitments and tracking of you.)

## References

These books are not required, but may provide additional support or study material.

- Larry Peterson and Bruce Davie, *Computer Networks: A Systems Approach*, – this is the open sourced version of one of the standard networking textbooks.  
(<https://book.systemsapproach.org/>)
- Brian W. Kernighan and Dennis Ritchie, *The C programming language*, 2nd edition, Prentice Hall, 1988. ([ICCS/Computer Science Reading Room link](#) and [UBC Library Link](#))
- Delores M. Etter, *Engineering Problem Solving with C*, 4th edition, Prentice Hall, 2013.  
([ICCS/Computer Science Reading Room link](#))

## Online Learning Tools

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- **Canvas** (for lecture slides and the other resources): <https://canvas.ubc.ca/courses/164476>.
- **PrairieLearn** (for practice questions):
  - CPSC 317 PrairieLearn link: See CPSC 317 Canvas homepage.
  - CBTF link: <https://cbtf.ubc.ca/students/procedures>
- **iClicker Cloud** (for in-class participation questions):
  - Section 101: <https://join.iclicker.com/CMQC>
  - Section 102: <https://join.iclicker.com/BILO>
- **Piazza** (for class discussions):
  - [https://piazza.com/ubc.ca/winterterm12025/cpsc\\_v3171011022025w1](https://piazza.com/ubc.ca/winterterm12025/cpsc_v3171011022025w1)

## Academic Conduct

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In addition to the requirements with respect to academic conduct that students are required to adhere to as outlined in the University Calendar, this section provides some clarification on academic conduct as applied to this course.

Submitting the work of another person as your own (i.e. plagiarism) constitutes academic misconduct, as does communication with others (either as donor or recipient) in ways other than those permitted for assignments and exams. Such actions will not be tolerated. Specifically, for this course, the rules are as follows:

- Assignments are to be done on your own, unless instructions to the contrary are explicitly given. You may not, under any circumstances, submit any solution not written by yourself (including solutions found on the web or obtained from generated AI, for example) without proper attribution, and you may not share your own written work with others, including after the course is completed. There is one exception: you may build your solutions on examples made available by the instructors and TAs.
- You are encouraged to discuss approaches with fellow students, the TAs, and the instructor(s). However you may not take any record of any sort away from the collaboration (so, erase all whiteboards, delete all e-mail, recycle all paper, smash all carved stone tablets, etc). Also, you cannot, without prior approval by the instructor, discuss the assignments with anyone other than your instructor, TAs and current CPSC 313 students.
- After collaborating with fellow students, TAs or the instructor, you must spend at least an hour before working on your own submission by engaging in some other activity unrelated to the course, such as working on other courses, watching television, catching up on sleep, exercising etc. In other words, do something so distracting or inane that you must have learned anything you can reconstruct afterward.

Violations of these rules constitute very serious academic misconduct, and they are subject to penalties ranging from a grade of zero on a particular assignment to indefinite suspension from the University. More information on procedures and penalties can be found in the Department's Policy on Plagiarism and collaboration and in the University Calendar. If you are in any doubt about the interpretation of any of these rules, consult your instructor.

#### What's allowed

- Helping each other understand material and assignment specifications
- Exploring/discussing solutions to assignments
  - Caveat - no looking at each others code, exchanging anything written, or taking pictures (i.e. talk but don't write)
- Use of existing public approaches to problem, provided it is properly cited
  - Caveat - if the public approach is the solution provided by a previous student, then it constitutes academic misconduct
- Discussing with other students currently taking the course the approaches to solving a problem
- Discussion of requirements
- Discussing the merits of a proposed solution with the course instructor or TAs

#### What's not allowed

- Submitting someone else's work as your own. Examples include:
  - Having in your possession previous solutions to the assignments (either someone else's or the instructors', or even your own solution from a previous term if you failed it)
  - Working in a group and then handing in the work, even a part of it, as your own, unless the assignment explicitly permits it
- Work you have handed in to another course (all work must be new work)
- Using public pages to share code with any group members you might be working with (e.g., public Github repos, pastebin)
- Making a solution available as an aid to others, either now or in the future

Additional resources

If in doubt, ask the instructor or TAs. Also make sure to read and understand elaborations on these policies as described in these links:

- <http://www.cs.ubc.ca/about/policies/collaboration.shtml>
- <http://www.cs.ubc.ca/~tmm/courses/cheat.html>

## Weather Contingency Plan for Class, Quizzes, and Exams

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If in-person activities in our course are cancelled due to weather conditions (e.g., snow), please monitor <https://www.cs.ubc.ca> for information, the pinned posts section on Piazza for announcements on our course, and your UBC-registered e-mail. Specifically, in the event of such cancellations, we will:

- Make up missed lectures and tutorials via posted recordings or alternate exercises; follow Piazza for details.
- Adjust the deadline of quizzes, assignments, and in-class exercises during the affected period.
- Add scheduling dates to exams during the affected period and post instructions on how to re-register. (For the final exam, in the unlikely event that we run out of days available in the exam period, we will work with scheduling services and announce an alternate solution similar to normal exam rescheduling. Follow Piazza and your UBC-registered e-mail for more information.)

If rescheduling causes problems for you that require academic concession, please reach out as usual to [cp317-admin@cs.ubc.ca](mailto:cp317-admin@cs.ubc.ca) with details.

## Statement on Academic Integrity

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The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic

integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

## **University Policies and Values to Support Student Success**

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UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available [here](#).