COURSE DESCRIPTION FORM

INSTITUTION FAST School of Computing, National University of Computer and Emerging Sciences, Karachi

PROGRAM TO BE EVALUATED BS-School of Computing– Fall 2022

Course Description

Course Code	EL2003
Course Title	Computer Organization & Assembly Language Lab
Credit Hours	1
Prerequisites by Course(s) and Topics	PF, DLD
Grading Policy	Absolute grading
Policy about missed assessment items in the course	Retake of missed assessment items (other than midterm/ final exam) will not be held. For a missed midterm/ final exam, an exam re-take/ pre-take application along with necessary evidence are required to be submitted to the department secretary. The examination assessment and retake committee will decide the exam re-take/ pre-take cases.
Course Plagiarism Policy	Plagiarism in project or midterm/ final exam may result in F grade in the course. Plagiarism in an Lab will result in zero marks in the **whole Lab marks** category.
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	Assessment Items

Assessment Item	Number	Weight (%)
Lab Activity	12	24%
Project	1	10%
Midterm Exam	1	16%
Final Exam	1	50%

Course Instructors	
Lab Instructors	Zakir Hussain
Course Coordinator	Dr. Muhammad Nouman Durrani
URL (if any)	
Current Catalog Description	- 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
Textbook (or **Laboratory Manual** for Laboratory Courses)	Assembly Language for Intel Based Computers K.Irvine 7th Edition MIPS Assembly Language Programming by Ed Jorgensen, Version 1.1.35 April 2018
Reference Material	Computer organization and design: the hardware/software interface by David A. Patterson and John L. Hennessy Computer Organization & Embedded Systems Hamacher et al. 6th Ed.

Course Learning Outcomes

A. Lab Learning Outcomes (CLOs)

On successful completion of this course students will have to know how of:

LLO	Lab Learning Outcome (LLO)	Domain	Taxonomy Level	PLO	Tools
01	Use of an Integrated Development Environment (IDE) to compile, debug, run, and refactor x86 Assembly code	Cognitive	3	05	L, M, F, P
02	Identify the use of addressing modes for solving problems related to conditional processing, shift operations, stack operations and string handling.	Cognitive	4	02	L,M,F
03	Design a coding project in x86 or RISC Assembly.	Cognitive	5	03, 05	F,P

Tool: L = Labs, M = Midterm, F=Final, P=Project

B. Program Learning Outcomes

For each attribute below, indicate whether this attribute is covered in this course or not. Leave the cell blank if the enablement is little or non-existent.

1. Computing Knowledge	Apply knowledge of mathematics, natural sciences, computing fundamentals, and a computing specialization to the solution of complex computing problems.	
2. Problem Analysis	Identify, formulate, research literature, and analyze complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences.	✓
3. Design/ Develop Solutions	Design solutions for complex computing problems and design systems, components, and processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	✓
4. Investigation & Experimentation	Conduct investigation of complex computing problems using research-based knowledge and research-based methods.	
5. Modern Tool Usage	Create, select, and apply appropriate techniques, resources and modern computing tools, including prediction and modeling for complex computing problems.	✓
6. Society Responsibility	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues relevant to context of complex computing problems.	
7. Environment and Sustainability	Understand and evaluate sustainability and impact of professional computing work in the solution of complex computing problems.	
8. Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of computing practice.	

9. Individual and Teamwork	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.	
10. Communication	Communicate effectively on complex computing activities with the computing community and with society at large.	
11. Project Management and Finance	Demonstrate knowledge and understanding of management principles and economic decision making and apply these to one's own work as a member or a team.	
12. Lifelong Learning	Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes.	

C. Mapping of LLOs on PLOs
(LLO: Lab Learning Outcome, PLOs: Program Learning Outcomes)

		PLOs											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
LLOs	1					✓							
	2		✓										
	3			✓		✓							

Topics covered in the course with number of lectures on each topic (Assume 15 weeks of instruction and 1 hour lecture duration)	**Topics to be covered**				
	List of Topics	**Week**	**No. of Weeks**	**Contact Hours**	**CLO(s)**
	Introduction to Assembly and Configuration of Visual Studio	**1**	**1**	**3**	**1**
	Debugging, Basic elements of Assembly Language, Defining Data, Intrinsic Data types, Data Definition statements	**2**	**1**	**3**	**1**
	Data Initialization, Multiple Initialization, String Initialization	**3**	**1**	**3**	**2**
	Data transfer Instruction, Instructions and Flags	**4**	**1**	**3**	**2**
	Working with data related operators and directives, Indirect Addressing	**5**	**1**	**3**	**2**
	Theory Mid I				
	Working with arrays and loops, and built-in procedures	**6**	**1**	**3**	**2**
	Lab Mid				
	Stack operations, procedures & Boolean conditional jumps	**7**	**1**	**3**	**2**
	Working with Conditional processing	**8**	**1**	**3**	**2**
	Theory Mid II				
	Shift & Rotate, Multiplication & Division instructions, Extended Addition & Subtraction	**9**	**1**	**3**	**2**
	Stack Frames, Recursion, INVOKE, ADDR, PROC, PROTO Directives	**10**	**1**	**3**	**2**
	String and Arrays**:** String Handling Instructions, Two dimensional array	**11**	**1**	**3**	**2**

	Project evaluations	**12**	**1**	**3**	**3**
	Week 16	***Final Exam***			
	Review		**1**	**3**	
	Total		**16**	**48**	

Laboratory Projects/Experiments Done in the Course	**Mentioned in Lab Mannuals**			
Class Time Spent (in percentage)	**Theory (%)**	**Problem Analysis (%)**	**Solution Design (%)**	**Social and Ethical Issues (%)**
	10	50	35	5
Oral and Written Communications	Every student is required to submit at least 1 written report of typically 10 pages in IEEE research report format. Students will also be called for viva/presentation of the project and any assignment where necessary in Lab Section			

Instructor Name: Zakir Hussain

Instructor Signature: Zakir Hussain

Date: 22nd Aug 2022