



Subject Course book 2014-2015

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Course book outline

Course name: Computer Organization & Applied Logic

Lecturer / Tutor's name: **Kanar R. Tariq**

College / Department: College of Science and Technology / Department of IT

Class: 1st class

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University of Human Development

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Other participant Lecturers:

1-

2-

3-

Coordinator's name:

Course overview

A computer system like any system, consist of an interrelated set of components. The system is best characterized in terms of structure – the way in which components are interconnected – and function – the operation of the individual components. Furthermore, a computer's organization is hierarchical. Each major component can be further described by decomposing it into its major subcomponents and describing their structure and function. And the intent of this course is to provide a thorough discussion of the fundamentals of computer organization and architecture and to relate these to contemporary design issues.

This course is to present basic understanding of computer organization: roles of processors, main memory, and input/output devices. Understanding the concept of programs as sequences of machine instructions. Understanding simple data path and control design for processors. Understanding memory organization, including cache structures and virtual memory schemes. Course include basic machine architecture and design, digital logic circuits, digital components, central processing unit, machine representation of instructions and data, addressing techniques, memory organization, and execution of instructions at machine level.

Course objective

The objective of this course is to presents the basic of computer organization and how computer works logically. At the end of this course, students have to:

- 1- Be familiar with computer component.
- 2- Understand how computer designed.
- 3- Understand how computer works.
- 4- Learn basic concept of computer arithmetic and logics.
- 5- Understand memory technology of all memory types such as internal, external, and cache memory.
- 6- Understand the Central Processing Unit and how its work.
- 7- Learn basic concept instruction set and assembly language.
- 8- Be familiar with computer system and applications.

The objectives of the practical part are:

- 1- Be familiar with the basic upgrading and repairing PCs.
- 2- Troubleshooting of different PC devices.
- 3- Installing and upgrading PC system and application.
- 4- Troubleshooting of PC system and applications.
- 5- Understand windows application.
- 6- Be familiar with office applications.
- 7- Understand the logical rule and instructions with the numbering system and how to use logic gates.

Course reading list and references

1. Text Book:

“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.

2. Useful references:

a. Theory

1. *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*
2. *Irvine, K. R. (2011). Assembly language for x86 processors. Prentice Hall.*
3. *Fundamentals of Computer Organization and Architecture. 2004, Mostafa Abd-El-Barr and Hesham El-Rewini.*

b. Practice

1. *Wiley. Com. Mueller, S. (2010). Upgrading and repairing PCs. Que Publishing*
2. *Irvine, K. R. (2011). Assembly language for x86 processors. Prentice Hall.*

The topics- Theory

No.	Title of the subject	weeks	Tutor's name
1-	Introduction to Computers and Computer Organization Fundamentals	1	Kanar R. Tariq
2-	Computer Generations	1	Kanar R. Tariq
3-	Basic Design of a Computer	2	Kanar R. Tariq
4-	Computer Memory and Memory types	3	Kanar R. Tariq
5-	Cache memory	1	Kanar R. Tariq
6-	I/O devices and I/O Organization	2	Kanar R. Tariq
7-	System Buses and Direct Memory Access DMA	2	Kanar R. Tariq
8-	Microprocessors parts and architecture	2	Kanar R. Tariq
9-	CPU Structure & Functions	2	Kanar R. Tariq
10	Computer Program	1	Kanar R. Tariq
11	Digital Computer & Digital System	1	Kanar R. Tariq
12	Numbering System & Arithmetic Functions	2	Kanar R. Tariq
13	Logic Gates & Digital Design	1	Kanar R. Tariq

1- Introduction to Computers and Computer Organization Fundamentals

Objectives:

- Identify characteristics of computer.
- Define a computer.
- Identify the roles of computer and application.
- Categorize capability of computer in terms of speed and accuracy.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*

2- Computer Generations

Objectives:

- Provide overview of the First Generation of a computer.
- Limitation of the different Computer Generation.
- Computer Types.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*

3- Basic Design of a Computer

Objectives:

- Provide overview of the basic design of a computer.
- Know how different parts of a computer are organized.

- Know how various operations are performed between different parts to do a specific task.
- Understand the meaning of Arithmetic Logical Unit, Control Unit and Central Processing Unit.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*
- *Fundamentals of Computer Organization and Architecture. 2004, Mostafa Abd-El-Barr and Hesham El-Rewini.*

4- Computer Memory and Memory types

Objectives:

- Provide overview of the memory types.
- Know the basic organization of memory device.
- Know the basic interface between processor and memory device.
- Understand the different purposes for memory in the operation of a computer.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Fundamentals of Computer Organization and Architecture. 2004, Mostafa Abd-El-Barr and Hesham El-Rewini.*

5- Cache memory

Objectives:

- Know the physical types of cache memory with hierarchy diagram.
- Describe the physical characteristic and organization of cache memory.
- Describe the cache memory design.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*

6- I/O devices and I/O Organization

Objectives:

- Describe and discuss various types of I/O devices.
- Know the connection and how to connect between processor and I/O devices via ports.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*
- *Irvine, K. R. (2011). Assembly language for x86 processors. Prentice Hall.*

7- System Buses and Direct Memory Access DMA

Objectives:

- Know the Single and multiple BUS structures.
- Describe and discuss various types of Buses.
- Describe the function of direct memory access DMA.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*
- *Irvine, K. R. (2011). Assembly language for x86 processors. Prentice Hall.*

8- Microprocessors parts and architecture

Objectives:

- Provide an introduction to the various parts of the microprocessor.
- Describe Microprocessor Architecture.
- Know Microprocessor Functions.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*

9- CPU Structure & Functions

Objectives:

- Know how to connect the CPU and internal connections.
- Describe Instruction Cycle.
- What is Pipeline and Pipeline types.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Irvine, K. R. (2011). Assembly language for x86 processors. Prentice Hall.*

10- Computer Software

Objectives:

- Know the basics and application of software.
- Describe the operating systems and utilities.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*
- *Irvine, K. R. (2011). Assembly language for x86 processors. Prentice Hall.*

11- Digital Computer & Digital System

Objectives:

- Introduction to Systems (Digital & Analogue).
- What is digital design & electronics circuit?
- Describe the Digital Computers.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**

12- Numbering System & Arithmetic Functions

Objectives:

- Introduction to Numbering Systems.
- Know the Type of numbering Systems.
- Provide the arithmetic functions on numbering systems.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*

13- Logic Gates & Digital Design

Objectives:

- Introduction to Logic gates.
- How many types of gates in digital systems.
- Design simple circuits by using different type of logic gates.

References:

- **“Computer Organization and Architecture, Designing For Performance”, 8th edition, 2010, William Stallings.**
- *Patterson, D. A., & Hennessy, J. L. (2008). Computer organization and design: the hardware/software interface. Morgan Kaufmann.*
- *Irvine, K. R. (2011). Assembly language for x86 processors. Prentice Hall.*

Coursework and exams

The assessment of this course is **50% course works and 50% exams**. It will be done through three different types of assessment, which are:

Homework

There will be home work every week.

Exams

There will be quizzes each quiz will contain multiple choices, true or false and short answer questions.

Final exam (30% of the total mark)

- 1- Type of the exam (Normal Questions (explanation), True & False, Fill in the blanks....etc)
- 2- Exam's duration (Theory 90 minutes / Practical 60 minutes)
- 3- The number of the questions and how the marks are distributed, 4-5 Questions and the marks depending on questions.

The answer should contain preface, main contents and conclusion.

Rules and instructions to be followed by students for exams (optional)

Exam hints and preparations

- a) Self study is composition to develop individual skills and knowledge, the key is preparation.
- b) The environment should be quite and free of distraction. Make sure you understand the topics.
- c) Try to write short notes and review the material on the daily bases.
- d) Read the questions twice and if you are unsure of anything, don't just ignore it, think twice!
- e) Think carefully before answering and plan the answer on a separate paper if that helps your memory.
- f) The answer should contain preface, main contents and conclusion.
- g) Eat healthily, give yourself at least 10 minutes of brake for every hour of study, and make sure you drink water regularly.

The day before the examination

- h) Review the material using abbreviated notes not the lecture slides they are too long.
- i) Practise some exam questions and make sure you know the answer for them. Exam questions will be provided towards the end of the course.
- j) Know the location and time of the exam. Plan to arrive early.
- k) Make sure you have eaten before the exam.
- l) Make sure you have some good sleep before the exam

Type of exams questions

Q1. When a DMA module takes control of a bus, and while it retains control of the bus. What does the processor do?

Q2. What are the four main components of any general purpose computer?

Q3. What is general relationship among access time, memory cost and capacity?

Q4. What is the different between DRAM and SRAM, in terms of application?

Q5. What are some applications for ROM?

Q6. How are data read from magnetic disk?

Typical answers for above exam questions

A1. The processor pauses for each bus cycle stolen by the DMA module.

A2. A **main memory**, which stores both data and instructions: an **arithmetic and logic unit** (ALU) capable of operating on binary data; a **control unit**, which interprets the instructions in memory and causes them to be executed; and **input and output (I/O) equipment** operated by the control unit.

A3. Faster access time, greater cost per bit, greater capacity. Slower access time, smaller cost per bit, smaller capacity.

A4. SRAM is used for cache memory (both on and off chip), and DRAM is used for main memory.

A5. Micro programmed control unit memory; library subroutines for frequently wanted functions; system programs; function tables.

A6. The read head consists of a partially shielded magneto resistive (MR) sensor. The MR material has an electrical resistance that depends on the direction of the magnetization of the medium moving under it. By passing a current through the MR sensor, resistance changes are detected as voltage signals.

External examiner

From now on every course should have its own external examiner with identified roles.

The one who can play the role of an external examiner should:

- Have an academic post with the scientific rank of assistant Professor and higher.
- He/she should be an active, reputable and experienced academic staff in his field or a related field to the course.
- He/she should have not participated in lecturing or administering of the course.

The roles of the external examiner are:

- Evaluating the contents and the program of the course.
- Prior to the exam, he/she should contribute to choosing the questions and looking at the ideal answers.
- Evaluating the process of the examinations: he/she should see all the marked exam papers, and then choose randomly nine marked papers: three with high marks, three with medium and three with low marks.
- Evaluating the students' feedbacks
- He/she should participate in the final meeting of the first round examinations committee and give his assessment on the entire course and the examination process, then to give his opinion about the final results.
- He/she should participate in the final meeting of the second round examinations committee and should have a main vote on those problems that may face them.
- Then the lecturer/ tutor in charge will respond to the external examiner's questions and will reply officially to all the questions and clarify the reasons.

Student's feedback on the course

Course:

Lecturer/ tutor:

Date: / /201

Year: 2014-2015

College:

Department:

University: Human Development

	Evaluation Questions	Subject's Level 1-5	Subjective Remarks
1	The objectives and key messages of the subject were clear		
2	The contents of the subject were useful and were related to the main objectives of the course		
3	The coordinator teacher had worked hard to prepare the materials		
4	The lecturer/ tutor while lecturing tried to analyze the principles, contents and the important points of the subject simply and properly.		
5	The lecturer/ tutor came into the classroom on time and was committed to the duration of the lecture.		
6	The lecturer's behavior in the classroom was calm and respectful.		
7	The slides used in the lecture were clear and attractive.		
8	At the end of the lecture, the lecturer gave the students a chance for questions and comments. His/ her answers were complete.		
9	The coordinator teacher gave a good attention to the students' criticisms and claims		
10	Information on the Examination process was well provided		
11	The questions of the exams were related to the contents of the course.		
12	The reading sources are new and compatible with the subject.		
	Total of the levels		

Standards to evaluate the level of the contents				
1	2	3	4	5
Very bad	Bad	Medium	Good	Very good

فیدباکی خویندکار / قوتابی بۆ کۆرسەکه

مامۆستا:

کۆرس:

سالی خویندن: 2015-2014

بەروار:

بەش:

کۆلیژ:

زانکۆ: گەشەپێدانی مرویی

ژ	پرسیاری هەڵسەنگاندن	ئاست (5-1)	تێبینی زیاتر – بەشیوەیهکی بابەتیانە
1	پەیام و ئامانجەکانی کۆرسەکه پروون و ئاشکرا بوون؟		
2	ناوەڕۆکی بابەتەکان سوودبەخش بوو؟ پەیوەندی بە ئامانجی سەرەکی کۆرسەکهوه هەبوو؟		
3	مامۆستای وانەبێژ خۆی بە پەرتووکی کۆرسەکهوه ماندوو کردبوو		
4	مامۆستاکە لەکاتی وانە گوتنەوهدا هەولیدا پرنسیپ و ناوەڕۆک و خالە گرنگەکانی بابەتەکه بە جوانی و بە سادەیی شیبکاتەوه؟		
5	مامۆستاکە لەکاتی خۆیدا هاتە وانەکهوه لە کاتی خۆیدا وانەکهی تەواوکرد؟		
6	لە کاتی وانە گوتنەوهدا مامۆستا بە هێمنی و نەرمی و ریزلێنانەوه هەلسوکەوتی کرد؟		
7	ئەو سلایدانەیی بەکارهێنران پروون و ئاشکرا و سەرئێش بوون؟		
8	مامۆستا کاتی پرسیارکردنی هێشتەوه و هەولی دا پرسیارەکان بە تێروتەسەلی وەلام بداتەوه؟		
9	مامۆستاکە گرنگی بە ڕەخنە و گلهیی قوتابییە خویندکارەکان دەدا		
10	زانپاری لەسەر شیوازی تاقیکردنەوهکان بەباشی پیشکەشکرا بوون		
11	پرسیارەکانی تاقیکردنەوهکان ڕەنگدانەوهی ناوەڕۆکی کۆرسەکه بوون		
12	سەرچامەکانی خویندەنەوه نوێن و لەگەڵ ناوەڕۆکی بابەتەکه دەگونجین		
	کۆی ناستەکان		

پێوەری هەڵسەنگاندن			
5 – 4.1	4 - 3.1	3 - 2.1	2 - 1
زۆرباش	باش	مامناوەندی	باش نیە