EE 550 Course Syllabus – Fall 2015
Data Networks: Design and Analysis

Instructor
Michael J. Neely (EEB 520, mikejneely@gmail.com, 213-740-3505)
Office hours: Tu/Th 9:30-11:30 (look for me at the RTH cafe area outside the EEB building)
• When contacting me by email, use my gmail account, and please put “EE 550” in the subject.
• Feel free to email or come to office hours to ask about problem set questions or project ideas before they are due. In
  most cases, the professor or TA is comfortable giving hints and/or guiding students to work out exact solutions.

Teaching assistant
Mengjiong Qian (mengjioq@usc.edu), Office hours Tues. 5-6pm, Wed 5-7pm, RTH 418.

Class location and time:
Tuesday/Thursday 8-9:20am (OHE 122)

Textbook and course notes
• Data Networks (2nd ed.) by D. Bertsekas and R. Gallager.
  http://web.mit.edu/dimitrib/www/datanets.html
• “Network Optimization: Notes and Exercises”:
  http://ee.usc.edu/stochastic-nets/docs/network-optimization-notes.pdf

Supplemental reading
• Backpressure routing and Lyapunov optimization wiki links:
  http://en.wikipedia.org/wiki/Lyapunov_optimization
• MAC analysis with ZigZag decoding (extended from a prior project in EE550):
  J. Paek and M. J. Neely, “Mathematical analysis of throughput bounds in random access with zigzag decoding,” Mobile

Grading:
Homeworks 20%, Midterm 35%, Final 40%, Mini Project 5%. Class participation may factor into the homework score.
The following minimum letter grades are guaranteed to students with a weighted total score that is within the specified
intervals: 85-100 (A), 65-85 (B: grades of B+ and A- are also given), 45-65 (C: Grades of C+ and B- are also given). The
above thresholds may be adjusted at the end of the semester at the discretion of the instructor. Any such adjustments will be
in favor of a higher letter grade.

Statement for students with disabilities:
Any student requesting academic accommodations based on a disability is required to register with Disability Services and
Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be
sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30
a.m.5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on academic integrity:
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of
respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed
by an instructor, and the obligations both to protect ones own academic work from misuse by others as well as to avoid
using anothers work as ones own. All students are expected to understand and abide by these principles. Scampus, the Student
Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix
A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs
and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can
be found at: http://www.usc.edu/student-affairs/SJACS/.
Exam dates (locations to be announced later):

- Midterm exam: Thursday Oct 15, 8-9:20am
- Final Exam: Tuesday Dec 15, 4:30-6:30pm

A. Course mini-projects

Mini-projects are chances for you to design your own extended problem set questions, with answers. You can work alone, or in groups of up to 3 people. Due dates will be assigned to individual students, starting in week 2 of the course. You are expected to give a presentation (in professor or TA office hours) and a short 2-3 page writeup (using, for example, latex).

I. Tentative course outline

- Markov chains and indicators for bit pattern problem, 2-army problem, error detection codes
- CRC codes, Burst error detection, Framing, flags and overhead
- Shortest path problems, Bellman-Ford, Dijkstra, bi-criteria optimization
- Opportunistic routing, Min cost subject to constraint, Pareto optimality
- Calculus solutions, Lagrange multipliers for 1-constraint, convex programs
- Convex program examples, Network flows, drift-plus-penalty method for convex programs, Fast TCP
- Drift-plus-penalty method for convex programs, Fast TCP, Power-aware formulations
- Student example problems
- ARQ, Stop and wait, Go-back-n, correctness proofs
- RN/SN modulus, Selective repeat, Review of queue/renewal theory
- M/G/1 analysis, Markov chain truncation for admission control
- Optical networks and wavelength continuity constraints
- Multiple access via Aloha, CSMA
- CSMA-CD, special topics and student presentations