

1. Course number and name

CptS/EE 455: Introduction to Computer Networks

2. Credits and contact hours

3 credits, 3 lecture hours

3. Instructor's or course coordinator's name

Adam Hahn

4. Textbook, title, author, and year

Kurose and Ross, 2017. *Computer Networking: A top-down approach* (7th ed.).

Pearson. ISBN: 978-0133594140.

Other supplemental materials

Instructor notes/slides and various papers/websites will be provided for some topics.

5. Specific course information

- a. *Catalog description:* Concepts and implementation of computer networks; architectures, protocol layers, internetworking and addressing case studies.
- b. *Prerequisites or corequisites:* CptS 360 with a C or better, or EE 234 with a C or better; certified major in Computer Science, Computer Engineering, or Electrical Engineering.

6. Specific goals for the course

By the end of the course, students will be able to

- Assess the performance of computer networks based on time (latency) and throughput (1a, 1b, 1c, 1d).
- Analyze network operations requirements to determine the protocols (e.g., Ethernet, IP, IPv6, TCP, UDP, DNS, BGP, HTTP) necessary for end-to-end packet delivery for various applications (1a, 1b, 1c, 1d, 1e).
- Design and develop TCP/IP based programs to communicate over unreliable networks using socket APIs (2a, 2b, 2c, 2g).
- Implement algorithms to provide quality of service and network multiplexing, including routing, network access, congestion control, and resource allocation (2a, 2b, 2c, 2g).
- Apply new technologies, such as software-defined networks (SDN), to solve existing network challenges (7a, 7f, 7g).

7. Brief list of topics to be covered

- Network performance metrics
- Network programming/sockets
- Network models (TCP/IP, OSI)
- Error detection/correction
- Addressing (Ethernet, IPv4, IPv6)
- Network layer protocols (ARP, ICMP)

- Switching/forwarding
- Routing algorithms (BGP, OSPF)
- Transport protocols (UDP, TCP)
- Reliability (Sliding Window, ARQ)
- Congestion control algorithms
- Application protocols (DNS, HTTP, SMTP)
- Security (IPsec, TLS)
- Software defined networks