Course Syllabus

CSCI/CYBR 5010: Fundamentals of Data Communications
Fall 2022 (9:30 – 10:45 a.m., T/TH, Rm. ECCR 150, 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

Meghana Gowda

Office Hours: Friday 1:00-2:00pm 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 book is offered for free on Canvas > Course Materials

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
8/22/2022	Lecture: Introduction to Network Engineering Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 1 Homework: ● **Assignment 1 (Due 8/29)–** 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.

8/29/2022	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 9/5) ● **Assignment 2** – VirtualBox, GNS3, and Cisco Packet Tracer (Due 9/5) ● **Graded Discussions on CANVAS**
9/5/2022	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 9/12) ● **Graded Discussions on CANVAS**
9/12/2022	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 9/19) ● **Graded Discussions on CANVAS**

9/19/2022	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 09/26) ● **Graded Discussions on CANVAS**
9/26/2022	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 10/10) ● **Graded Discussions on CANVAS**
10/03/2022	Midterm Review (Tuesday) and Exam (Thursday)
10/10/2022	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 -10/24) ● **Graded Discussions on CANVAS**
10/17/2022	Lecture: Transport Layer - Transmission Control Protocol (TCP) Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 3 Homework: ● **Lab 6 –** Wireshark (Due *two-week lab -10/24) ● **Graded Discussions on CANVAS**

10/24/2022	Lecture: Applications and Multimedia Networking Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 2 Homework: ● **Lab 7 –** DHCP and DNS (Due *two-week lab -11/7) ● **Graded Discussions on CANVAS**
10/31/2022	Lecture: Applications and Multimedia Networking Required Reading: ● Computer Networking (Kurose & Ross) – Ch. 2 Homework: ● **Lab 7 –** DHCP and DNS (Due *two-week lab -11/7) ● **Graded Discussions on CANVAS**
11/07/2022	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 11/14) ● **Graded Discussions on CANVAS**
11/14/2022	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 11/28) ● **Graded Discussions on CANVAS**
11/21/2022	No Class – Fall Break
11/28/2022	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 12/5)
12/05/2022	Lecture: Final Exam Review (Tuesday) & Final Exam (Thursday)
12/13/2022	Final Deliverable

University Policies

Classroom Behavior

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail 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 policies on classroom behavior and the Student Conduct & Conflict Resolution policies.

Requirements for COVID-19

As a matter of public health and safety, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. CU Boulder currently requires COVID-19 vaccination and boosters for all faculty, staff and students. Students, faculty and staff must upload proof of vaccination and boosters or file for an exemption based on medical, ethical or moral grounds through the MyCUHealth portal.

The CU Boulder campus is currently mask-optional. However, if public health conditions change and masks are again required in classrooms, students who fail to adhere to masking requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policy on classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the "Accommodation for Disabilities" statement on this syllabus.

If you feel ill and think you might have COVID-19, if you have tested positive for COVID-19, or if you are unvaccinated or partially vaccinated and have been in close contact with someone who has COVID-19, you should stay home and follow the further guidance of the Public Health Office (contacttracing@colorado.edu). If you are fully vaccinated and have been in close contact

with someone who has COVID-19, you do not need to stay home; rather, you should self-monitor for symptoms and follow the further guidance of the Public Health Office (contacttracing@colorado.edu). In this class, if you are sick or quarantined, please email the instructor from your Colorado.edu email address or use Canvas to let the professor know you will be missing class.

Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, 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 academic integrity policy. Violations of the Honor Code may include, but are not limited to: plagiarism, 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 the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the Honor Code website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. The university will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by or against members of our community.

Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or email cureport@colorado.edu. Information about university policies, reporting options, and the 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 of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about their rights, support resources, and reporting options. To learn more about reporting and support options for a variety of concerns, 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.

See the campus policy regarding religious observances for full details.

University Resources and Support Services

Counseling and Psychiatric Services

We offer confidential, on-campus mental health and psychiatric services for a variety of concerns such as academics, anxiety, body image, depression, relationships, substance use and more.

Contact Us: 303-492-2277 (24/7 support including crisis care)

CAPS Main Office

Fall hours

- Monday - Thursday: 8 a.m. to 6 p.m.
- Friday: 8 a.m. to 5 p.m.

Walk-in hours

- Monday - Friday: 10 a.m. to 4 p.m.

Center for Community, Suite N352

Our Services

We offer a range of mental health services tailored to fit the needs of CU Boulder students.

Counseling

CAPS is a place where students can receive confidential short-term counseling with a licensed therapist who respects and understands their needs.

Psychiatry

CAPS has psychiatrists and psychiatric mental health nurse practitioners who are specially trained to help students deal with or overcome mental disorders and psychological issues.

Workshops

Our educational workshops are designed to provide valuable information and insight to students on a variety of topics. They are a great option to address a variety of needs.

Process Therapy Groups

These confidential groups are contained settings where students can speak on and get support for a variety of topics. All groups are free for CU students.

Skill-Based Therapy Groups

These free, confidential groups focus on skill building in specialty topic areas such as Dialecticial Behavior Therapy (DBT) and Acceptance and Commitment Therapy (ACT).

Let's Talk: Informal Consultations

Let’s Talk is a free service where CU Boulder students can stop by for an informal and confidential consultation with a counselor. No appointment necessary.

Canine-Assisted Therapy

Canine-assisted therapy incorporates the presence of a dog during a counseling session. Dogs can reduce stress and help a student feel more comfortable discussing difficult issues.

Suicide Prevention

Recognize signs and find information about how to support someone in need.

Virtual Reality Therapy

The virtual reality therapy (VRT) program aims to integrate VR with traditional therapy techniques for students facing common mental health issues like anxiety, depression and phobias.

Eating Disorders Services

Through our eating disorders services, CAPS works in collaboration with other Health and Wellness Services unites to provide assessment and treatment to students struggling with issues related to food, weight, and body image, including mild to moderate eating disorders.

ADHD

We offer assessment and treatment of Attention-Deficit/Hyperactivity Disorder (ADHD).

Substance Use

In an effort to support students and help them succeed at CU, CAPS is committed to working with students to avoid pitfalls related to alcohol and drug use. CAPS offers several services to address these issues.