

# Undergraduate Curriculum

SIGCOMM 2002 Education Workshop

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# GT's Current Undergrad Offerings

- 3251 Introduction to Networking  
Internet “Best” Practices - 120 students, 2/year
- 4251 Networking II  
More Depth, +Physical Layer - 40 students, 2/year
- 4255 Network Management  
FCAPS, SNMP - 30 students, 1/year
- 4260 Telecommunication Systems  
Telco Architecture and History - 30 students, 2/year
- 4270 Data Communications Laboratory  
Hands On Labs - 24 students, 2/year

# 3251 - Intro to Networking

- A survey course
- Current “best” practices of the Internet.
- Teach core networking concepts through the examples of current Internet protocols.
- Not a lab course. 60% written, 40% sockets programming
- Currently using Kurose and Ross.

# Key Themes - My View

- What are protocols?  
why needed, standards, specifications, evolution
- Layering Abstraction  
service interface, encapsulation, modular design
- Performance Issues  
protocol overhead, bandwidth vs propagation delay, effect of error rate
- Network Programming Issues  
API's (e.g. sockets), data representation, reliability, security
- Security Issues  
cleartext messages, address spoofing, DOS

# Key Themes - Students' View

- Applications - HTTP, SMTP, POP, DNS  
Contrast of design, signaling. Demo using Telnet.
- Transport - TCP, UDP  
Connection management, ARQ, Flow and Congestion Control
- Network - IP, IPv6  
Routing protocols, addressing, NAT, firewalls, IP vs MAC addressing, IPv6 transition
- Datalink - CSMA/CD Ethernet  
Emphasis on probabilistic nature and timing issues, evolution to 100Mb, Gb and wireless.

# Student Projects

## Successes

- Network discovery: traceroute, ping, arp
- Socket implementations
  - TCP and UDP
  - Both client and server to my specification.
  - Just one end, must interoperate with mine.
  - Student designs protocol and implements.

## Experiences

- commercial simulation packages
- performance competitions, bakeoffs

# Challenges and Opportunities

- Top Down vs Bottom Up vs Neither
- Theory vs hands-on?
- How much programming and when?
- How to teach performance analysis issues?
- Lighter weight simulation projects.
- Dealing with larger class sizes