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)
Course information

- introductory (first) course in computer networking
- who is this course for?
  - undergrads, MS students
- prerequisites:
  - algorithms, Operating Systems, programming skills
- course materials:
  - class notes (print and bring to class)
  - class video will be posted online (I hope)

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Course information (more)

- class WWW site:
  - the most important piece of info you will receive today!

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

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Course information (more)

- online discussion: we will be trying Piazza (discussion forum)

- workload (approx):

<table>
<thead>
<tr>
<th>coursework</th>
<th>approx amount</th>
<th>approx %</th>
</tr>
</thead>
<tbody>
<tr>
<td>written homeworks</td>
<td>5-6</td>
<td>20%</td>
</tr>
<tr>
<td>programming (C,C++,Java,Python)</td>
<td>2</td>
<td>15%</td>
</tr>
<tr>
<td>lab assignments (Wireshark)</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>midterm</td>
<td></td>
<td>15%</td>
</tr>
<tr>
<td>2nd midterm</td>
<td></td>
<td>15%</td>
</tr>
<tr>
<td>Final</td>
<td></td>
<td>20%</td>
</tr>
</tbody>
</table>

  25% each if you don’t take final

Course information (even more)

Odd and ends…

- in-class style: interaction, questions (please!)
- incomplete policy
- academic honesty
- additional 1-credit honors option?

  questions, comments, … ???
Course overview:

Introduction (3 classes, text: Chapter 1)
- what is the Internet, what is a protocol?
- network edge, network core, network access
- physical media
- delay, loss, throughput in packet-switched networks
- protocol layers, service models
- Internet backbones, ISPs, IXPs
- brief history of networking, Internet

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
Course overview:

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
- P2P: Skype
- socket programming

PROGRAMMING ASSIGNMENT 1

Course overview:

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)
**Course overview:**

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

**Course overview:**

Link layer, LANs *(4 classes, text: Ch. 5)*
- introduction, services
- error detection, correction
- multiple access protocols, LANs
- LAN addresses, ARP
- Ethernet
- network as a link layer: MPLS
- a day in the life of a web request (synthesis)

trip to, or visit by, ISP
Course overview:

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

Course overview:

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
end of course overview

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