

Summer 2011

CEG 720-01: Computer Architecture

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CEG 720: Computer Architecture
Summer 2011, 4:10-5:25, M. W., at 191 Joshi

1. **Instructor:** Jack JEAN, 334 RC, 775-5106, email: jack.jean@wright.edu
Office Hours: 3-4, 5:30-6 PM, M,W (or by appointment)
2. **Textbook:** COMPUTER ARCHITECTURE: A QUANTITATIVE APPROACH, 4th edition, John Hennessy and David Patterson, Morgan Kaufmann, 2007
3. **References:**
 - a. Computer Organization and Design, 4th edition, David Patterson and John Hennessy, Morgan Kaufmann, 2009
 - b. Modern Processor Design, 1st edition, John Paul Shen and Mikko H. Lipasti, McGraw Hill, 2005.
4. **Course Contents:**

Topics	Chapters
Overview : Sequential Machines, PC Architecture, Parallel Machine Classification	Class Notes, 1, 4
Performance Measure, Amdahl's Law	1
Instruction Set Architecture: RISC/CISC, MMX, SSE	Appendix B
Pipelining and Pipeline Hazards	Appendix A
Instruction Level Parallelism (ILP), Loop Unrolling, Branch Prediction, Dynamic Scheduling, Speculation	2
ILP Limits and Multithreading	3
Midterm (July 11)	
Cache and Memory Hierarchy	Appendix C, 5
Multiprocessors	4
Storage Systems, Buses, RAID	6
Interconnection Networks and Clusters	Class Notes, Appendix E
Final (August 17)	

5. **Grading:** [90,100]→A, [80,90) →B, [70, 80) →C, [60, 70) →D, [0, 60) →F

- (1) Midterm (35%): July 11 (Mon.), closed book test.
- (2) Final (40%): August 17 (Wed.), non-comprehensive, closed book test.
- (3) Homework (10%). (No programming is involved.)
- (4) Final Report (15%): due August 8 (Monday). You need to either (1) summarize and compare three recent papers about computer architecture or (2) work out a hardware/software design project. A page that identifies a working title and a list of references is due July 27 (Wednesday).

CEG720 Final Report

Choose a topic, select at least three recent papers, summarize and compare them, and then add your own comments. PhD students are encouraged to select journal papers.

The report should include an abstract, an introduction section, several sections about the papers, a conclusions section, and a bibliography. Papers should be compared and your own observations/comments/suggestions should be included. There will be penalty on typos and grammatical errors. The length of the report should be more than 8 single spaced pages. The source materials should be attached and anything quoted directly should be clearly specified (with quotation marks) in the report and highlighted on the source materials.

The report should be written individually. (Team projects must be pre-approved by the instructor prior to the submission of the working title. Team members do not necessarily get the same grades.)

When you submit the working title and the references, you should have read the papers. Do not forget to include your name. No abstract is necessary. For each reference, specify the title and where and when it was published. Use a typical bibliography style that you may find at the end of journal papers. (There will be penalty if you do not follow such styles.)

Suggested Topics:

(1) Application Specific Architectures (Mobile, Handheld, Embedded, Power-Aware, Reconfigurable), (2) PC Architecture (Processors, Graphics Chips, Buses, PnP), (3) Processor Architectures (DSP, PowerPC), (4) GPGPU (General-Purpose computation on Graphics Processing Units), (5) Machine Benchmarks, (6) Any Specific Supercomputer, (7) Parallelization or Vectorization Compiler, (8) Fault Tolerance, (9) Interconnection Networks, and (10) any other interesting topics.

Where to Locate References:

(Please read the corresponding sections in the textbook so as to be sure whatever you write is not already in the textbook. You may want to search the web or the references at the end of the textbook for a start. Once you find a paper, you may locate related papers from its reference list or you may search for the latest articles written by the same authors.)

1. Digital libraries (IEEE computer society, ACM). Or use search engines.
2. IEEE Computer Magazine, IEEE Transactions on Computers, IEEE Spectrum, Journal of Parallel and Distributed Computing, IEEE Transactions on Parallel and Distributed Systems
3. Proceedings of International Conference on Parallel Processing, International Symposium on Computer Architecture, Computer Architecture News (ACM Special Interest Group on Computer Architecture), Proceedings of FCCM (Field Programmable Custom Computing Machines)