Daffodil International University

Faculty of Science and Information Technology
Department of Computer Science and Engineering

Course Code: CSE322 **Credits**: 03
Course Title: Computer Architecture and Organization **CIE Marks**: 60
SEE Marks: 40

Course Description (from syllabus)/**Rational:**

The computer lies at the heart of computing. Without it most of the computing today would be a branch of theoretical mathematics. To be a professional in any field of computing today, one should not regard the computer as just a black box that executes programs by magic. All students of computing should acquire some understanding and appreciation of a computer system's functional components, their characteristics, their performance, and their interactions. This course can help the students in this regard.

Course Learning Outcome: (at the end of the course, student will be able to do:)

CLO1	Understand the internal working procedure of a computer system.
CLO2	Able to Identify different components and compare between the generation of a computer system.
CLO3	Determine which hardware blocks and control lines are used for specific instructions.
CLO4	Detect pipeline hazards and identify possible solutions to those hazards.
CLO5	To be able to map a virtual address into a physical address and show how cache design parameters affect cache hit rate.

Mapping of Course Learning Outcomes to Program Learning Outcomes [attainment level used for COs from 1(weak)-3(strong) correlation]

PLO's / CLO's	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	3	-	2	-	-	-	-	-	-	-	-	-
CLO2	3	-	-	-	-	-	-	-	-		-	-
CLO3	2	-	3	-	-		-	-	-	-	-	-
CLO4	-	2	3	-	-	-	-	-	-	-	-	-
CLO5	1	3	3	3	-			-			-	-

Teaching and Learning Activities (TLA)

TLA1	Lectures twice a week using multimedia of different topics.
TLA2	Active discussion in class regarding efficient solving of the logical and mathematical
TLA3	Group discussion and presentation regarding diverse problems and corresponding lectures.
TLA4	Evaluation of class performances to reach each student in a class for every topic.

Course Delivery Plan (include Lab if any)

Week/Lessen (hour)	**Discussion Topic & Book Reference**	**Student Activities during Online and Onsite and TLA**	**Assessment and Mapping with CLO**
Week 1 Lessen 1 & 2 (1.5 each)	**Lesson 1:** Introduction to Computer Organization and Architecture. (Ref. Text W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1**	CLO1, CLO2
	Lesson 2: Discuss the basic concepts and structure of computers. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA2**	
Week 2 Lessen 3 & 4 (1.5 each)	**Lesson 3:** History of computing. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1**	CLO1 ,CLO2
	Lesson 4: Comparison between electrical and mechanical computers and Summarize the functional units of computer. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA3**	
Week 3 Lessen 5 & 6 (1.5 each)	**Lesson 5:** Evolution of computers. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1**	CLO1, CLO2 **<u>Class Test# 1</u>** Either online/onsite based on Week-1 and Week -2 discussion.
	Lesson 6: Performance evaluation of computing systems. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT,	

		Video, H5P; TLA1, TLA2, TLA3, TLA4	
Week 4 Lessen 7 & 8 (1.5 each)	**Lesson 7:** continued and understanding performance. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA2, TLA3**	CLO2 **<u>Assignment-1</u>** [will be due by week 6] Topic: Performance evaluation
	Lesson 8: System representation and design process. (Ref. Text: John P. Hayes)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA2**	
Week 5 Lessen 9 & 10 (1.5 each)	**Lesson 9:** Register and gate level design. (Ref. Text: John P. Hayes)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA3, TLA4**	CLO1, CLO2 **<u>Class Test# 2</u>** Either online/onsite based on Week-4 and Week -5 discussion.
	Lesson 10: Understand concepts of register transfer logic and types of micro operations. (Ref. Text: John P. Hayes)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA3, TLA4**	
Week 6 Lessen 11 & 12 (1.5 each)	**Lesson 11:** Processor level design and design logic circuits for different micro operations. (Ref. Text: John P. Hayes)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA2**	CLO1, CLO3
	Lesson 12: Data representation and encoding. (Ref. Text: John P. Hayes)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA2** **Student Submit Assigment-1 in LMS or BLC (online).**	
Week 7	**Week – 7: Midterm Examination** **Syllabus:- Week 1 – Week 6**		

Week 8 Lessen 13 & 14 (1.5 each)	**Lesson 13:** Instruction set characteristics and types of instruction formats. (Ref. Text: John P. Hayes)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA3**	CLO3
	Lesson 14: Basic CPU design. (Ref. Text: John P. Hayes)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA3**	
Week 9 Lessen 15 & 16 (1.5 each)	**Lesson 15:** Addressing modes, Data Transfer and manipulations. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA2**	CLO3 **<u>Assignment-2</u>** [will be due by week-10] Topic: Addressing Modes.
	Lesson 16: Asynchronous data transfer, Modes of Transfer and RISC, CISC. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TAL1, TLA3**	
Week 10 Lessen 17 & 18 (1.5 each)	**Lesson 17:** Pipelining strategy, performance. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1**	CLO1, CLO4 **<u>Class Test# 3</u>** Either online/onsite based on Week-8 and Week -9 discussion.
	Lesson 18: Pipeline hazards and measures against pipeline hazards. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA2, TLA4** **Student Submit Assigment-2 in LMS or BLC (online).**	
Week 11 Lessen 19 & 20 (1.5 each)	**Lesson 19:** Arithmetic pipeline, Instruction pipeline, RISC Pipeline. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA2**	CLO3, CLO4
	Lesson 20: Memory hierarchy and introduction to cache	Online/Onsite discussion; Review Feedback online;	

	memory. (Ref. Text: W. Stallings)	Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1**	
Week 12 Lessen 21 & 22 (1.5 each)	**Lesson 21:** Cache addressing and cache mapping functions. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1, TLA3**	CLO5
	Lesson 22: Introduction to Virtual memory and memory mapping technique. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; **TLA1**	
Week 13 Lessen 23 & 24 (1.5 each)	**Lesson 23:** Demand Paging. (Ref. Text: W. Stallings)	Online/Onsite discussion; Review Feedback online; Using Interactive content e.g. Voice over PPT, PPT, Video, H5P; TLA1	CLO5
	Lesson 24: Review class	TLA3	
Week 14	**Week – 14: Final Examination** **Syllabus:- Week 8 – Week 13**		

Text Books:

1. Computer Organization and Architecture, by William Stallings, 8th edition
2. Computer Architecture and Organization by John P. Hayes, Third Edition

Reference Books:

1. Computer Architecture- A Quantitative Approach, by David A. Patterson and John L. Hennessy, 4th edition
2. The Essentials of Computer Organization and Architecture by Linda Null , 3rd Edition

CIE – Breakup (Theory) [60 marks]

Bloom's Criteria	Attendance (07)	Class Test (15)	Assignment (05)	Presentation (08)	Mid Exam (25)
Remember		02			
Understand		05	02	02	05
Apply		05		03	05
Analyze			03		05
Evaluate		03			05
Create				03	05

SEE – Semester End Examination [40 marks] {Theory}

Bloom Criteria	Score for the Test
Remember	05
Understand	05
Apply	15
Analyze	05
Evaluate	05
Create	05

Appendix-1: Program outcomes

POs	Category	Program Outcomes
PO1	**Engineering Knowledge**	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis**	Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.
PO3	**Design/Development**	Design solutions for complex engineering problems and design

	of Solutions	system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.
PO4	**Investigations**	Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO5	**Modern tool usage**	Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	**Environment and sustainability**	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**	Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.
PO9	**Individual work and teamwork**	Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.
PO10	**Communication**	Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.
PO11	**Project management and finance**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.
PO12	**Life Long Learning**	Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.