

Course Title	Computer Architecture (Lab)		
Course Code	DC-322L		
Credit Hours	3 (2,1)		
Category	Computer Science Core		
Prerequisite	CC-210 Computer Organization & Assembly language		
Co-Requisite	None		
Follow-up	None		
Course Introduction	There are many computer applications which have diverse requirements as high performance, low power and small size in memory. These requirements have resulted in different hardware like multicore/many-core systems, GPUs, FPGAs and embedded systems. Building on digital logic design, this course goes through the techniques that help in designing a modern microprocessor.		
Course Learning Outcomes (CLOs)	At the end of the course, the students will be able to:	BT	PLO
	CLO1: Explain that the hardware components of the CPU, I/O units, Memory units and Instruction Set are designed in a single computer system to execute the program.	C2 (Explain)	3
	CLO2: Explain that the CPU can be implemented as either hardwired or microprogrammed.	C2 (Explain)	3
	CLO3: Understand the various I/O processes according to the characteristics of each I/O unit.	C2 (Understand)	4,5
	CLO4: Understand engineering techniques (cache memory, virtual memory) that can be applied to system memory.	C2 (Understand)	4,5
Course Description	Introduction to basic hardware components and devices, Register Transfer and Micro-operations , RTL Register Transfer Language, Register, bus and memory transfers, Arithmetic, Logic and Shift micro-operations, : Computer Instructions and instruction codes , Hardware design: Computer registers, Design of arithmetic logic unit, Design of hardwired control unit, Timing and control, Instruction cycle, Instruction types: Register to register transfer instructions, Memory reference instructions, Input-output and interrupt, Complete design of basic computer, Microprogrammed Control , Control memory, Address sequencing, Design of microprogrammed control unit, Introduction to MIPS ISA, The Processor: Introduction to processor design, Logic Design Conventions, Building a Datapath, A Simple Implementation Scheme, An Overview of Pipelining, Pipelined Datapath and Control, Data Hazards: Forwarding versus Stalling, Control Hazards, Large and Fast: Exploiting Memory Hierarchy: Introduction, Memory Technologies, The Basics of Caches, Measuring and Improving Cache Performance, Dependable Memory Hierarchy		
Text Book(s)	1. Computer System Architecture, Third Edition by M. Morris Mano. 2. Computer Organization and design fourth edition by Hennessy and Patterson		
Reference Material			