Course Syllabus

CSCI/CYBR 5010: Fundamentals of Data Communications
Fall 2023 (9:30 – 10:45 a.m., T/TH, Rm. ECCR 1B55, 3 Credits)

Course Description and Objectives

Based on the Internet, communications and computing systems are integrated into all major disciplines in our landscape. Beyond a simple interconnection of systems, the Internet today is a major economic and innovative force in most business, engineering, or technology-based disciplines. It is important to understand the complexity of the technological environment we operate in.

CSCI 5010 gives students the opportunity to learn about how the Internet works. The course is a series of carefully selected lectures that will allow students to understand essential core Internet technologies and lab experiments that will teach them how to setup and operate an Internet network. This combination of conceptual knowledge and hands-on experience will allow students to use Internet technology to provide innovative solutions in their discipline.

This course has the following key objectives:

- Understand the core technologies, theories, common services, and dilemmas that face Internet engineers.
- Implement best practices for designing, installing, and troubleshooting networks through technologies such as IP addressing, switching, routing, and wireless.
- Design and manage secure networks.
- Given the instructor's years of experience in telecommunications industry, students will engage in real-world discussions on the current controversies with implementing and troubleshooting networks.

CSCI 5010 covers these topics and achieves these objectives through hands-on lab exercises built around real-world applications and theories presented in the lectures. The course is split into the following units of study:

- Unit 1: Network Concepts
- Unit 2: Network Media and Topologies
- Unit 3: Network Installation and Configuration
- Unit 4: Network Management, Design, and Security

The resulting understanding should enhance employment or promotion opportunities in the network engineering sector and enhance the student's ability to participate in the public discourse regarding this field. By the end of the course students will be competent in the technologies, services, and tools used in enterprise networks and the Internet.

Instructor

Dr. Levi Perigo
Scholar in Residence | Network Engineering
levi.perigo@colorado.edu
303-735-5131
ECOT 535
Office Hours: TBD

Graduate Student Assistant

TBA

Office Hours: TBA in the DLC lobby (or via Zoom)

Course Prerequisites

None

Grading

Pop Quizzes and Class Participation	05%
Homework Labs and Assignments	70%
Midterm	10%
Final	15%

To do well in this course, you will need to be prepared for each class by being ready to discuss and engage in critical thinking on issues covered in the readings. Be forewarned: pop quizzes will often be given at the start of class on the assigned reading material for the class.

All labs, homework, and assignments are due based on the due date in the syllabus. No exceptions to deadlines for course work will be made. Classroom absence may be permitted either for an emergency or prior notification to the professor stating the date and reason for the classroom absence two weeks in advance.

Grading Scale

100 – 93%	A
92 – 90%	A-
89 – 87%	B+
86 – 83%	B
82 – 80%	B-

Class Readings

Students will be expected to have read the class readings noted in the course syllabus before attending the class.

REQUIRED BOOK:
Kurose, J., & Ross, K. (2022). *Computer Networking: A Top-Down Approach, Eighth Edition.*
ISBN-9780135928523

This digital book is offered for free from the campus library

RECOMMENDED BOOKS:
Odom, W. (2022). *CCENT/CCNA ICND1 100-105 Official Cert Guide*. ISBN-10: 1-58720-580-7

Note: There are older versions of this Cert Guide in the University library (online).

Meyers, M. (2015). *CompTIA Network+ All-In-One Exam Guide, Sixth Edition.* ISBN-10: 0071843233

Note: There is an older version of the Network+ Exam Guide in the University library (online).

Coleman, D., & Westcott, D. (2014). *CWNA: Certified Wireless Network Administrator Official Study Guide, Fourth Edition.* ISBN: 9781118893708

Note: This book is available in the CU online library.

Chappell, L. (2013). *Wireshark 101: Essential Skills for Network Analysis (Wireshark Solutions)*. ISBN-10: 1-89393-972-3

Solomon, M., & Kim, D. (2022). *Fundamentals of Communications and Networking, Third Edition*. ISBN: 978-1-284-20011-9

Many of the readings will be posted on the Canvas web site. To access Canvas, go to: https://canvas.colorado.edu/. You can login using your IdentiKey username and password. Once you login, click on the course name to go into the course[1].

Course Outline (Subject to Change)

Date	Topic, Reading, and/or Work Assignment
8/28/2023	Lecture: Introduction to Network Engineering Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 1 Homework: ● **Assignment 1 (Due 9/04)–** Document Your Internet World ○ Create a single page "executive summary" (*see Canvas for guide*) of the Internet around you. What do you notice? What unique places do you see the Internet being used? What are the favorite apps and websites you frequent? Reflect about how these technologies interact in your daily life and what the future of the Internet will be.

[1] Please visit https://oit.colorado.edu/services/teaching-learning-tools/canvas/help to watch videos and learn more about using Canvas. If you run into any problems using Canvas, contact the help desk at: help@colorado.edu or at (303) 735-HELP.

9/04/2023	Lecture: OSI Model and Network Media and Topologies Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 1 (pgs 47-53) & Ch. 6 (pgs 449-476) Recommended Reading: ● Network+ (Meyers) – Ch. 2-6 ● CCENT/CCNA (Odom) – Ch. 1-2 ● Cable Making Guide Homework: ● **Lab 1** - Internet Connectivity/Speed Test and Command Prompt/Shell (Due 9/11) ● **Assignment 2** – GNS3, and Cisco Packet Tracer (hosted VM) (Due 9/11) ● **Graded Discussions on CANVAS**
9/11/2023	Lecture: LAN Switching Technologies ● Cisco CLI Lecture (Optional) Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 6 (pgs 477-500) Recommended Reading: ● Network+ (Meyers) - Ch. 6 (pgs 94-98), 12 (pgs 395-403) ● CCENT/CCNA (Odom) – Ch. 6-9 Homework: ● **Lab 2** – Introduction to Cisco IOS and Switching Spanning Tree Protocol (STP) (Due 9/18) ● **Graded Discussions on CANVAS**
9/18/2023	Lecture: IP Addressing (IPv4), DHCP, and IPv6 Overview Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 4 (pgs 330-343) Recommended Reading: ● Network+ (Meyers) - Ch. 7 & 13 ● CCENT/CCNA (Odom) – Ch. 4, 13-16 Homework: ● **Lab 3** – IP Addressing (Due 9/25) ● **Graded Discussions on CANVAS**

9/25/2023	Lecture: VLANs, Trunks, and InterVLAN Routing Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 6 (pgs 477-500) Recommended Reading: ● Network+ (Meyers) - Ch. 6 (pgs 94-98), 12 (pgs 395-403) ● CCENT/CCNA (Odom) – Ch. 10-12 Homework: ● **Lab 4** – VLANs & InterVLAN Routing (Due 10/02) ● **Graded Discussions on CANVAS**
10/02/2023	Lecture: IP Routing Technologies Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 4 & 5 Recommended Reading: ● Network+ (Meyers) - Ch. 8 ● CCENT/CCNA (Odom) – Ch. 17-19, 24 Homework: ● **Lab 5** – Static and Dynamic Routing (Due 10/16) ● **Graded Discussions on CANVAS**
10/09/2023	Midterm Review (Tuesday) and Exam (Thursday)
10/16/2023	Lecture: Troubleshooting & Protocol Analyzers (Wireshark) Recommended Reading: ● Network+ (Meyers) - Ch. 9-10 ● CCENT/CCNA (Odom) – Ch. 5 ● Wireshark (Chappell) – Ch. 0-5 Recommended Videos: ● Wireshark ● Introduction to Wireshark ● Custom Wireshark Shortcuts Homework: ● **Lab 6 –** Wireshark (Due *two-week lab -10/30) ● **Graded Discussions on CANVAS**
10/23/2023	Lecture: Transport Layer - Transmission Control Protocol (TCP) Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 3 Homework: ● **Lab 6 –** Wireshark (Due *two-week lab -10/30) ● **Graded Discussions on CANVAS**

10/30/2023	Lecture: Applications and Multimedia Networking Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 2 Homework: ● **Lab 7 –** DHCP and DNS (Due *two-week lab -11/13) ● **Graded Discussions on CANVAS**
11/06/2023	Lecture: Applications and Multimedia Networking Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 2 Homework: ● **Lab 7 –** DHCP and DNS (Due *two-week lab -11/13) ● **Graded Discussions on CANVAS**
11/13/2023	Lecture: Wireless Networking and Technologies Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 7 Recommended Reading: ● Network+ (Meyers) - Ch. 15 ● CWNA (Coleman & Westcott) – Ch. 1, 2, & 3 Homework: ● **Lab 8** – Wireless Roaming and Troubleshooting (Due 11/27) ● **Graded Discussions on CANVAS**
11/20/2023	No Class – Fall Break
11/27/2023	Lecture: Network Security and Introduction to Linux Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 8 Recommended Reading: ● Network+ (Meyers) - Ch. 19 ● CCENT/CCNA (Odom) – Ch. 25, 34 Homework: ● **Lab 9** – Network Security and Apache2 (Due 12/04) **Graded Discussions on CANVAS**
12/04/2023	Lecture: Cloud, Automation, and Internet of Things (IOT) Recommended Reading: ● Network+ (Meyers) - Ch. 1 ● PC Mag – What is Cloud Computing? ● Network Automation: More than Scripting ● Automating - Cisco ● Internet of Things

	● Software is Eating the World ● Future Predictions 1 & Future Predictions 2 Homework: ● **Assignment 3** – Packet Capture Analysis (HTTP) (Due 12/11)
12/11/2023	Lecture: Final Exam Review (Tuesday) & Final Exam (Thursday)
12/13/2023	Final Deliverable

University Policies

Classroom Behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation, or political philosophy.

For more information, see the classroom behavior policy, the Student Code of Conduct, and the Office of Institutional Equity and Compliance.

Requirements for Infectious Diseases

Members of the CU Boulder community and visitors to campus must follow university, department, and building health and safety requirements and all public health orders to reduce the risk of spreading infectious diseases.

The CU Boulder campus is currently mask optional. However, if masks are again required in classrooms, students who fail to adhere to masking requirements will be asked to leave class. Students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct & Conflict Resolution. Students who require accommodation because a disability prevents them from fulfilling safety measures related to infectious disease will be asked to follow the steps in the "Accommodation for Disabilities" statement on this syllabus.

For those who feel ill and think you might have COVID-19 or if you have tested positive for COVID-19, please stay home and follow the further guidance of the Public Health Office. For those who have been in close contact with someone who has COVID-19 but do not have any symptoms and have not tested positive for COVID-19, you do not need to stay home.

Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

Disability Services determines accommodations based on documented disabilities in the academic environment. If you qualify for accommodations because of a disability, submit your accommodation letter from Disability Services to your faculty member in a timely manner so your needs can be addressed. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance.

If you have a temporary medical condition or required medical isolation for which you require accommodation, please contact your faculty immediately--before class. Also see Temporary Medical Conditions on the Disability Services website.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: honor@colorado.edu, 303-492-5550. Students found responsible for violating the Honor Code will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit Honor Code for more information on the academic integrity policy.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits protected-class discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. These behaviors harm individuals and our community. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who believe they have been subjected to misconduct can contact OIEC at 303-492-2127 or email cureport@colorado.edu. Information about university policies, reporting options, and support resources can be found on the OIEC website.

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of incidents related to these policies regardless of when or where something occurred. This is to ensure that individuals impacted receive an outreach from OIEC about their options for addressing a concern and the support resources available. To learn more about reporting and support resources for a variety of issues, visit Don't Ignore It.

Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, please let the instructor know two weeks in advance.

See the campus policy regarding religious observances for full details.

University Resources and Support Services

Mental Health and Wellness

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact Counseling and Psychiatric Services (CAPS) located in C4C or call (303) 492-2277, 24/7.

Free and unlimited telehealth is also available through Academic Live Care. The Academic Live Care site also provides information about additional wellness services on campus that are available to students.