The University of Jordan

Faculty of Engineering and Technology

Computer Engineering Department

Fall Term 2014/2015

Course	Computer Design – 0907432 (3 Cr. – Core Course)
Catalog Description	Exploiting instruction level parallelism, hardware and software approaches. Pipelined, Vector, Super scalar, and VLIW processors. Predication, Branch Prediction, and Control and Data Speculation. Case Studies of Modern Processors. Hierarchical Memory Design. Virtual memory. Input/Output Interfacing and System Integration. Introduction to Parallel Processing. Flynn's classification. Symmetric Multiprocessors. Cache coherence.
Prerequisites by Course	Computer Organization (0907335)
Prerequisites by Topic	Students are assumed to have had sufficient knowledge pertaining to digital logic design, MIPS instruction set architecture, computer arithmetic, processor datapath and control design, single-cycle, multi-cycle, and pipelined implementations of processors.
Textbook	Patterson and Hennessy. Computer Organization & Design: The Hardware/Software Interface, 5th ed., Morgan Kaufmann, 2014.
References	1. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, 5th ed., Morgan Kaufmann, 2011. 2. D. Culler and J.P. Singh with A. Gupta. Parallel Computer Architecture: A Hardware/Software Approach, Morgan Kaufmann, 1998. 3. J. Hayes. Computer Architecture and Organization, 3rd ed., McGraw-Hill, 1998.
Course Website	http://www.abandah.com/gheith/?page_id=1029
Facebook group	https://www.facebook.com/groups/549894571732525/
Schedule & Duration	15 Weeks, 45 lectures, 50 minutes each (including exams)
Student Material	Text book, class handouts, some instructor keynotes, and access to a personal computer and the internet.
College Facilities	Classroom with whiteboard and projection display facilities, library, and computer laboratory.
Course Objectives	The objectives of this course are: 1. Introduce students to the technological changes in designing and building processors and computers. 2. Introduce students to the advanced techniques used in modern processors including pipelining, branch prediction, dynamic and speculative execution, multiple issue, multithreading, and software optimizations. 3. Introduce the students to the basic concepts and technologies used in designing memory and storage systems including cache, main memory, virtual memory, and secondary memory. 4. Introduce the students to the various approaches in parallel processing including SIMD extensions, vector processors, GPUs, multicore processors, shared memory multiprocessors, clusters, and message-passing multicomputers.

Course Outcomes and Relation to ABET Program Outcomes

Upon successful completion of this course, a student should be able to:

1. Calculate the performance of processors and memories of various modern and high-performance designs [a].
2. Design memory hierarchy to meet desired performance within economic and power constraints [c].
3. Understand the technological improvements and the effect of these improvements on emerging computers, communication means, and personal mobile devices [h, j].
4. Use available knowledge sources to research a contemporary issue in computer design [i, j].

Course Topics

1. Introduction
2. Computer Technology and Performance (Sections 1.5–1.11)
3. Processor: Instruction-Level Parallelism (Sections 4.5–4.15)
4. Memory Hierarchy (Sections 5.1–5.16)
5. Parallel Processors (Sections 6.1–6.14)

Computer Usage

Practical aspects of the course are covered in Computer Design Lab 0907439.

Important Dates

Date	Event
Sun 14 Sep, 2014	Classes Begin
Tue 14 Oct, 2014	Quiz 1
Oct 28 – Nov 18, 2014	Midterm Exam Period
Thu 20 Nov, 2014	Project Proposal Deadline
Tue 2 Dec, 2014	Quiz 2
Thu 18 Dec, 2014	Project Report Deadline
Tue 23 Dec, 2014	Last Lecture
Dec 30, 2014 – Jan 8, 2015	Final Exam Period

Policies

- Attendance is required. Class attendance will be taken every class and the university's polices will be enforced in this regard.
- All submitted work must be yours
- Cheating will not be tolerated
- Open-book exams
- Join the facebook group of this course
- Check department announcements at: http://www.facebook.com/pages/Computer-Engineering-Department/369639656466107 for general department announcements.

Assessments

Quizzes, Exams, and Research Project

Grading policy

Two Quizzes	10%
Midterm Exam	30%
Research Project	10%
Final Exam	50%

Instructors

Dr. Gheith Abandah, abandah@ju.edu.jo
Homepage: http://www.abandah.com/gheith
Office Hours: Sun – Wed: 11:00–12:00

Class Time and Location

Section 1: Sun, Tue, Thu: 10:00–10:50, CPE 001

Last Updated: Sep 10, 2014

Program Outcomes (PO)

a	An ability to apply knowledge of mathematics, science, and engineering
b	An ability to design and conduct experiment as well as to analyze and interpret data.
c	An ability to design a system, component, or process to meet desired needs , within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d	An ability to function on multidisciplinary teams
e	An ability to identify, formulate, and solve engineering problems
f	An understanding of professional and ethical responsibility.
g	An ability to communicate effectively
h	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i	A recognition of the need for, and an ability to engage in life-long learning
j	Knowledge of contemporary issues
k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice