

# ECE/CS 541 and CSE 524: COMPUTER SYSTEMS ANALYSIS

## Course Introduction - Fall 2009

### Instructor

Professor David M. Nicol - [nicol@iti.uiuc.edu](mailto:nicol@iti.uiuc.edu), 457 Coordinated Science Lab, 244-1925

Office Hours: Monday 3-5 p.m., and by appointment. I'm happy to make appointments at other times. To make an appointment, contact me or my assistant, Keri Frederick ([klfreder@iti.uiuc.edu](mailto:klfreder@iti.uiuc.edu), 333-3546), to set up an appointment.

Teaching Assistant : Elizabeth Van Ruitenbeek ([evanrui2@crhc.uiuc.edu](mailto:evanrui2@crhc.uiuc.edu)), CSL 231  
Office hours Monday 2-3 p.m., Wednesday 1-2 p.m.

### Class Time

Tuesdays and Thursdays, 9:30-10:45 in 106B3 Engineering Hall. We will also arrange a regular makeup time, to cover my occasional absences. We will average just 2 meetings a week; we'll schedule 3 meetings a week in order to provide "built-in" makeup lecture times needed due to the instructor's travel schedule. Dates when the class will not meet will be announced in advance.

### Text

No required text. Slides of many lectures will be distributed via the course web site (<http://users.crhc.illinois.edu/nicol/ece541-f09>). There will be readings from research papers and texts on reserve at the Grainger Engineering Library.

### Prerequisites

ECE 413 (formerly 313) or equivalent. At least one 400-level or higher course in computer architecture or networks.

### Overview

ECE 541/CS 541/CSE 524 is a comprehensive introduction to methods for computer system and network analysis. It focuses on methods that are applicable to a wide range of systems and practical uses and implementations of these methods. Broadly speaking, the course is divided into three parts: analytic/numerical modeling, simulation, and measurement. Each of these three approaches to computer system and network analysis has important uses, and will be covered in detail. Using each of these methods, of the course will address models for performance, dependability (reliability and availability), security (availability, integrity, confidentiality), survivability, and performability (combined performance/dependability/security) analysis.

In doing so, it will first briefly review stochastic processes, as applied to computer system and network analyses. It will then study dependability-specific methods (fault trees, reliability block diagrams), single queues, networks of queues, and product-form analysis techniques. Finally, it will address techniques based on stochastic Petri nets and stochastic activity networks, which are appropriate for performability analysis. In doing so, it will briefly address numerical issues in the solution of both steady-state and transient models.

The simulation portion will first provide an overview of process and discrete-event-based simulation. It will then address the issues of random variable generation, and issues related to simulator execution: initial transient determination, stopping criteria, and various statistical issues. We will focus on simulation of computer and communication networks, and use a simulator designed for this purpose.

This course is intended to be a fun, interactive introduction to computer system analysis. Hands-on learning, through the use of software tools in homework and projects, will be emphasized. Students from all areas of electrical and computer engineering and computer science, as well as other engineering disciplines, are encouraged to enroll.

### **Grading Policy**

Grades will be assigned based on performance on homeworks, reading reports, 2 projects, a mid-term, and a take-home final. The weight assigned to each component will be as follows:

Projects (2, 20% each)	40%
Homework/Reading Reports	10%
Midterm	25%
Final (take home)	25%

### **Course Rules**

1. Reading reports and homeworks must be done individually. General ideas regarding homework may be discussed (this is encouraged), but the work handed in must be your own.
2. Projects and the presentation will be done in groups. Students must clearly state their contributions to the project and make individual presentations. Different grades may be assigned to different people in a project.
3. All work must be completed during the semester; no incompletes will be given except under extenuating circumstances.
4. No late assignments are accepted; all assignments are due at the beginning of class on the due date, or by the time stated, if a specific time is stated.