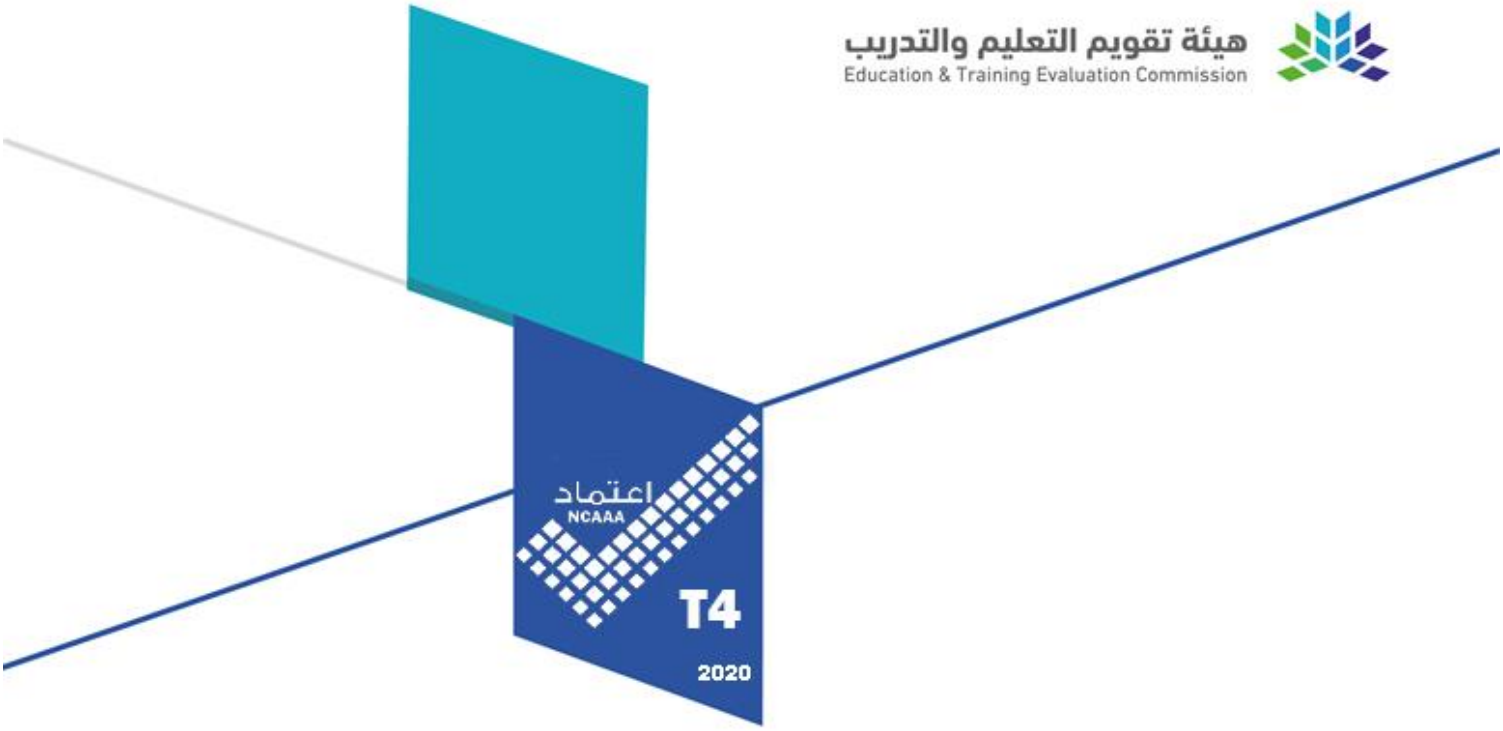
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Computer Organization**
Course Code:	**CPIT210**
Program:	**Bachelor of Science in Information Technology**
Department:	**Information Technology**
College:	**Faculty of Computing and Information Technology**
Institution:	**Northern Border University, Rafha**

Table of Contents

A. Course Identification

1. Credit hours: 3
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): CPCS202 - Programming 1
5. Co-requisites for this course (if any): **Nil**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	60	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	45
2	**Laboratory/Studio**	15
3	**Tutorial**	
4	**Others** (specify)	
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description

The objective of this course is to explain how computers are designed and how they work. Students are introduced to modern computer principles using a typical processor. They learn how efficient memory systems are designed to work closely with the processor, and how input/output (I/O) systems bring the processor and memory together with a wide range of devices. The course emphasizes system-level issues and understanding program performance. Topics include instructions sets, assembly language, internal data representation, computer arithmetic, processor data path and control, memory hierarchy, pipeline, and parallel processing.

2. Course Main Objective

Students will recognize the concepts of logic and digital design and analyze the internal configuration of computers and the various types and structures of processors.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Recognize the concepts of numbering systems and digital logic design.	K1
1.2	Define internal components of the computer and basic machine instructions.	K1
2	**Skills:**	
2.1	Design Processor's Datapath and control in interaction with memory	S1, S2
2.2	Implement with assembly language programs solving basic problems	S3
3	**Values:**	

C. Course Content

No	List of Topics	Contact Hours
	Overview of Computer Architecture and Hardware Technology	3
	Introduction to Assembly Language	6
	Number systems (Decimal, Binary, Octal, Hexadecimal, Signed Magnitude, 1's Complement, 2's Complement, IEEE754 Simple and Double Precision)	6
	Basic Arithmetic Operation for Computers, Capacity and Limits, Overflow	3
	Overview of Digital Logic Design	6
	Processor Datapath Design	6
	Control unit design	6
	Memory access, cache and pipeline	3
	Advanced Assembly concepts	6
Laboratory Works		
1	Introduction to assembly environment - hello world example	2
2	Overview of Instructions related to Basic arithmetic operations	2
3	Logical operations with assembly language	2
4	Memory access and addressing with assembly language	2
5	Branching instructions	2
6	Loops with assembly language	3
7	Interruptions and functions	2
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 concepts of numbering systems and digital logic design.	Class / Group discussion, Reciprocal teaching guided discovery	Writing Oral

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Define internal components of the computer and basic machine instructions.	Class/Group discussion Reciprocal teaching, Guided discovery	Writing Oral
2.0	**Skills**		
2.1	Design Processor's Datapath and control in interaction with memory	Lab-based learning, Micro-teaching, Problem-Solving	Writing Performance Observation
2.2	Implement with assembly language programs solving basic problems	Lab-based learning, Micro-teaching, Problem-Solving	Writing Performance Observation
3.0	**Values**		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz-1	2	2.5
2	Quiz-2	8	2.5
3	Assignment-1	4	5
4	Assignment-2	10	5
5	Oral questions	1-11	5
6	Lab tasks	1-11	16
7	Midterm exam	6	20
8	Lab exam	12	4
9	Final exam	13	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:

Every instructor has an announced office hours schedule. All students are encouraged to visit the concerned teacher according to the schedule. Students can also use Email address or Blackboard System to seek help or book an appointment.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1. Patterson, David A., and John L. Hennessy. (2021), "Computer Organization and Design MIPS Edition: The Hardware/Software Interface", Morgan Kaufmann. ISBN-13: 978-0128201091 2. Kip R. Irvine (2020). Assembly Language for x86 processors., 8th edition, Pearson. ISBN 978-0135381656

Essential References Materials	1. Daniel Kusswurm (2018). Modern X86 Assembly Language Programming. Second Edition, Apress. ISBN 978-1-4842-4062-5 2. AtaElahi (2018). Computer Systems: Digital Design, Fundamentals of Computer Architecture and Assembly Language. Springer. ISBN 978-3-319-66775-1 3. Linda Null and Julia Lobur (2019). The essentials of computer organization and architecture. Fifth edition, Jones & Bartlett Learning. ISBN-10: 1284123030. 4. Patterson, David A., and John L. Hennessy. (2016), "Computer Organization and Design ARM Edition: The Hardware/Software Interface", Morgan Kaufmann. ISBN 9780128017333.
Electronic Materials	1. Blackboard System: https://lms.nbu.edu.sa/ 2. Northern Border University Electronic Library: https://www.nbu.edu.sa/AR/Deanships/Library_Issues 3. Saudi Digital Library (SDL): https://portal.sdl.edu.sa/english/
Other Learning Materials	Nil

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classroom • Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	• Data Show (Projectors) in Classroom and Laboratory. • Desktop computers • OS: Windows • Software: Editor, assembler, linker, debugger, and emulator for X86 architecture and/or RISC (MIPS or ARM) architecture.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• Microprocessor training kit.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students	Indirect
Quality of learning resources	Students	Indirect
Extent of achievement of course learning outcomes	Faculty	Direct

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	Information Technology Department Council
Reference No.	10
Date	27/02/2022