

CMPSCI 453, 591 Computer Networking

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What is this course about?

introductory (first) course in computer networking

- learn *principles* of computer networking
- learn *practice* of computer networking
- Internet architecture/protocols as case study
 - ❖ by the time you are finished

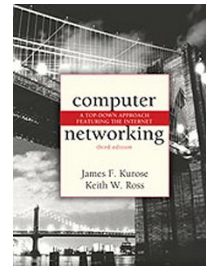
Goals:

- learn a lot (not just factoids, but principles and practice)
- have fun (well, it should be interesting, at least)

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Course information

- *introductory* (first) course in computer networking
- *who is this course for?*
 - ❖ undergrads, MS students
- *prerequisites:*
 - ❖ algorithms, Operating Systems, programming skills
- *course materials:*
 - ❖ text: *Computer Networking: A Top Down Approach Featuring the Internet*, J. Kurose & K. Ross, Addison Wesley, 3rd ed., 2004
 - ❖ class notes
 - ❖ class DVD on reserve: Learning Support Services, DuBois Library (one week later, and in main CS office)



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Course information (more)

- *class WWW site:*

the most important piece of info you will receive today!

gaia.cs.umass.edu/cs453

- *everything* is posted on this site!
 - ❖ syllabus
 - ❖ TA info
 - ❖ class notes (powerpoint, pdf)
 - ❖ assignments
 - ❖ old exams
- nothing will be handed out in class :-)



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Course information (more)

- **broadcast email:** `cs453@cs.umass.edu`
 - ❖ more later

- **workload:**

<u>Coursework</u>	<u>approx amount</u>	<u>approx %</u>
written homeworks	5	20%
programming (C,C++,Java)	2	15%
lab assignments (Ethereal)	5	15%
midterm		25%
2 nd midterm		30%

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Course information (even more)

Odd and ends...

- me
- in-class style: interaction, questions (*please!*)
- video instructional program (VIP)
- incomplete policy
- academic honesty
- getting into this course...

questions, comments, ... ???

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Course Overview:

Part 1: Introduction (2 classes, text: Chapter 1)

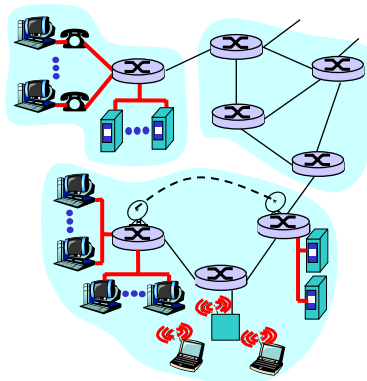
- ❑ what is the Internet, What is a protocol?
- ❑ network edge, network core, network access
- ❑ physical media
- ❑ delay, loss in packet-switched networks
- ❑ protocol layers, service models
- ❑ Internet backbones, NAPs and ISPs
- ❑ brief history of networking, Internet

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A top-down approach:

We'll cover networking
top-down

- ❑ **end-system** applications, end-end transport
- ❑ **network core:** routing, hooking nets together
- ❑ **link-level** protocols, e.g., Ethernet
- ❑ **other stuff:** security, mobility, management,



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Course Overview:

Part 2: Application Layer (4 classes, text: Ch. 2)

- ❑ principles of application-layer protocols
- ❑ World Wide Web: HTTP
- ❑ file transfer: FTP
- ❑ electronic mail in the Internet
- ❑ the Internet's directory service: DNS
- ❑ socket programming

PROGRAMMING ASSIGNMENT 1

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Course Overview:

Part 3: Transport Layer (6 classes, text Ch. 3)

- ❑ Transport-layer services and principles
 - ❑ Multiplexing and demultiplexing applications
 - ❑ Connectionless transport: UDP
 - ❑ Principles of reliable of data transfer
 - ❑ TCP case study
- PROGRAMMING ASSIGNMENT 2*
- ❑ Principles of congestion control
 - ❑ TCP congestion control

← **MIDTERM
EXAM (approx)**

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Course Overview:

Part 4: Network Layer (5 classes, text: Ch. 4)

- ❑ introduction and network service model
- ❑ what's inside a router?
- ❑ routing principles (algorithms)
- ❑ hierarchical routing
- ❑ IP: the Internet Protocol
- ❑ Internet routing: RIP, OSPF, BGP

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Course Overview:

Part 5: Link Layer, LANs (4 classes, text: Ch. 5)

- ❑ introduction, services
- ❑ error detection, correction
- ❑ multiple access protocols, LANs
- ❑ LAN addresses, ARP
- ❑ Ethernet
- ❑ PPP: the Point-to-Point protocol
- ❑ A network as a link layer: ATM, MPLS

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Course Overview:

Part 6: Wireless and Mobile Networks (3 classes, Ch 6)

- wireless link characteristics
- the wireless link:
 - ❖ 802.11
 - ❖ cellular Internet access
 - ❖ mobility principles
- ❖ mobility in practice:
 - ❖ mobile IP
 - ❖ mobility in cellular networks

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Course Overview:

Part 7: Network Security (3 classes, text: Ch. 7)

- what is network security?
- principles of cryptography
- authentication: Who are you?
- integrity
- key distribution, certification
- firewalls
- attacks, countermeasures
- *case studies: secure e-mail, SSL, IPsec, 802.11*

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End of course overview

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