COMPUTER SCIENCE 375
COMPUTER SYSTEMS & ARCHITECTURE DESIGN

I. Introduction

   A. Catalog description

   The study of the functionality and implementation of computing machines. Topics include: central processor design, memory hierarchies and parallel architectures. We will explore the motivations behind the fundamental concepts as well as analyze their particular implementation in existing machines. *Prerequisites: CSCI 361 (or concurrent).*

   B. Objectives

   This course introduces the student to the concept of a computer systems' architecture and its implementation as a heirarchy of hardware and software components. The student will study advanced architectural concepts and discover how these concepts are implemented in current architectures.

   C. Prerequisites

   CSCI 361 (or concurrent). A grade of C- or better is required in prequisite courses.

II. Required Topics

   A. Perspective

      1. Eras of computers
      2. Von Neumann architecture

   B. Central processor design

      1. Control and data organization
      2. Instruction set design
      3. Vertical and horizontal microcode
      4. Pipelining
      5. Prefetching

   C. Memory hierarchies

      1. Buses
      2. Virtual Memory
      3. Caches

   D. Parallel architectures

      1. Vector processors
      2. Flynn's taxonomy
      3. Amdahl's law

III. Optional Topics

   A. Performance evaluation
   B. Special purpose architectures
   C. VLSI design issues

IV. Bibliography

Patterson and Hennessy   *Computer Organization and Design; A Quantitative Approach*
Siewiorek, Bell and Newell   *Computer Structures: Principles and Examples*
Stallings   *Computer Organization and Architecture*
Tanenbaum   *Structured Computer Organization*