

[Anura Jayasumana](#)[Close your browser to end your session. \(http://www.acns.colostate.edu/single-sign-on-using-shibboleth/#1471272725675-5603b487-ebab\)](#)

Course Outline

Instructor:

Prof. Anura Jayasumana, C201D Engr. Building

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Credits: 4 (3-3-0)

Objectives: The field of computer and communication networking continues its exponential growth posing new challenges and opportunities for the networking industry and researchers. Internet of Things, Software Defined Networking, virtual network services, 5G, the convergence of video/voice/data, Quality of Service provisioning, access technologies (wireless, optical, power-line networks), mobile networking, and P2P networks are examples of areas of active research and growth. This course attempts to provide an understanding of the broad landscape of existing and emerging networking and internetworking technologies.

Outcomes: Students successfully completing this course will be able to

- Use network programming concepts to develop and implement distributed applications and protocols over the Internet,
- Model and evaluate the performance of networking systems,
- Develop and implement next generation protocols required for emerging applications,
- Carry out research and development tasks in networking

The course would be useful for those who wish to gain an understanding of the fundamental principles and practical aspects of communication and data networks. It will open new career paths in these hot areas for those who want to join the industry. Students looking for thesis research topics in networking will find this course useful as well.

Pre-requisites: CS 457 – Data Communications or EE456 – Computer Networks, or equivalent background.

Expertise in computer programming.

[Assignments may be carried out in any language familiar to the student. With languages other than Python students will have to rely on their own resources for basic support. Irrespective of the language used, there will be no help for debugging programs.]

Reading Material:

Selected conference and journal papers, Internet Society RFC (Request for Comment), Standards, etc.

Topics: The course will cover selected topics related to following areas.

- Internet architecture and TCP/IP protocol suite
 - End-to-end paradigm, Quality of Service (QoS) provisioning
 - Selected technologies and applications (VOIP, etc.)
- Sockets and network programming
- Overlay and P2P Networks
- Software Defined Networks and Network Function Virtualization
- Performance modeling and evaluation
 - Analytical and simulation models
 - Queuing systems and Markov chains, network measurements, case studies
- Internet of Things (IoT) and Sensor networks
 - Hardware, protocols, standards, and applications
- Wireless and mobile networking
 - Standards (WiFi, WiMax), wireless mesh networks, cognitive radio, and dynamic spectrum allocation
- Networking Research – Selected topics
- Future trends

Grading:

Presentations	25%
Homework/Reading Assignments/Quizzes	20%
Lab Assignments and/or Project	45%
Minute Papers	10%

- The lectures will be a mix of instructor-led and student-led presentations on selected topics. Each student is required to make **two or more presentations** on pre-approved course-related topics or papers.
- There will be several homework and reading assignments. Selected assignments and problems may be graded.
- The programming/ lab assignments are a very important part of this course. There will be a set of core assignments covering network programming and simulation. These will be followed by more in-depth assignments and a project. You are required to demonstrate each lab and submit a report. See [1](http://water.me.vccs.edu/reports.htm) (<http://water.me.vccs.edu/reports.htm>) and [2](https://www.craftofscientificwriting.com/laboratory-reports.html) (<https://www.craftofscientificwriting.com/laboratory-reports.html>), for report writing guidelines. You must score >60% in each lab assignment/project to pass the course.
- You are encouraged to do a creative project, make one **15-minute presentation based on the project, and submit a report**. The source code needs to be submitted along with a report. Depending on the complexity of the project undertaken, one or more lab assignments may be waived.
- Programming is a creative process similar to composition, and the individual or the group must understand the problem and methodology to arrive at a solution. During this time, discussions with colleagues are encouraged. However, the program must be your own work, and no collaborative efforts are acceptable in developing the program except in the case of group assignments, for which any collaboration has to be limited to the group. ***Under no circumstances should you copy a program or a segment of a program from another source. Providing code for use by someone else or using someone else's code in any form is academic fraud, and will be dealt with harshly. It is your responsibility to ensure that the code you write for the assignments is not accessible to others.***
- A minute paper is a short write-up (typically 300 to 500 words) about a lecture and addresses questions such as: What are the most significant things you learned in the lecture? Why is it significant? What question is uppermost in your mind at the end of the lecture? Be creative!! Since each minute paper is based on a lecture, you must not submit one for a lecture that you did not attend. The minute paper for a given lecture must be submitted prior to the next lecture.

Academic Integrity:

This course will adhere to the CSU Academic Integrity Policy in the General Catalog (<http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity>) (<http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity>) and the Student Conduct Code (<https://resolutioncenter.colostate.edu/conduct-code/>) (<https://resolutioncenter.colostate.edu/conduct-code/>). At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.