

ECE 476/576 – Advanced Computer Networking

Catalog Description: Covers advanced networking concepts - source/channel coding, queuing theory, router design, network architectures (Intserv, DiffServ, MPLS), multimedia protocols (TFRC, RTP), overlay networks, and wireless standards (Bluetooth, 802.11b, 3/4G).

Credits: 4 **Terms Offered:** Winter

Prerequisites: (ECE 372 or CS 372) and (ECE 353 or ST 314 or ST 314H)

Courses that require this as a prerequisite: None

Structure: Varies; typically three 50-minute lectures per week

Instructors: B. Hamdaoui

Course Content:

- Review of packet-switched networks: principles, concepts, and architectures
- Congestion control and avoidance mechanisms
- Multimedia and QoS-aware communications for IP networks
- Buffer management, scheduling policies, fairness, and queuing principles for packet-switched networks
- Services models: integrated services, differentiated services, proportional services, and best-effort services
- Wireless and mobile networks: LANs, WANs, and cellular.
- Network security

Measurable Student Learning Outcomes:

ECE 476: At the completion of the course, students will be able to...

1. **Explain** congestion control and avoidance concepts and mechanisms (ABET Outcomes: a, c, k, l, m, n)
2. **Analyze** resource reservation mechanisms and protocols for multimedia/QoS networking, such as RSVP (ABET Outcomes: a, c, k, l, m, n)
3. **Explain** queuing concepts, buffer management, and scheduling policies and fairness in packet switched-networks (ABET Outcomes: a, c, k, l, m, n)
4. **Compare/contrast** different service models: (IntServ, DiffServ, Proportional, and best-effort), (ABET Outcomes: a, c, k, n)
5. **Identify** challenges associated with wireless and mobile networking, and explain some popular wireless networks and protocols, such as IEEE 802.11 wireless LANs (ABET Outcomes: a, e, L, m, n)
6. **Explain** network security and threats: threat models, worm propagation, viruses, etc (ABET Outcomes: b, c, j, k)

ECE 576: At the completion of the course, students will be able to...

[1-6 above at a more advanced level of understanding] plus

7. **Design and implement** an advanced networking project

Evaluation of Student Performance:

ECE 476: Students will be evaluated via class assignments, quizzes, midterm(s) and/or final exams

ECE 576: Students will be evaluated via class assignments, quizzes, midterm(s) and/or final exams. Graduate students are required to do harder assignments/projects to demonstrate (1) deeper level of understanding and (2) ability to solve problems independently by designing and implementing sophisticated networking projects.

Learning Resources:

- *Computer Networking with Internet Protocols & Technology*, by W. Stallings, Prentice Hall, 2004 (optional)
- *Wireless Communications and Networks, 2nd Edition*, by W. Stallings, Prentice Hall, 2005 (optional)
- *Network Security Essentials: Applications and Standards, 3rd Edition*, by W. Stallings, Prentice Hall, 2007 (optional)
- Several technical papers

Students with Disabilities:

Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

Link to Statement of Expectations for Student Conduct:

<http://oregonstate.edu/admin/stucon/achon.htm>

Revised: 1/16/08

Revised: 2/4/14