

525.712 Advanced Computer Architecture

Course Policy

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1 Objective

The course 525.712 Advanced Computer Architecture is for students pursuing a graduate degree in electrical or computer engineering during their spare time. It covers topics essential to modern superscalar processor design. A review of pipelined processor design and hierarchical memory design is followed by advanced topics including the identification of parallelism in processes; multiple diversified functional units in a pipelined processor; static, dynamic, and hybrid branch prediction techniques; the Tomasulo Algorithm for efficient resolution of true data dependencies; advanced data flow techniques with and without speculative execution; multiprocessor systems; and multithreaded processors.

2 Textbook

Primary John Paul Shen and Mikko H. Lipasti, *Modern Processor Design: Fundamentals of Superscalar Processors*, McGraw Hill, 2005.

Also recommended John L. Hennessy and David A. Patterson, *Computer Architecture: A Quantitative Approach*, 3rd edition, Morgan Kaufmann, 2003.

3 Homework, Quizzes, Term Paper and Exams

Homework will be assigned frequently and graded. I will post my own solutions on the course web site at <http://www.apl.jhu.edu/Notes/Cameron/525.712/>

Inevitably, the amount of homework I assign will not equal the amount you need to do to learn the material. If you really want to master the subject, you will have to do considerably more work than this.

I will hold three short, graded quizzes as shown in the syllabus. If you miss a quiz, you will receive a grade for it that is computed by averaging all your other quizzes together. Otherwise, all quizzes are weighted equally.

There will be a mid-term exam and a final exam. If you cannot be present for either of these, you must notify me in advance to make alternative arrangements.

All quizzes and exams are open-book, open-notes, without restriction. However, communication with other persons either directly or by the use of any communications devices is prohibited.

A term paper will be due on April 14. Topics are posted on the web site. If there is a topic you would particularly like to write about, forward the topic to me before February 10 and I will consider including it in the list.

As I consider clearly written communication of complex technical ideas to be every bit as important

Table 1: Points awarded for problems and subproblems

Points	Description
4	Excellent work
3	Well done, but with some minor difficulties
2	Failure to show a good grasp of the problem or topic
1	Serious misunderstanding or major omission
0	No submission, or the submission was completely off target

as the ideas themselves, my assessment of the clarity of your work will have a major affect on all grades I assign. Develop your solutions with the same degree of clarity, logic, and thoroughness that makes good textbooks successful.

For problems, subproblems, and the term paper, I award points as shown in Table 1. I weight the points for problems and subproblems on quizzes according to their difficulty and then convert the overall result to a four-point scale. I will use the weightings shown in Table 2 to compute your overall grade for the course. Finally, I will calculate letter grades for the course according to the equivalence in Table 3. I reserve the right to adjust your final grade according to intangible factors such as class participation and trends.

Table 2: Computation of Grades

Item	Weighting
Homework	10 %
Quizzes	15 %
Mid-term exam	25 %
Term project paper	15 %
Term project presentation	10 %
Final exam	25 %

Table 3: Correspondence between points and letter grades.

Points	Letter Grade
Points ≥ 3.5	A
Points ≥ 2.5 and < 3.5	B
Points ≥ 1.5 and < 2.5	C
Points < 1.5	F

4 Miscellaneous

I do not permit any collaboration on quizzes or exams. You may seek help from others in preparing your term paper and the corresponding presentation, but the work must be your own. Include a bibliography in the paper with citations for all the sources you used, whether written or oral.

You are free to use any calculators or computers you care to in class, in quizzes, and in exams. However, wall power may not be available. If your batteries fail, you are on your own. In some specific problems, I may require you to solve a problem manually rather than with a calculator if I think this will help reinforce a particular topic.

Please feel free to ask questions in class. In my experience, many people are reluctant to ask questions because they think they are parading their ignorance. This belief is nearly always completely false, not to mention self-defeating. Besides, others will benefit from the exchange, including myself.

5 Contacting the Instructor

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