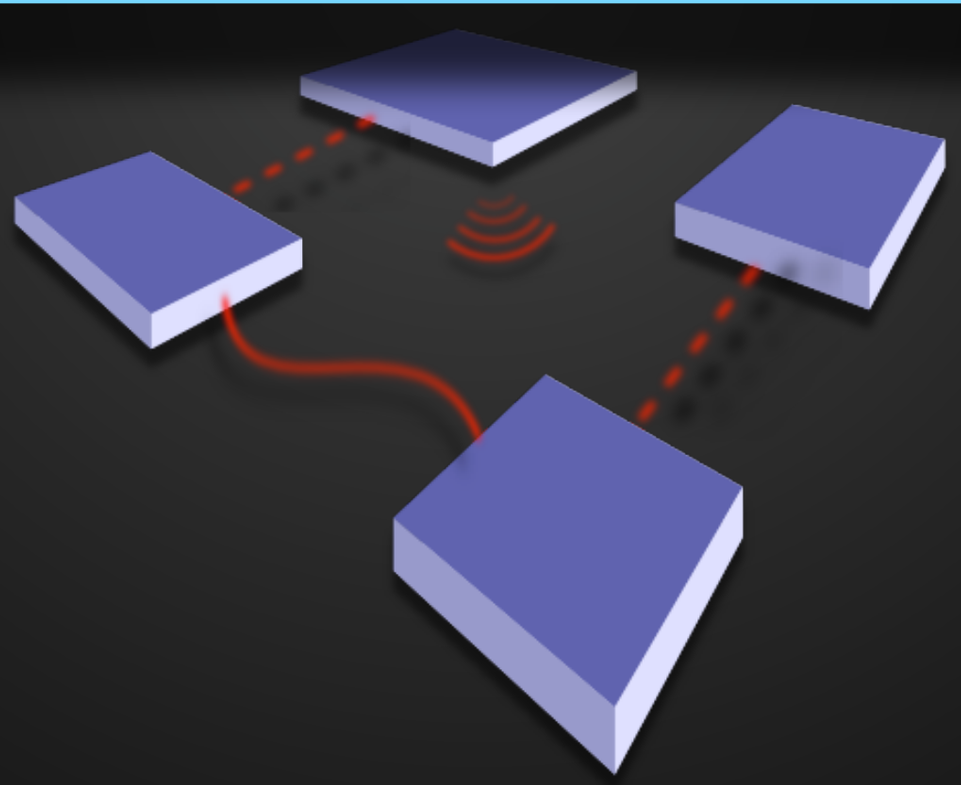
CS-435
spring semester 2025

Network Technology & Programming Laboratory

University of Crete
Computer Science Department

Stefanos Papadakis



CS-435

Lecture #1 preview

- About the Course
  - Goals
  - Requirements, Who’s who & formalities
- The course lecture topics in a nutshell
- A small flavor of the lab assignments

Course Goals

- Attain advanced knowledge in selected topics introduced in CS-335
- Become familiar with current Network Technologies
- Gain hands-on experience in using commercial products
- Discover textbook problems as they emerge in a networking laboratory
- Learn to provide solutions

CS-435 spring 2022

- Lectures: Stefanos Papadakis
- Lab TA: Nikos Boumakis, Giannis Bratsios
- Course Area: Telecommunications & Networks
- ECTS: 6
- Lecture Classes: H.204 Tue & Thu 12:00-14:00
- Lab Sessions: A.101 Fridays
- web: http://www.csd.uoc.gr/~hy435
- mailing list: hy435-list -(AT)- csd·uoc·gr
- course email: hy435 -(AT)- csd·uoc·gr

CS-435 spring 2022

- CS-335: Computer Network Systems is required

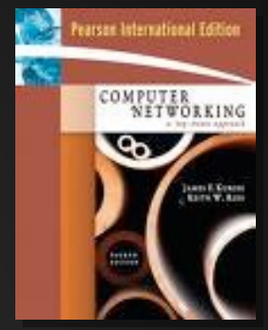
- This is a course that is based on the networking laboratory experience

- There is an assigned 2 hour lab interaction with the TAs, but the bulk of you work is done by you offline

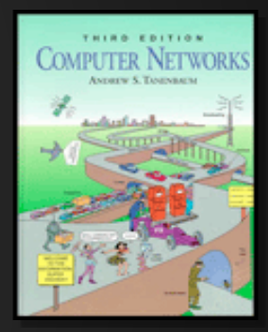
- Lab assignments & their oral exam are mandatory
  - you fail the course if you fail in more than 2

Study Material

- Computer Networks: A Top-Down Approach Featuring the Internet, 4th ed. J. Kurose and K. Ross, Addison Wesley, 2008

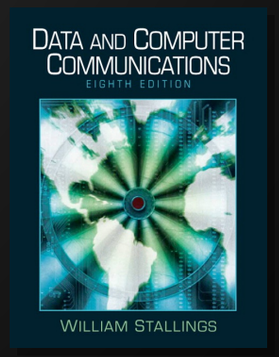


- Computer Networks,4th ed. A.S. Tanenbaum, Prentice Hall, 2002



- Communication Networks : A First Course, 2nd ed. J. Walrand, Mc Graw Hill, 1998

- Data and Computer Communications A First Course, 8th ed. W.A.Stallings, Addison Wesley 2007.



Study Material

- Whatever is provided on the course web-page:
  - Research Papers
  - Technology White-papers
  - Vendors' Product Manuals
- Whatever is related and you can get your hands on!
- CAUTION: Wikipedia may be a nice starting point for look-up & quick reference, but hardly good for study.

Laboratory Assignments

- There are 4(5) lab assignments scheduled

- Each assignment has a Tue ➔ Thu **9** day work-cycle.

- Assignments are worked by **2**-member teams
  - Each team delivers a report per assignment
  - Each team member takes an oral exam per assignment

- Extensions will be provided **only** under extraordinary circumstances

Laboratory Sessions

- TA next assignment reading

- Oral exam of the delivered assignment (sometimes just the TA, sometimes the TA and the lecturers)

- Mini-tests

- 6 total lab sessions
  - 1 introductory/tutorial
  - 4 for the exams & assignments TA reading
  - 1 for backup

Quick Lab Assignments Overview

- Internetworking introduction – addressing & rudimentary throughput measurements
- Packet forwarding, ARP & sniffing – VLANs
- Sockets Programming: UDP/TCP MSS - MTU understanding congestion control
- CIDR / Routing Protocols
- QoS / traffic priorities - using/understanding the traffic classes
- Simulation on GNS3
- 802.11 layer 1 & 2 issues: Interference / Throughput
- 802.11 layer 4+ issues: TCP / QoS

Quick Course Overview

- Switched Networks
- OSI Layering, Active Devices
- Internetworking, Packet Forwarding, Addressing
- IPv4, IPv6
- Hierarchical Routing
- UDP / TCP

Quick Course Overview

- TCP Congestion Control
- Socket Programming
- VPNs, IPsec
- NAT
- Software Defined Networks (SDN)
- Policing / Shaping
- MPLS
- QoS -over wired & -over wireless

Quick Course Overview

- Wireless Networking (layer 1 & 2)
- IoT wireless technologies (802.15.4, LoRa)
- 802.11 the whole lettersoup

Game Rules

- Final Exam: 30% Threshold: **4**
- Assignments: 60%
  - Note: each assignment is graded:
    - 50% based on your written report
    - 50% based on your oral exam
- Class Attendance: 10%
- Midterm or Project: 20% if greater than the Final Exam

- Example: final exam **5**, assignments **7**, attendance **8**, midterm **8**

5 x 0.3 + 7 x 0.6 + 8 x 0.1 + 8 x 0.2 = 1.5 + 4.2 + 0.8 + 1.6 = 8.1 =>

Grade = 8.1/1.2 = 6.75

Data Communications

- The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point

Claude Shannon (The Mathematical Theory of Communication)

- Science never solves a problem without creating ten more.

George Bernard Shaw (1925 Literature Nobel Laureate)

- It is a mistake to think you can solve any major problems just with potatoes.

Douglas Noel Adams (Hitchhikers' Guide to the Galaxy Author)