

CS 522: Computer Architecture and Organization Fall 2012

Class Hours: Mon/Wed, 3:30 p.m. – 5:00 p.m., University Union Room 120

Instructor: Kanad Ghose
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<http://www.cs.binghamton.edu/~ghose>
Office hours: M, W – 2 p.m. to 3 p.m. & by appointment

Course Materials: Distributed using Blackboard, accessible to all enrolled students.

Text: None! We will use reprints of classic and recent papers in the area covered by this course. Master copies of these papers will be made available in an envelope on my office door for copying. Hennessy & Patterson's *Computer Architecture: A Quantitative Approach, 4th. Edition* (Morgan–Kaufman, 2006) will be a good background reading. The course will cover material **at a more advanced level** than this book.

TAs: Mr. Dai–Hee Kim and Mr. Thomas Bartenstein, office hours to be announced.

Course Outline:

- *Pipelined CPU Design:* Basic Principles, Prefetching, Multiple Function Units, Forwarding, Hardware and Compiler–Based Scheduling/Control, Branch–Handling Techniques, Precise Interrupts
- *Advanced Pipelined CPU Design:* Superscalar and Super–pipelined Machines, Decoupled execute–access machines, advanced dynamic scheduling techniques for exploiting instruction–level parallelism, trace caches.
- *High–Speed Memory System Design:* Caches, TLBs, Inter–leaving, Data Mapping. Newer RAM technologies.
- *VLIW machines:* architectures, compilation techniques and case studies.
- *Emerging alternatives:* EPIC, multi–threaded processors, chip multiprocessors.

Course Requirements/Policies:

1. Every student will be responsible for using, modifying and recoding parts of a microarchitectural simulator. This simulator will run on the Linux systems in the pods. All programming assignments and the term project will use this simulator.
2. Your course grade will be based on the weights given in the following table.

ASSIGNMENT/TESTS	WEIGHT	COMMENTS
Homeworks and Other Assignments	30%	Assigned as needed
Exam 1	20%	3 hours, around late Oct./mid Nov.
Exam 2	25%	Takehome, given out early Dec.
Final Project	25%	Start as early as possible! Due: final's week

Select the topic for your paper/project as early as possible to avoid clustering a lot of work towards the end of the semester.

3. All assignments for this course, in particular homeworks and exams should be done individually. Any case of cheating will be dealt with severely and may result in serious disciplinary actions. **Any and all work that you turn in for this course must be your own.** I encourage discussions among students but draw a line between results of such discussions and any work that you turn in that has the look or contents of solutions turned in by students involved in discussions with you. The Watson school and campus have policies in place that deal with instances of academic dishonesty – these policies will be enforced. These Watson School policies are available at:

http://www.binghamton.edu/watson/Watson_Academic_Honesty_Policy.pdf

You are required to read this document to get an understanding of what constitutes academic violations.

This course is also offered under the articulation agreement between Binghamton University and SUNYIT. It is available to qualified students at Binghamton University via the distance learning system Enginet.