

# Communication Networks

## University of Kansas EECS 663

### Spring 2006

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Information Technology & Telecommunications Research Center  
The University of Kansas



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*<http://www.ittc.ku.edu/~jpgs/courses/eecs663>*

# Instructor Information

## Background

- Dr. James P.G. Sterbenz
  - current positions
    - Associate Professor, KU Lawrence, US
    - Visiting Professor of Computing, Lancaster University, UK
  - past research and management positions
    - UMass, BBN Technologies, GTE Laboratories, IBM Research
  - academic background
    - D.Sc, Washington University in St. Louis, 1991
  - research interests
    - survivable and resilient networking
    - autonomic, programmable, and active networks
    - mobile wireless networking
    - high-speed networking

# Instructor Information

## Office Hours

- Thu. 17:00 – 19:00
- 125U Regents Center
- Or by appointment
  - email or call to arrange in advance
  - call before dropping in unless already on campus
  - Thu: typically on Edwards campus in afternoon
  - MTWF: typically in Lawrence if not travelling
    - 209 Nichols research office
    - 3036 Eaton: teaching office

# Instructor Information

## Contact

- Contact information
  - email: *jpgs@eecs.ku.edu* *only*
    - begin subject with "EECS663 "
    - email to other addresses will be *ignored*
    - email generally checked daily
    - email is *unreliable* ; retry if no reply within 48 hours
  - email with *meaningful* subject lines
    - bad
      - Subject: Hi!
      - Subject: regarding class
    - good
      - Subject: EECS663 - need help IPv4 TOS field

# Instructor Information

## Contact

- Contact information
  - phone
    - Edwards office: +1 913 897 8538
    - Lawrence Nichols office: +1 785 865 7890
    - Lawrence Eaton office: +1 785 864 8846
    - only if *urgent* : +1 508 944 3067
  - web
    - *<http://www.ittc.ku.edu/~jpgs>*

# Student Information

- Brief Introductions
  - around the room
- Photos to help me learn your names
- Roster information
  - full name
  - nickname
  - email for class information list
  - phone (day, other) will only be used for urgent matters
  - degree (MS, PhD), option if MS (course, project, thesis)

# Course Information

## Correspondence

- Course information and notes
  - <http://www.ittc.ku.edu/~jpgs/courses/eecs663>
    - notes for each lecture will be posted in PDF
  - check this *regularly* for updates
    - readings and homework assignments in schedule table
    - “last updated on bottom of page”
- Class email list
  - check email regularly
  - check email every afternoon before class
- Telephone
  - I’ll only phone you if urgent

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# Course Information

## Course Description

Comprehensive in-depth introduction to communication networks with emphasis on the Internet and various access networks, but also covering the PSTN (public switched telephone network – wired and wireless) mobile ad hoc networks, and SCADA (supervisory control and data acquisition) networks. Extensive examples of protocols and algorithms will be presented at all levels, including: client/server and peer-to-peer applications; transport protocols, the end-to-end arguments, and end-to-end congestion control; network architecture, forwarding, routing, signalling, addressing, and traffic management, quality of service, queuing (basic M/M/1 and Little's law); LAN architecture, link protocols and MAC algorithms; physical media characteristics and coding; network security and information assurance; network management.

Prereq: basic knowledge of Internet, computer systems, programming

# Course Information

## High-Level Schedule

- Thu. 19:10 – 22:00
  - 254 Regnier – Edwards Campus
- 26 Jan. – 18 May
  - three sectional exams plus final
- Cancellation due to weather
  - official closings unlikely
    - follow media announcements
  - if I can't make it from Lawrence
    - email to you by 16:00
    - phone message with Edwards reception +1 913 897 8400

# Course Information

## Reading

- Reading to be done *before* corresponding class
  - you will not do well if you slack on the reading
  - you are responsible for *all* required reading
    - may be on exams even if not covered in lecture!
    - contributes to your class participation grade
- Textbooks
  - Kurose & Ross, *Computer Networking: A Top-Down Approach Featuring the Internet*
  - Sterbenz & Touch, *High-Speed Networking: A Systematic Approach to High-Bandwidth Low-Latency Communication*
  - occasional additional readings on class web page
  - supplementary texts on web page
    - many on reserve

# Course Information

## Grades

- Grades modified curve grouped by mode
  - based only on merit
  - not based on employer reimbursement or immigration status
  - qualitative meaning
    - A: exceptional exam results and outstanding term paper
    - B: mastery of material and solid term paper
    - C: slacking but know basic material and marginal paper
    - D: very poor performance on exams or paper
    - F: nonperformance on exams or paper  
academic misconduct

# Course Information

## Grade Contribution

- Grade relative contribution
  - 45% section exams
    - three at 15% each
    - third will be first half of final exam
  - 15% comprehensive portion of final exam
  - 20% term paper
    - extra credit possible
  - 10% homework
  - 10%: class participation

# Course Information

## Exams

- Section exams: 15% each
  - tentative schedule
    - exam 1 on 2 Mar.
    - exam 2 on 27 Apr. (I expect to be out of the country)
    - exam 3 on 18 May (first half of final exam period)
- Final exam: 15%
  - comprehensive covering entire course
  - synthesis of multiple sections
  - second half of final exam period
- Closed book
  - no PDAs or programmable calculators

# Course Information

## Homework

- Homework assigned approximately weekly
  - you *must* solve the problems individually
    - you may discuss problems and solution strategies
  - due 23:59 midnight date in schedule table (generally Mon.)
    - late homework generally not accepted
    - submit by email
      - Subject: line *must* begin with EECS663 homework
      - inline *plain text*; not as an attachment unless instructed
  - credit based on
    - credible submission
    - *small* random sample will be graded
  - all solutions will be posted to web page
    - do not share with others!

# Course Information

## Term Paper

- Purpose and scope
  - research area of networking beyond class coverage
    - technical in nature
    - beyond description of single topic
      - comparison, history, future prospects, etc.
    - may involve simulation or implementation
  - gain technical writing and presentation experience
  - may lead to MS thesis or PhD dissertation
- Schedule
  - class discussion      16 Feb.
  - proposal due            22 Feb.
  - presentations          11 May
  - paper due                12 May

# Course Information

## Sources of Literature

- The Library
  - big building with books and paper journals: use it!
- The Web
  - source for journal papers
    - ACM Digital Library, IEEE (subscription through library)
    - individual and project Web pages
  - source for information on research projects
  - source for other information
    - non-refereed reports and information
    - compare to a street corner bulletin board: *use with care*
    - use *very* judiciously
      - reports with many URL refs unlikely to receive acceptable grade

# Course Information

## Class Participation

- 10% of grade is based on class participation
- Interactive class is better for all of us
  - questions, comments, arguments
  - blurt it out; don't wait
    - don't need to raise hand
- Reading before class will result in cluefull contribution

# Course Information

## Etiquette

- Try to be on time
  - consistent late arrivals are disruptive
- No audible mobile phone or pagers
  - if it doesn't vibrate, turn it off!
- University does not tolerate class disruption

# Academic Integrity and Plagiarism

## Reading the Riot Act

- Apologies to those that already know this
- Opportunity to learn for those who:
  - are inexperienced in writing
  - come from an environment or culture of tolerance
- Warning of the consequences
  - ignorance will not be an excuse
  - ask me if you have *any* question about this
- Applies to
  - copying homework
  - cheating on exams
  - plagiarism on term paper and presentation

# Academic Integrity and Plagiarism

## Referencing and Citations

- All sources *must* be properly referenced and cited
  - authors, “paper name”, *journal*, date, publisher, page–range
    - also URL if from obscure source (e.g. university tech reports)
    - see course Web page or for examples

James P.G. Sterbenz, Rajesh Krishnan, *et al.*,  
 “Survivable Mobile Wireless Networks: Issues, Challenges, and Research Directions”,  
*Proceedings of the ACM Wireless Security Workshop (WiSE) 2002 at MobiCom*,  
 Atlanta GA, Sep. 2002, pp. 31–40.

- Cite whenever
  - work is related or ideas are used
  - text is quoted or paraphrased
  - diagrams are reproduced or incorporated (even if redrawn)

# Academic Integrity and Plagiarism

## Quoting and Paraphrasing

- Quoting text or paraphrasing
  - “quotation marks” for sentence or less
  - blockquote for multiple sentences
- Beware of read-then-write in two windows
  - take intermediate notes from which you write
- Quoting is *rarely* needed
  - example: quoting or paraphrasing definition or principle
- Sequence of quotes *doesn't* show understanding
  - not a shortcut to English writing skills
    - better to be in your *own* imperfect English
  - unlikely to receive acceptable grade

# Academic Integrity and Plagiarism

## Detection and Sanctions

- Plagiarism is remarkably easy for me to detect
  - inconsistent writing styles and language use
  - technical depth beyond the supposed author
  - inconsistent terminology
- Tools: Web makes both plagiarism & detection easier
  - google on suspicious phrases
  - turnitin automates and correlates searches; goes beyond Web
- Plagiarism will result in **F** for *course*
  - and possible further sanctions
  - it is highly unlikely that you will get away with it!
    - but students still try every semester; *you have been warned*

# Course Outline

## Top Down Approach

- Introduction: preliminaries, network overview
- Applications: client/server and peer-to-peer
- Transport layer and end-to-end communication
- Network layer: routing, forwarding, signalling, etc.
- Link layer and LANs
- Physical layer
- Wireless and mobile networks, MAC
- Multimedia and session control
- Security and survivability
- Network management

# Communication Networks

## Relationship to Curriculum

- *Tentative* networking curriculum
  - currently under revision at Edwards and in Lawrence
- EECS663 is feeder course to
  - EECS745: high-speed networking
  - EECS8XX: mobile and wireless networking
  - EECS888: routing and network administration