

The purpose of this course is to introduce you to issues and techniques in the performance analysis of data networks. The primary goal of performance analysis in the design stage is to predict, without actual deployment, the relative performance of different schemes to move information through a network. Typical performance measures are loss, throughput, delay, fairness, and efficiency, which usually have to be traded off against each other.

This course is intended for 4th year undergraduate students in Mathematics and Engineering and Mathematics, and first or second year graduate students in Engineering, Mathematics and Engineering, and Mathematics. Knowledge of networking protocols is not assumed, and will be introduced as needed.

**Textbook:** *Data Networks*, 2nd Edition  
by D. Bertsekas and R. Gallager (Prentice Hall)

**Prerequisite:** STAT-455\* *or* permission of the instructor.

**Instructor:** G. Takahara

<b>Evaluation:</b>	Final Examination or Project	55%
	Midterm Test	15%
	Assignments	30%

**Outline:**

- Data networks continue to evolve at a rapid pace. Telephone communication networks, the Internet, wireless and cable networks are all competing or merging to provide ubiquitous, transparent, and comprehensive service including email, file transfer, web browsing, e-commerce, streaming audio and video, broadcast video, video on demand, video telephony, as well as traditional voice communications and future services.
- The driving forces behind this evolution are consumer demand for services and technological advances (e.g. fibre optics, microchip advances, high speed electronics), though current technology is currently outpacing demand. With the technological advances on the hardware side new protocols are required, implemented in both software and hardware, to form the “brains” of this infrastructure. The collection of protocols which specify the rules for moving information is sometimes called the network architecture. It is NOT one of the purposes of this course to give a comprehensive overview of these protocols. Just becoming familiar with existing protocols can occupy the greater part of a course (eg. ELEC 471, ELEC 478, ELEC 878, CISC 435, CISC 837). However, this is also not one of the primary purposes of this course, although as we apply techniques for performance analysis, we will familiarize ourselves with some protocols.
- The project will involve either (a) performance analysis of a system involving analysis or simulation or both, which sheds light on the strengths and weaknesses of a given protocol or setup, or (b) re-analysis of a performance analysis from a research paper. The project will be evaluated on the basis of a written report and a short class presentation. Students have the option of doing the project or writing a final exam.