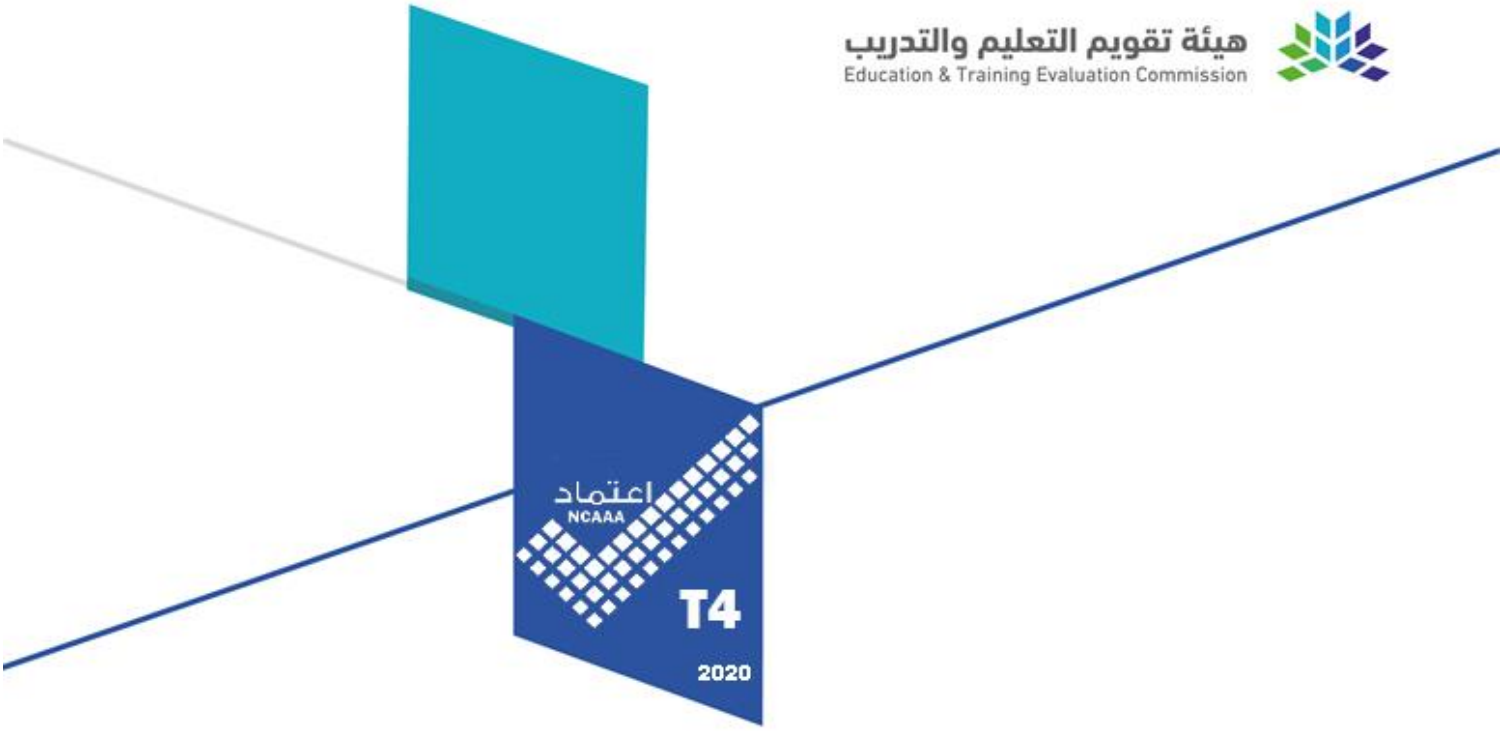
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Computer Organization and Architecture
Course Code:	**231CCS-4**
Program:	**BSc in Computer Science**
Department:	**Department of Computer Science**
College:	**College of Computer Science and Information Systems**
Institution:	**Najran University**

Table of Contents

A. Course Identification

1. Credit hours:	4 (3, 1, 1) [Theory, Lab, Tutorial]
2. Course type	
a.	University ☐ College ☐ Department ☑ Others ☐
b.	Required ☑ Elective ☐
3. Level/year at which this course is offered:	Level 6 /Year 2
4. Pre-requisites for this course (if any)**:**	None
5. Co-requisites for this course (if any)**:**	None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroo6**	70	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	20
3	**Tutorial**	10
4	**Others** (specify)	
	Total	**60**

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces the basic structure of computers relating the computer basic unit organization and design such as interconnection, memory, input/output, operating systems, arithmetic and logic unit, and registers with computer instructions and addressing modes.
It also discusses on machine instructions, MIPS and programs, performance enhancements, floating-point operations, basic processing unit, multiprocessing, pipeline concepts and distributed architectures and the latest technologies in computing

2. Course Main Objective

The main objective of this course is to make the students be able to :

- Describe the basic processing units of the computer.
- Recognize the current architecture of computer systems (data representation, performance enhancement, CPU, memory hierarchy design, I/O design).
- Discuss the latest technology in computer science with modern Architecture.
- Apply conversion formula among different number systems used in digital computers.
- Compare different types of instruction set architectures and addressing modes.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Recognize the current architecture of computer systems (data representation, performance enhancement, CPU, memory hierarchy design, I/O design).	K_1
1.2	Describe the basic processing units of the computer.	K_1
2	**Skills :**	
2.1	Apply conversion formula among different number systems used in digital computers	S_4 , S_5
2.2	Discuss the latest technology in computer science with modern architecture	S_4
2.3	Compare different types of instruction set architectures and addressing modes	S_1, S_2
3	**Values:**	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Computer Organization and Architecture	2
2	Number Systems and Data Representation	8
3	Digital Logic and Circuits Design Basic ALU architecture and components (Combinational circuits, Half adder, full adder), Decoders, Encoders, Flip Flops	10
4	Assembly Language Basics, Data movement instructions; arithmetic instructions and flags	10
5	Performance analysis, Amdahl's Law, CPI, MIPS	3
6	Unsigned and signed Integer representation, integer arithmetic	8
7	Floating point representation and arithmetic	8
8	CPU and processing unit and I/O design	4
9	Memory unit and cache memory	4
10	Introduction to Pipelining and parallel computation	4
Total		**60**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize the current architecture of computer systems (data representation, performance	TS-1: Relate Course Learning Outcomes (CLOs) to the topics in each chapter	Locally Developed Exams such as Quiz, Mid Exam, & Final Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	enhancement, CPU, memory hierarchy design, I/O design).	TS-2: Lectures: using PPT presentation to address verbally in front of students the concepts associated with examples with taking help of writing on the board as needed. TS-3: Engaging the students in problem-based learning through Tutorials TS-4: Lab Demonstrations TS-5: Motivating Student: Motivating students to be active during class by asking questions regularly during lecture and giving them assignments to enforce the students to work in home, to search data from internet and to read related reference books TS-6: Recall the topics of last lecture and the critical issues based on different topics.	
1.2	Describe the basic processing units of computer		Locally Developed Exams such as Quiz, Lab Assessments, Mid Exam, Final Lab Exam & Final Exam
2.0	**Skills**		
2.1	Apply conversion formula among different number systems used in digital computers	TS-1: Relate Course Learning Outcomes (CLOs) to the topics in each chapter TS-2: Lectures: using PPT presentation to address verbally in	Locally Developed Exams such as Quiz, Mid Exam & Final Exam
2.2	Discuss the latest technology in computer science with modern architecture		Locally Developed Exams such as Quiz, Mid Exam & Final Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.3	Compare different types of instruction set architectures and addressing modes	front of students the concepts associated with examples with taking help of writing on the board as needed. TS-3: Engaging the students in problem based learning through Tutorials TS-4: Lab Demonstrations TS-5: Motivating Student: Motivating students to be active during class by asking questions regularly during lecture and giving them assignments to enforce the students to work in home, to search data from internet and to read related reference books TS-6: Recall the topics of last lecture and the critical issues based on different topics.	Locally Developed Exams such as Quiz, Lab Assessments, Mid Exam, Final Lab Exam & Final Exam
3.0	**Values**		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes	3rd week	10%
2	Assignments or mini project (presentation)	5th week	10%
3	Midterm	6th week	20%
5	Lab Performance & Assessment	Every week	10%
6	Final Lab Exam	11th week	10%
7	Final Theory Exam	12th or 13th week	40%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- During the whole semester, 10 hours/week are reserved for students to guide them, to help them, to explain the topic which is not clear for them etc.
- Academic advisors are assigned to advise and support students.
- Instructors arrange and provide tutorials to students.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1.William Stalling, Computer Organization and Architecture, Pearson, 11th edition, 2019; **2.** M. Morris Mano, Computer System Architecture, Revised 3rd edition, Pearsons, 2017
Essential References Materials	1. Kip R. Irvine, Assembly Language for Intel-Based Computers, Prentice Hall; 5th edition 2. John L. Hennessy and David A. Patterson, Computer Architecture- A quantitative approach, Morgan Kaufmann; 6th edition, 2017 3. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization, McGraw Hill, 5th Edition
Electronic Materials	-
Other Learning Materials	Logisim and Microsoft Assembler (MASM) Software

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Smart Boards may be provided to carry out the demonstrations and lectures. • The classroom that has minimum of 25-30 seats and laboratories that has at least 20 PCs
Technology Resources (AV, data show, Smart Board, software, etc.)	• The laboratory may be equipped with a network, so that the students have their privacy (by providing logins) in accessing their files with limited permissions of accessibility. • All the computers in all the laboratories may be installed with the MASM and Logisim software
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• Upgraded Anti-Virus with long term validity may be installed in all the systems in the lab.

Item	Resources
	• Printers should be installed in each lab to enable the students to take the print out of their lab work.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and Assessment	Course Students	Online Course Survey
The extent of achievement of Course Learning Outcomes (Indirect Assessment)	Course Students	Course CLO Survey
The extent of achievement of Course Learning Outcomes (Direct Assessment)	Course Instructor	Course Assessments such as Exams, Quiz, Lab Performance
Verifying Standards of Student Achievement	Peer Reviewer, Program Coordinator, Dean	Students' Answer Sheet Review, Students' Grade Sheet Review
Verifying the standard of the course assessment method such as Exams	Course Coordinator, Peer Reviewer	Exam Moderation Process

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Computer Science Departmental Council
Reference No.	14440203-0185-00002
Date	1st Sep, 2022