ECE/CS 658 # Internet Engineering **Spring 2023**

4 credits (3-3-0)
Tu, Th 12:30-1:45PM, Eddy 105

Instructor: Prof. Anura Jayasumana, C201D Engr
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Objectives: The evolution of internetworking and communication technologies over the past several decades has resulted in the global Internet, an ubiquitous integrated infrastructure that provides instant and universal access to resources on demand. This is arguably the most complex man-made system. The Internet seamlessly integrates numerous wired and wireless access techniques, cellular systems (5G/6G), switches, routers, software defined networks, P2P systems, etc., to support a variety of distributed applications ranging from Internet of things to high-definition video conferencing, cloud computing to remote surgery, and social networking to crypto currency. Unique Quality of Service requirements of such a vast array of applications are supported seamlessly and simultaneously. Networking standards and capabilities at different layers continue to evolve while harmoniously serving the application requirements. This course attempts to provide an understanding of the broad landscape of existing and emerging networking and inter-networking technologies, and the architectural features that support such a complex, dynamic and evolving system.

Outcomes: Upon completing this course, students will have a solid understanding of how various evolving networking technologies, protocols, and standards work together to enable universal, ubiquitous communication services. They will be able to utilize concepts such as end-to-end principle, peer-to-peer (P2P), and machine-to-machine (M2M) communication for the development of networks, distributed applications and systems.

This course will also provide students with valuable skills and knowledge that can open up new career opportunities in the industry. Additionally, those seeking thesis research topics in networking (ranging from on-chip to global to interplanetary) and distributed systems will find this course to be a useful resource.

Prerequisites: CS 457 – Data Communications, or EE456 – Computer Networks, or equivalent background; Ability to program in a language of student's choice.

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

Topics: Topics will vary based on the interests of the enrolled students. Example topics include:

- Internet architecture and standards
  - End-to-end paradigm, TCP/IP protocol suite
- Virtualization and Software Defined Networks (SDN)
- Cellular Systems
  - Evolution from 1G to 4G
  - 5G and 6G networks
- Optical, wireless and mobile networks
  - Evolution of WiFi, cognitive radio and dynamic spectrum allocation
  - SONET
- Overlay and P2P networks

- Performance modeling and evaluation
- Internet of Things (IoT)
- Blockchains, distributed ledgers and crypto currencies
- Future trends

Grading:		
	Two class presentations	30%
	Reading Assignments	20%
	Project and/or labs	30%
	Minute papers and participation	20%

- The lectures will be a mix of instructor led and student led presentations on selected topics. Each student is required to make two presentations on a pre-approved course-related topic(s). (30%)
- Active participation in class and contributing to discussions will be rewarded. Reading assignments serve as the basis of class discussions and occasionally may involve short written answers. (20%)
- Depending on individual interests, a student may propose and carry out a project, complete several assigned labs, or do a combination of a few labs and a simpler project. A report and/or a presentation is expected. *This year, the lab assignments have been redesigned to require significantly less programming effort compared to those in prior years*. (30%)
- A minute paper is a short write-up (typically 300 to 500 words) about a lecture and address 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. Follow the link from course web page to submit minute papers. (20%)

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) and the Student Conduct Code (https://resolutioncenter.colostate.edu/conduct-code/).

General Expectations: Students are expected to attend and actively participate in class discussions. Do not text, check e-mail, browse web, etc., during the lecture unless it is directly related to the lecture.