



King Saud University
College of Computer and Information Sciences
Department of Computer Engineering

1. Course number and name: **CEN 316, Computer Architecture and Assembly Languages**

2. Credits and contact hours: **3 (3, 0, 1)**

3. Instructor's or course coordinator's name: Hamid Abachi

4. Text book, title, author, and year:

Computer Organization and Design: The Hardware/Software Interface, Hennessy and Patterson, 5th Edition, 2014

a. other supplemental materials:

Lecture slides (available from the instructor).

5. Specific course information

a. Course description (catalog)

History and factors affecting the advances in processor design. Basic computer organization. Performance evaluation and metrics. Assembly Language of MIPS processor. Instruction formats, instruction sets and their design. Integer and floating-point representations and arithmetic operations. Datapath design. Control design, pipelining and their effect on performance. Memory Hierarchy Organization and its effect on performance. I/O Systems.

b. prerequisites or co-requisites: CEN313 (prerequisite).

c. Required, elective, or selected elective course: Required.

6. Specific goals for the course

a. **Course Learning Outcomes:** This course requires the student to demonstrate the following

1. Analyze computer performance and how it is affected by different aspects of hardware and software technology.
2. Explain the different levels of programs and how to write in assembly language.
3. Describe integer and floating-point representations and how arithmetic operations are performed.
4. Evaluate the different techniques related to pipelining (hazards, forwarding, and branch prediction).
5. Analyze different forms of memory organization and their effect on computer performance.
6. Recall concepts of I/O systems.

b. **Relationship of Course to Student Outcomes**

Outcome	Student Outcome Description	Contribution
(a)	an ability to apply knowledge of mathematics, science, and engineering	√
(b)	an ability to design and conduct experiments, 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)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

7. Brief list of topics to be covered and schedule in weeks

Course Introduction, Computer Abstraction and Technology	2
Instruction Set and Assembly Programming	3
Arithmetic for Computers	2
The Processor: Datapath and Control	4 (2 + 2)
Memory Hierarchy	2
Storage and other I/O topics	1
Review and Evaluation	

8. Assessment Plan for the Course

Quizzes and assignments	20%
Midterm Exams (2)	40%
Final Exam	40%
Total	100%

Midterm exam dates:

Midterm 1: week 7

Midterm 2: week 11

Course Policies:

- Cheating or plagiarism in any form will not be tolerated. A grade of 'fail' will be registered for any infraction.
- **Attendance in the lecture is a must.** Students will be denied final exams if they exceed 25% absence rate and any official excuse of absence is accepted no later than one week of the absence. There is no mark on attendance.
- **All the exams are closed book.**

Lecture room number: CCIS Building 31 , room no.3;

Current Instructor, Department, Office Hours and Date:

Dr. Hamid Abachi

Department of Computer Engineering

Room 2192

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