Introduction to Communication Networks
The University of Kansas EECS 563
Fall 2017

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https://www.ittc.ku.edu/~jgps/courses/intronets
Communication Networks

AE.1 Administrivia

AE.1 Administrivia
AE.1.1 Schedule
AE.1.2 Prerequisites and description
AE.1.3 Instructor information and correspondence
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Course Information

High-Level Schedule

• Lecture: Mon. 09:30 – 10:45
  – Learned 3136

• 22 Aug. – 15 Dec.
  – three sectional exams plus final (15 December)
  – guest lecturer when I travel

• 15 Nov. is drop deadline

• No class
  – Tue. 17 Oct. (Fall Break)
  – Thu. 23 Nov. (Thanksgiving)
Course Information
Cancellation and Rescheduling

• Cancellation due to weather
  – official closings unlikely
    • announced on https://www.ku.edu

• Guest lectures due to my travel
  – I try *very hard* to avoid impacting class
  – project meetings & conferences sometimes interfere
  – this is the cost of an instructor who is active in research
Course Information

Influenza Precautions and Requirements

- Influenza
  - severity predictions will become more accurate late fall
  - peak typically in spring semester

- If there is a declared influenza breakout
  - if you have flu-like symptoms (with fever, aches)
  - *do not come to class or lab*, but contact me in advance
    - report to me your measured temperature
    - see your doctor or Watkins Health Services and get a note
  - I’ll work with you to make up material
Course Information

Influenza Recommendations

- Recommendations
  - *get the seasonal flu vaccine* (as I will)
    - flu shot clinics in the fall on Lawrence and Edwards campuses
    - available by appointment from KU WHS: +1 785 864 9507
  - *carry and use alcohol-based hand sanitiser*
Course Information

Influenza Official University Advice

• Provost advice for people with flu-like symptoms
  – stay home
  – isolate yourself until your temperature, without medication, is normal for 24 hours
  – don't go to the Student Health Services or other medical offices if you don't need to; faculty are asked not to require doctor's notes from absent students
  – if you have concerns, call a nurse at Student Health Services or other medical offices
  – students unable to attend class due to illness should contact their professor prior to the absence and make arrangements for completing class assignments
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AE.1.2 Prerequisites and Description

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EECS 563 Student Requirements

- Undergraduate students
  - EECS 168 or 169
  - EECS 461 or Math 526

- Graduate students
  - should take EECS 780 instead
An introduction to the principles used in communication networks is given in this course. Topics include a discussion of the uses of communications networks, network traffic, network impairments, standards, layered reference models for organizing network functions. Local Area Network technology and protocols are discussed. Link, network, transport layer protocols, and security are introduced. TCP/IP networks are stressed. VoIP is used as an example throughout the course. Basic concepts of network performance evaluation are studied, both analytical and simulation techniques are considered.
Communication Networks

Summary of EECS 563 Course Description

- Introductory undergraduate-level course
  - concepts and examples of systems and protocols
  - mostly non-mathematical
  - some basic queuing theory

- Emphasis on
  - Internet
  - contrast to PSTN (public switched telephone network)
  - introduction to mobile and wireless networks

- Top-down approach
  - following the structure of *Kurose and Ross*
Communication Networks

AE.1.3 Instructor Information, Correspondence

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Instructor Information

Background

• Prof. James P.G. Sterbenz
  – Professor, The University of Kansas (KU) Lawrence, US
  – Visiting Professor, Lancaster University, UK
  – Adjunct Professor, The Hong Kong Polytechnic University
  – Adjunct Professor, Chinese Academy of Sciences
  – past Visiting Guest Professor, ETH Zürich
  – past research and management positions
    • UMass, BBN Technologies, GTE Laboratories, IBM Research
  – academic background
    • D.Sc., Washington University in St. Louis, 1991
    • MSCS, WUSTL, 1986
    • BSEE, BSCS, AB (Economics, Asian Studies), WUSTL, 1980
Instructor Information

Research Interests

• Prof. James P.G. Sterbenz
  – resilient, survivable and disruption-tolerant networking
  – IoT (Internet of things and smart cities)
  – Future Internet architecture and programmable networks
  – mobile wireless networking and MANETs
  – high-speed networking and system architecture

  *note: plenty of research opportunities in my group*
Instructor Information

Contact Modes

- **Web**: check the class Web pages first
  - important announcements at top of 2017 page
  - detailed schedule

- **Email**: generally the best means of communication
  - many issues and questions can be quickly resolved
  - use to arrange other appointments

- **Social networks**
  - Facebook: facebook.com/groups/eecs563
  - subscribe and *post* if you wish to interact
Instructor Information

Contact Modes

- Interactive
  - skype chat (but not voice unless pre-negotiated)
    - jpgsterbenz
    - make sure to edit the connect request to include “EECS 563”
  - phone

- Office hours
  - face-to-face contact
Instructor Information

Office Hours

- Tue. and Thu. after class 11:00 – 12:00
  - 3036 Eaton
- Or by other appointment
  - email, or skype chat to arrange in advance
  - typically in Nichols if not in Eaton or travelling
    - 154 Nichols: research office
    - 3036 Eaton: teaching and undergraduate advising office
Grader Information
Background and Office Hours

• Xinyang Rui
  – MS student, The University of Kansas EECS
  – ruixy@ku.edu

• Adam Van Hal
  – MS student, The University of Kansas EECS
  – adam.van.hal@ku.edu

• Office hours
  – Friday 14:00–17:00
  – 1005 Eaton Commons
  – you need to look at weekly assignments before Fri.
Instructor and Grader Information
Contact: Email Address

- Email: jpgs@eecs.ku.edu or ruixy@ku.edu or adam.van.hal@ku.edu only
  - begin subject with exact string “EECS563 -”
    - no space between “EECS” and “563”
    - blank space between “563” and hyphen
  - Email to other addresses will likely be misfiltered and unread
  - I generally check email daily
    - email is unreliable; retry if no reply within 48 hours
    - if quick reply is needed feel free to skype chat
Instructor Information

Contact: Email Address

• Email with *meaningful* subject lines
  – bad
    Subject: Hi!
    Subject: regarding class
  – good
    Subject: EECS563 - need help understanding AIMD
Electronic Mail
Netiquette: Sender Identification Name

• Configure email client with your name in ISO-Latin
  – e.g. Ima K.U. Student <ima.student@eecs.ku.edu>
  – this is an example; use your real name

• CJK (Chinese, Japanese, Korean) encodings
  – appear as gibberish to older and non-GUI email clients
  – use only after ISO-Latin name
  – e.g.
    James P.G. Sterbenz 司徒傑莫 송재윤 <jpgs@eecs.ku.edu>
Electronic Mail
Netiquette: Sender Identification Signature

• Define a meaningful signature (.sig)
  – name, affiliation, telephone number, URL if you have one
  – max. of ~4 lines (not including separator dashes)
  – max of 72 characters/line, e.g.

------------------------------------------------------------------------
Ima K.U. Student
Electrical Engineering & Computer Science, The University of Kansas
ima.student@ku.edu                            www.ittc.ku.edu/~ikus
+1 785 864 4776
Electronic Mail
Netiquette: Formatting

- Email was originally text-only with no formatting
  - many people still like it that way!
    - some people still use text only clients
    - increasing use of PDAs
  - not all clients are MS Outlook!
- Unless pre-negotiated with the recipient:
  - use plain text with no formatting
    - some email clients have formatting on by default
    - some misconfigured (MS-Exchange) servers format anyway
  - do not send email as HTML
  - do not embed images
Electronic Mail

Netiquette: Content and Attachments

• Content issues
  – use meaningful subject lines
  – spellcheck (most modern clients do this)
  – *think* before you send

• Simple emails should not be sent as attachments
  – e.g. MS-Word document containing “where are you now?”

• Do not send very large attachments unless
  – receiver is able to handle them (broadband access)
  – small enough to pass relay & server limits (typ. ≤ 10 MB)
Electronic Mail

Netiquette: Professionalism

- Email is like conversation, writing, and attire
  - adapt style to context
  - academic and professional is more formal than with friends
- Style
  - plain text, no embedded images
  - limit jargon and emoticons to someone you know well
  - proofread and think before you send
- Proofread and *think before you send!*
Electronic Mail

Netiquette: Professionalism

- Avoid free email accounts
  - e.g. hotmail, yahoo
- Gives you a very unprofessional appearance
  - frequently auto-append advertisements
- Frequently spam-blocked
- Use academic or corporate email addresses
  - for professional correspondence
  - gmail has become acceptable for professional appearance
Electronic Mail
Netiquette: Professionalism Examples

To: James Sterbenz <jpgs@eecs.ku.edu>
From: ima <cool_dude@stupidmail.com>
Subject: need a job!!!

i’m new at KU and really like it 😊
i’m interested in **everything** and
am bombing this email to all KU
professors. i’ve stopped by your office
in Eaton but you’ve never there!!! 😞
do you even have office hours
dude? LOL! Just tell me when I can
drop by too learn what you do

RU THERE??!!

cu later,
ima

Get your free email at Stupidmail.com!

Eat at Joe’s: 1234 Mass, Lawrence, KS
Electronic Mail
Netiquette: Professionalism Examples

To: James Sterbenz <jgps@eecs.ku.edu>
From: ima <cool_dude@stupidmail.com>
Subject: need a job!!!

i'm new at KU and really like it 😊
i'm interested in everything and am bombing this email to all KU professors. I've stopped by your office in Eaton but your never there!!! 😊
do you even have office hours dude? LOL! Just tell me when I can drop by too learn what you do

RU THERE??!!

cu later,
ima
________________
Get your free email at Stupidmail.com!

Eat at Joe's: 1234 Mass, Lawrence, KS

To: James Sterbenz <jgps@eecs.ku.edu>
From: Ima Student <student@eecs.ku.edu>
Subject: Interest in ResiliNets group

Dear Professor Sterbenz,

I am a new M.S. student in the EECS department with interests in networking. I have looked at your Web pages and read the SUMOWIN paper. I am very interested in this research and will come to the next ResiliNets group meeting on Friday. I would like to discuss the possibility of you becoming my advisor and want to understand if there are any funding opportunities.

Sincerely,
Ima Student

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Ima Student       EECS, Univ. of Kansas
student@eecs.ku.edu     +1 785 555 1212
Course Information
Correspondence to Class

- Course information and notes
  - https://www.ittc.ku.edu/~jpgs/courses/intronets
    - notes for each lecture will be posted in PDF
      - typically weekend after class
    - navigate to subpage for Fall 2017 specific information
      - announcements, schedule, and deadlines
  - https://www.ittc.ku.edu/~jpgs/courses
    - generic information
  - check *regularly* for updates
    - assignments in schedule table in sub-page
    - “last updated” on bottom of page
Course Information

Correspondence to Class

- Class email list: auto-generated by Enroll & Pay
  - I may use occasionally
  - check KU email regularly
Instructor Information

Contact: Phone and Chat

- Contact information
  - skype: jpgsterbenz
    - ok to use chat *judiciously* when email not appropriate
      - send *meaningful* introduction message containing “EECS563”!
    - don’t use voice unless prearranged by chat
      - I frequently am not in a position to use headset/microphone
  - phone: rarely useful
    - Lawrence Nichols office: +1 785 864 7890
    - Lawrence Eaton office: +1 785 864 8846
    - don’t call my mobile or home phone unless *emergency*
Communication Networks

AE.1.4 Grading and Student Expectations

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Course Information

Textbook

• Kurose & Ross
  – you *must* use the *7th* edition; homework problems different
  – you may need to buy a content license if:
    • you bought a used copy
    • you bought an international edition
    • this is *not* needed for the Wireshark labs
  – also used in EECS 780

• Get it *now*
  – you may not use waiting for shipment as an excuse
    • I’m sorry if you have to pay for rush shipment
    • this is your fault as you could have gotten from KU Bookstore
    • get your *own* copy; library copies may be recalled any time
Course Information

Reading

• Required readings are mandatory
  – the textbook is not just a reference
  – you won’t be able to use them on exams
• Reading must be done before corresponding class
  • may be on exams even if not covered in lecture
Course Information

Grades

• Grades: modified curve grouped by mode
  – A guaranteed if > 90
  – B guaranteed if > 80
  – C guaranteed if > 70
  – F for academic misconduct regardless of other grades
  – no +/- grades in this class
  – based only on merit; not on:
    • immigration status or potential visa invalidation
    • probationary status at KU

• I do not give you grades, you **earn** them (or don’t)
  – I am unable ethically to record a grade higher than you **earn**
Course Information
Grade Contribution

- Relative grade contribution
  - 80% exams
    - 60% section exams; 20% each (third first half of final period)
    - 20% comprehensive portion of final exam
  - 10% homework
  - 10% Wireshark and socket programming exercises
  - extra credit for brownie points
  - 0% for effort “Do. Or do not. There is no try.” – Yoda
    - mandatory academic integrity quiz in second week
  - no extra credit at the end of term to make up for slacking
Course Information
Exam Schedule and Weight

• Section exams: 60%
  – tentative schedule *subject to change*
    • academic integrity quiz on 29 Aug. (required to pass course)
    • exam 1 on 05 October
    • exam 2 on 09 November
    • exam 3 on 15 December 07:30 (portion of final exam period)

• Final exam: 20%
  • comprehensive covering entire course
  • synthesis of multiple sections
  • portion of final exam period
Course Information

Exam Characteristics

• Closed book, no electronic devices
  – makeup exams only for *documented* emergency
  – you will probably have to take the exam *in advance*

• Exams test *understanding of concepts*
  – not memorisation of facts that could be looked up
  – not focused on the ability to solve problems
    • that is what homework practice is for
  – this will be new to some of you!

• More exam information on
  https://www.ittc.ku.edu/~jgps/courses/exams.html
Course Information
Exam Questions

• Exams consist of three types of questions
  – sufficient space given to properly and fully answer
• Multiple choice
Course Information

Exam Questions

• Exams consist of three types of questions
  – sufficient space given to properly and fully answer

• Multiple choice

• Short answer example (several per page):
  – example question:
    Compare the functionality of the link and transport layers.
Course Information
Exam Questions

• Exams consist of three types of questions
  – sufficient space given to properly and fully answer

• Multiple choice

• Short answer example (several per page):
  – example question:
    Compare the functionality of the link and transport layers.

• Long answer example (one per page):
  – example exam question:
    Sketch and label a packet flow diagram for stop-and-wait, go-back-n, and selective repeat. Explain the advantages and disadvantages of each scheme.
Course Information

Exam Answers

- Answers must legibly fit in space provided
  - sufficient space given to properly and fully answer
  - be brief; points will be *deducted* for irrelevant information
    - and you will have a hard time finishing the exam
  - writing on back of page & deep into margins will be *ignored*
Course Information

Exam Answers: How to Answer

- Example question:
  Compare the functionality of the link and transport layers.
Course Information
Exam Answers: How to Answer

- Example question:
  Compare the functionality of the link and transport layers.
  - example correct answer (1 minute to write):
    Both the link and transport layer transfer data; the link layer hop-by-hop and the transport layer end-to-end.
Course Information

Exam Answers: How Not to Answer

- Example question:
  Compare the functionality of the link and transport layers.
  
  - example correct answer (1 minute to write):
    Both the link and transport layer transfer data; the link layer hop-by-hop and the transport layer end-to-end.

  - example poor answer (10 minutes to write):
    The link layer is layer 2 in the OSI model, shown in the figure. Examples of link layer protocols include Ethernet, 802.11, SONET, and HDLC. 802.11 was developed in as a replacement for Ethernet, and thus has similar frame structure, shown in Figure 2. Note that 802.11 has more MAC address fields than Ethernet. The reason for the additional address fields has to do with the operation of the 802.11 MAC. Actually I really don’t know the answer to this question, but I did memorise a bunch of stuff on some of these protocols, so I hope that if I write enough that I will get some credit for this question and that if I bomb you with information you will find some reason to give me credit on this problem and so I’m just going to keep writing until time is called on this
Course Information
Homework Assignments and Lab Exercises

• 20% of grade on homework and laboratory exercises
  – homework assignments give you problem solving experience
  – laboratory exercises give you practical experience
• Slacking on either will also hurt your exam scores
  – and you will most likely earn no better than a C grade
Homework Assignments

- You **must** solve homework assignments individually
  - you may discuss problems and solution strategies
    - but should not walk away from discussion with written notes
    - nor engage in group homework solving
  - you **must not use** (illegal) copies of the solution manual
  - you **must not use** solutions posted or answered on the Web

- Homework problems
  - show your work; answers alone will receive no credit
  - show all units, e.g. $10 \text{ [Mb/s]} \cdot 5 \text{ [μs]} = 5\text{[b]}$
  - when asked explain *how* you reached your answer
Course Information
Homework Assignment Submission

• Due at in class or to EECS office on the due date
  – typically Tue.
  – late assignments *not* accepted
  – if submitted to office must be time-stamped before close
Course Information
Homework Assignment Preparation

- Homework must be submitted on paper
  - name and date on every page
  - fold vertically in half with name and date *only* on outside
  - *legibly* hand written
    - assignments difficult to grade with be returned with a 0
    - or
  - using the text or word processor of your choice
    - use LaTeX math mode or MathType for complex formulæ
    - for simple formulæ you may use common conventions
      - e.g. * for multiplication, ^ for exponentiation, _ for subscripts
Course Information

Wireshark and Socket Programming Exercises

• Exercises to gain practical experience
  – Wireshark laboratories for protocol analysis (download now)
    • must explain what you did and not only submit screen shots
  – socket programming exercise
    • code must be commented
    • code must run with no warnings

• You must solve individually
Course Information

Attendance

• Attendance is mandatory
  – will be tracked as necessary with class photos
• Explicit information on exam content in class
  – not available on Web pages or lecture notes
Course Information

Class Participation

• Interactive class is better for all of us
  – questions, comments, arguments
  – blurt it out; don’t wait: you don’t need to raise your hand
  – this may be a cultural shift for some of you; get used to it

• Reminder: reading *before* class essential

• Brownie points
  – find bug in lecture notes or book; make a good suggestion
  – email reminder with *exact*
    Subject: EECS563 - brownie point
Course Information

Etiquette: Class Presence

- Try to be on time
  - I understand some are commuting, but...
  - *consistent* late arrivals are disruptive
Course Information

Etiquette: In-Class

• No audible mobile phone or pagers
  – if it doesn’t vibrate, turn it off!
  – inform me in advance if need audible alerts
    • e.g. sick relative; child home alone

• No mobile or computing devices
  – other than for following lecture notes
  – texting, emailing, Web surfing, streaming, social networking
    • must leave the room for the rest of the lecture session
    • yes, it is easy for me to tell

• University does not tolerate class disruption
  – protests, sit-ins, heckling, etc.
Course Information

Intellectual Property and Recording

- Lecture notes and presentations
  - copyright belongs to the instructor
- In-class recording strictly prohibited
  - audio or video
- Returned assignments
  - strictly for your own use
  - sharing with others strictly prohibited
  - uploading prohibited
    - public servers or Web sites
    - subscription-based sites such as Course Hero
Course Information

Guns

- Concealed carry now legal on KU campus
  - subject to restrictions
  - KU policy at https://concealedcarry.ku.edu

- Open carry not permitted
  - if existence of firearm in this class revealed
    - campus and Lawrence police will be called
    - class will be cancelled
    - penalty for false reporting
Course Information

Academic Accommodations

• Academic disability accommodations
  – must be processed by KU AAAC
    • https://access.ku.edu/academic-accomodations
  – well in advance of first affected assignment

• Students are responsible for
  – processing AAAC qualification
  – presenting AAAC accommodations to instructor
  – scheduling alternate exams *one week in advance*
Course Information

Discrimination and Harassment

- Discrimination and harassment not tolerated
  - race, colour, ethnicity, national origin, ancestry
  - religion
  - sex, sexual orientation, sexual preference
  - gender identity, gender expression
  - disability
  - status as a veteran
  - marital status, parental status
  - age
  - genetic information

- Report to me and KU
Course Information
Religious Observances

- Religious observances and holidays
  - you must meet with instructor at the beginning of semester
  - discuss potential conflicts with class sessions and exams

- Class conflicts
  - student responsible for missed material
  - meet during office hours if questions after reviewing notes

- Exam conflicts
  - remind instructor two weeks before exam date
  - alternative exam must be taken before scheduled date
Communication Networks

AE.2 Ethics and Academic Integrity

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Academic Integrity and Plagiarism

Reading the Riot Act

• Apologies to those that already know this
  – ... especially who’ve heard it from me before
• Opportunity to learn for those who:
  – 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 and lab exercises
  – cheating on exams
  – plagiarism on term paper and presentation
Plagiarism
Definition and Overview

- Plagiarism
  “The action or practice of taking someone else’s work, idea, etc., and passing it off as one’s own”
  retrieved through KU Libraries subscription

- Plagiarism is the *ultimate academic crime*
  – do not underestimate the *shame* of this act
  – it ends student careers and destroys academics

- Plagiarism is...
  – cheating, lying, stealing, dishonuor
  – at least as sleazy as stealing money from family and friends
Plagiarism Types

• Ideas
  – using or presenting the ideas of other without full credit

• Words
  – incorporating or paraphrasing the words of others
  – without proper quotation style and citation

• Figures and images
  – using figures, drawings, plots, and images without citation

• Algorithms, programs, and non-trivial formulæ
  – without full credit and citation
Plagiarism

Context

- In school
  - submitting assignments that are not your own
  - you will be dismissed from KU for doing this
- In research
  - submitting papers or research reports that are not your own
  - your research career will be ruined
- In business
  - using ideas and code of others in your product
  - you will lose your job and may go to prison
Plagiarism

Examples in our Department

• EECS PhD student plagiarises dissertation
  – dismissed from program
• EECS student buys code from rent-a-coder
  – caught by our spies that infiltrate code-for-purchase
  – dismissed from KU
• EECS student plagiarises paper in my course
  – gets F and destroys GPA
  – goes on academic probation; leaves KU without degree
  – unlikely to get good job
• EECS student cheats on final
  – gets F and is deported
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

• 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
Proper 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
  - never ever cut-and-paste from others into your own work
  - take intermediate notes from which you write
Academic Integrity and Plagiarism

Excessive Quoting and Paraphrasing

• 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
    • but use the writing center
  – papers with excessive quotes will not receive decent grade
    • even if properly quoted and cited
Plagiarism
No Excuses

• Unintentional plagiarism is *not* an excuse
  – will not reduce sanctions

• Lame excuses we’ve heard and won’t buy
  – “I was going to edit into my own words but missed it”
  – “their English is better than mine so I thought it’s OK”
  – “I really did write it; there are only so many ways to say it”
    • every full sentence is unique

• Unawareness of a co-author is not an excuse
  – all authors are responsible for a work’s content
  – all authors must read works with their name on it
  – if you do not trust a co-author, do not work with them
Plagiarism Detection

- Plagiarism is *remarkably easy to detect*
  - inconsistent writing styles and language use
  - technical depth beyond the supposed author
  - inconsistent terminology
- If you plagiarise, *you will ultimately be caught*
  - at best you will completely lose the trust of your colleagues
  - at worst your student career will immediately end
- Tools: Web makes both plagiarism & detection easier
  - Web search on suspicious phrases
  - automated tools match and highlight with fuzzy searches
Plagiarism
Avoiding

- Never copy-paste into your paper or assignment
  - even if you intend to edit later
  - it is almost certain that many plagiarism artifacts will remain

- Do not read in one window and write in another
  - read and take bullet-style notes in your own words
  - use your notes to write prose in your own words

- Always credit and cite your sources
  - err on the side of caution
  - with experience citation of common knowledge unnecessary
Academic Integrity and Plagiarism
Sanctions

• Plagiarism will result in F for course
  – entry in department file
  – report to administration
  – and possible further sanctions, including dismissal from KU

• Your academic career will be ruined
  – your future job prospects are dismal
  – if you are a foreign student you may be deported in shame

• It is highly unlikely that you will get away with it!
  – but students still try every semester; you have been warned
  – don’t expect sympathy when you are caught cheating
Plagiarism
Cautionary Tale

• *IEEE Communications*
  – [Park, Baek, and Hong] run in May 2001 issue
  – plagiarised several related works
    • [Khan, Li, and Manning] and Khan’s thesis
  – without citing or proper quote style
    • verbatim text and paraphrases
    • figures and formulæ
Plagiarism
Cautionary Tale\textsuperscript{1b}

- \textit{IEEE Communications}
  - printed editorial retraction
  - side-by-side comparison of both papers
  - apology by two of the authors
- The plagiarising author’s career is ruined
  - and those of his oblivious coauthors severely damaged
  - made popular press in the UK and Korea
  - considered a national embarrassment by Koreans
Plagiarism
Cautionary Tale

• Recent high-profile plagiarism case at KU
  – Mahesh Visvanathan for plagiarism on scientific paper
  – Gerald Lushington for failing to take action once known

• Results
  – IEEE administrative retraction
    • “Notice of Violation of IEEE Publication Principles...”
      http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=5260432
    • 5-year publication ban
  – KU public censure
    • now gone from KU
  – US HHS Office of research integrity
    • 2-year probation
Plagiarism
Cautionary Tale

• Sterbenz finds a suspicious citation in Google Scholar
  – ITC 2011 paper has been stolen
  – OCRed, reformatted, and published in bogus IJCSNS journal
• Sterbenz emails ‘author’ employer and IJCSNS
  – receives apology from ‘author’ and employer
  – ‘author’ claims friend advised him to have pub for grad apps
  – ‘author’ finally gets IJCSNS paper retracted
  – Sterbenz has full cite and pointer to original paper on Wiki
  – panicking ‘author’ now trying to get info expunged from Web
    • but the Web remembers forever
    • including TCCC email archive on incident
Plagiarism
Cautionary Tale_3b

- The plagiarising ‘author’ has:
  - been fired from his job
  - will find it very difficult to gain admission to graduate school
  - has severely damaged his future job prospects
  - hopefully learned an important lesson
    - and spread to his friends

- Sterbenz will attempt to get bogus journal shut down
  - with help from Korean colleagues
Plagiarism
Self-Plagiarism

• Copying your own work
  – without proper acknowledgement

• Dual submission of papers or assignments
  – or substantial portions
  – unethical and against policy of legitimate societies / journals
  – unless specifically permitted and disclosed
    • e.g. conference to expanded journal paper

• Fuzzy line and slippery slope
  – generally OK to reuse introductory material if cited
  – auto-plagiarism detectors in paper submission systems
    • provide disincentive for reusing even introductory material
Academic Integrity and Plagiarism

Academic Integrity Quiz

- Homework this week: read
  https://www.ittc.ku.edu/~jps/courses/academic-integrity.html
  https://www.ittc.ku.edu/~jps/courses/source-cite.html

- You *must understand* this material
  - ask me if you have *any* question
  - goal is for new students to learn

- Next week: academic integrity quiz
  - you must take (and retake until perfect) to pass this course
AE.1 Administrivia

AE.2 Ethics and academic integrity

AE.3 Course outline
   I. Upper layers
   II. Lower layers
   III. Special topics
EECS 563 Outline

I: Upper Layers

I: Upper layers
- HA: Network history and architecture
- AL: Application layer
- TL: Transport layer

II: Lower layers

III: Special topics
EECS 563 Outline

HA: Network History and Architecture

- Understanding of where we are and how we got here
  - essential to understand *why* things are as they are
  - historical development of each
  - structure and architecture
- PSTN: public switched telephone network
  - traditionally voice over wired infrastructure
  - evolving for wireless, mobility, and data
- Internet
  - has become the global information infrastructure
  - cloud computing, data centres, IoT (Internet of things)
- Other networks: SCADA, military GIG, etc.
EECS 563 Outline

AL: Application Layer

• Distributed applications are the reason for networks
  – structure and operation of applications
  – characteristics: delay, bandwidth, loss tolerance
  – utility curves based on latency

• Information access applications and protocols
  – file transfer, Web and HTTP, netnews, P2P file sharing, ...

• Telepresence applications and protocols
  – email, chat, conferencing

• Distributed computing and storage
  – remote login, P2P file swarming, NAS, SANs, cloud

• Social networking
EECS 563 Outline
TL: Transport Layer

• Transport layer provides end-to-end communication
  – to distributed applications
• End-to-end vs. hop-by-hop communication
  – the end-to-end arguments
• Transport functions and mechanisms
  – framing and multiplexing
  – transfer modes and state management
  – reliability and error control
  – transmission (flow and congestion) control
• Internet transport protocols
  – TCP and UDP
EECS 563 Outline

II: Lower Layers

I: Upper layers

II: Lower layers

NL: Network layer
NR: Network routing
LL: Link layer and LANs
PL: Physical layer

III: Special topics
EECS 563 Outline

NL: Network Layer Data Plane

- Network provides infrastructure to create E2E paths
  - addressing to identify network components
  - routing to discover end-to-end paths
  - forwarding through switches and routers
  - signalling for network control
  - traffic management

- Switch and router design
  - programmable and software-defined networking

- PSTN addressing

- Internet protocols: DNS, IP, ICMP, DHCP, NAT
EECS 563 Outline

NR: Network Routing and Control Plane

- Network provides infrastructure to create E2E paths
  - addressing, forwarding, traffic management
  - signalling for network control
  - routing to discover end-to-end paths
- Routing algorithms
  - distance vector, link state, source routing, DHTs
- Internet routing architecture and protocols
  - PSTN
  - EGP: BGP
  - IGPs: RIP, IGRP, EIGRP, OSPF, IS-IS
- Network management
EECS 563 Outline
LL: Link Layer and LANs

- Links provide the connection between components
  - framing and delineation
  - error control
- LANs (local area networks)
  - topologies: point-to-point, ring, shared medium
  - multiplexing and switching
  - Ethernet and SONET (synchronous optical network)
- Link layer components
  - hubs and layer 2 switches
- Residential broadband
  - HFC (hybrid fiber coax) and DSL (digital subscriber line)
EECS 563 Outline

PL: Physical Layer

• Physical layer responsible for information transfer
  – bits in a wire as electrons and photons
  – signals and transmission

• Physical media
  – wire, fiber, free-space wireless

• Performance characteristics
  – delay, attenuation, frequency response

• Line coding
  – analog and digital
EECS 563 Outline

III: Special Topics

I: Upper layers
II: Lower layers
III: Special topics

MW: MAC, mobile, and wireless (preview to EECS 882)
SR: Security, Resilience and Survivability
MT: Multimedia networking, session control, traffic mgt.
EECS 563 Outline

MW: MAC, Mobile, and Wireless

- Medium access control (MAC)
  - arbitrates access to shared medium
  - needed for free-space wireless and other shared media
- MAC algorithms
  - channel partitioning, random access, coördinated access
- Wireless networks
  - 802.11, 802.16, 802.15 and Bluetooth, sensor networks
- Mobile networks
  - mobile IP
  - MANETs: mobile ad hoc networks
  - mobile cellular telephony
EECS 563 Outline

SR: Security, Resilience and Survivability

• Security functions and mechanisms
  – confidentiality and encryption
  – key distribution and revocation
  – authentication
  – integrity, digests, and digital signatures
  – nonrepudiation
  – access control

• End system protection
  – firewalls, intrusion detection, anti-virus and anti-worm

• Resilience and survivability
EECS 563 Outline
MT: Multimedia, Session Control, Traffic

• Multimedia applications
  – applications that stream audio and video media
  – VoIP: voice over IP

• Session control
  – coordinates multiple end-to-end transport flows
  – SIP: session initiation protocol and H.323

• Multimedia transport
  – additional timing and synchronisation
  – RTP: real-time transport protocol

• Traffic management
  – service models, congestion control, QoS
Next week

- fundamentals and preliminaries
- history and architecture