National University

of Computer & Emerging Sciences

Department	School of Computing	**Dept. Code**	CS
Course Title	Computer Organization and Assembly Language	**Course Code**	EE 2003
Pre-requisite(s)	CS118-PF and EE227- DLD	**Credit Hrs.**	3+1
Instructor	Aashir Mahboob		
Office	Faculty Room No.16, Cubical 6, Opposite HoD Office.	**Extension**	113
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Course Objective:	- Programming Methodology of low-level languages - How to access computer hardware directly - Overview of a user-visible architecture (of Intel 80x86 processors) - Intel 80x86 instruction set, assembler directives, macro, etc. - How programs interact with the operating system for various services including memory management and input/output services How is it possible to interface high-level language and low-level language modules

PLO	Program Learning Outcome (PLO) Statement
02	**Problem Analysis:** Ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
05	**Modern Tool Usage:** Ability to 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.

CLO	Course Learning Outcome (CLO)	Domain	Taxonomy Level	PLO	Tools
01	Illustrate micro-architectures of x86 and RISC processors	Cognitive	3	05	A1, M1, F
02	Create basic assembly code using different type of addressing modes in x86 & RISC ISAs to solve simple-moderate problems	Cognitive	4	02	A2, A3, M1, M2, F
03	Apply translation of machine instructions into binary code and visa versa.	Cognitive	5	05	A4, F
04	Illustrate use of stack during a parametrized function/procedure call that uses local variables.	Cognitive	5	05	A2, A3, M2, F
05	Justify need to use assembly code along with a high-level language code	Cognitive	5	05	A4, P, F
Tool: A = Assignment, M = Midterm, P= Project F=Final					

Text Book(s)	**Title**	Assembly Language for Intel Based Computers K.Irvine 7th Edition
	Author	Kip R. Irvine
	Publisher	Pearson Education Inc. (*ISBN 978-0-07-338065-0*)
Ref. Book(s)	**Title**	Assembly Language Programming and Org. of the IBM PC

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	Author	Ytha Yu, Charles Marut
	Publisher	McGraw Hill
	Title	Computer organization and design: the hardware/software interface
	Author	David A. Patterson and John L. Hennessy
	Publisher	Morgan Kaufmann

Week	Course Contents/Topics	Chapter	CLO
01	**Week 1: Introduction to Basic Concepts, Intel 80x86 Processor Architecture** Basic microcomputer architecture CLO1	BOOK 1 CH 1	01
02	**Week 2:** Instruction execution cycle, memory management, input and output systems CLO1	BOOK 1 CH 2 BOOK 2 CH 3	01
03	**Week 3: Assembly Language Fundamentals:** Assembling, Linking and debugging, defining constants and variables, Real and Protected mode Addressing and Programming **CLO2**	BOOK 1 CH 3	02
04	**Week 4**: Data transfer and Arithmetic Instructions, Addressing Modes **CLO2**	BOOK 1 CH 4	02
05	**Week 5**: Operators and directives, Introduction to control transfer instructions, Arrays and loops, (Addressing modes Contd.) **CLO2**	BOOK 1 CH 4	02
06	**Week 6**: **FIRST MID TERM EXAMINATION**		
07	**Week 7:** Procedures and Stack operations, Runtime stack, PUSH and POP instructions. **CLO4**	BOOK 1 CH 5	04
08	**Week 8: Conditional Processing** Boolean and comparison instruction, conditional jumps, conditional loop structures, high-level language constructs **CLO2**	BOOK 1 CH 6	02
09	**Week 9: Conditional Processing** (Contd.) Boolean and comparison instruction, conditional jumps, conditional loop instructions, high-level language constructs **CLO2**	BOOK 1 CH 6	02
10	**Week 10: Integer Arithmetic** Shift & Rotate, Multiplication & Division instructions, Extended Addition & Subtraction **CLO2**	BOOK 1 CH 7	02
11	**Week 11: SECOND MID TERM EXAM**		

12	**Week 12:** CISC vs RISC, Introduction to MIPS Assembly **Advanced Procedures – Introduction and Examples:** Stack Frames, Recursion, INVOKE, ADDR, PROC, PROTO Directives CLO1,CLO2, **CLO4**	DR NADEEM TO FILL BOOK 1 CH 8	1,2,4
13	**Week 13: String and Arrays** String primitive Instructions, Two dimensional array **CLO2**	BOOK 1 CH 9	02
14	**Week 14: Machine Language Translation** Instruction Formats, encoding an Instruction Set and Modes of Addressing, Translation and Working of an Assembler, Map File and Memory Map **CLO3**	DR NADEEM TO FILL	03
15	**Week 15: High level language Interfacing** Introduction, .model directive, Inline Assembly Code, **Procedures** Linking to an external library **CLO5**	DR NADEEM TO FILL	05

Assessment Plan:

Assessment	Weightage
Project	8%
Assignment	12%
Midterm Exams	30%
Final	50%

Official Excuses: Only excuses obtained officially are accepted. Personal excuses are not accepted. No make-up tests/quizzes/exams will be provided. If an official excuse exists, the student will be given the average of his grades, or as advised by the academic committee.

Google Classroom Code: acp743c