**University of Central Punjab**

**Faculty of Information Technology**

**Fall 2021**



1. **Course Description**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Code** | CSCS3543 | | | |
| **Course Title** | Computer Organization and Assembly Language (Theory) | | | |
| **Credit Hours** | 4(3+1) | | | |
| **Assessment Instruments with Weights** (quizzes, midterms, final, assignments, presentation, lab work, etc.) | Assignments (20%)  Quizzes (15%)  Class Participation (5%)  Mid Term (20%)  Final Term (40%) | | | |
| **Course Instructors** | Mr. Irfan Anjum  Mr. Sajid Hussain  Mr. Syed Nisar Ali  Mr. Ather Suleman  Mr. Umer Naeem  Mr. Maaz Tariq | | | |
| **Course Coordinator** | Dr. Adnan Ghafoor | | | |
| **Office Hours** | TBA | | | |
| **Plagiarism Policy** | **All the parties involved in first cheating case in Midterm or Final term will be awarded ‘F’ for the course.** | | | |
| **Current Catalog Description** | * The objective of this course is to understand the organization of microprocessor for instance Intel x88 in terms of assembly language instruction. This course primarily focuses on the detailed analysis and working of microprocessor. | | | |
| **Textbook (Notes)** | * Computer Organization and Assembly Language (Notes) by Umer Naeem and Arif Mustafa. | | | |
| **Reference Books** | * Assembly Language Intel based Computers, 4th Edition, by KIP, R, IRVINE * Computer Architecture and organization 8th Edition, by William Stallings. | | | |
| **Teaching-Learning Methodology** | * More emphasis will be on coding assignments and practical lab sessions. Regular and online quizzes will be held to help students improving their understanding. Extra tutorial session will be conducted to increase problem solving kills. | | | |
| **Course Goals** | Upon successful completion of this course, students will be able:   * To develop the understanding, working and organization of microprocessor. * Develop a habit to write both memory and time optimized code using assembly language. | | | |
| **Topics Covered in the Course, with Number of Lectures on Each Topic** | Attached | | | |
| **Lab Projects** | Yes | | | |
| **Theory & Lab Exam** | Mid Term: Theory 1. Hrs + Lab 3 Hrs  Final Term: Theory 3 Hrs + lab 3 Hrs | | | |
| **Class Time Spent on** (in credit hours) | **Theory** | **Problem Analysis** | **Solution Design** | **Labs** |
| 1 | 1 | 1 | 1 |

|  |  |  |
| --- | --- | --- |
| **Ser. #** | **Topics/contents** | **Assignments/ Quizzes** |
| **1** | **Introduction to Assembly Language**   * Basic Computer Architecture * General purpose registers |  |
| **2** | **Addressing Modes**   * Registers Architectures * Segment registers * MOV instruction and its variations * Add and Sub Instruction |  |
| **3** | **Addressing Modes**   * Physical Address Calculation |  |
| **4** | **Addressing Modes**   * Direct Addressing and variations * Size Mismatch Errors |  |
| **5** | **Addressing Modes**   * Indirect Addressing and variations * Address Wraparound |  |
| **6** | **Branching**   * Comparison Conditions * Types of jumps | **Assignment #1 (Addressing Modes)**  **Quiz#1 (Addressing Modes)** |
| **7** | **Branching**   * Conditional jump |  |
| **8** | **Branching**   * Unconditional jumps |  |
| **9** | **Bit Manipulation**   * Shifting and Rotations variations |  |
| **10** | **Bit Manipulation**   * Bitwise logical operation   1. Set or reset Specific bit.  2. Bit Masking | **Quiz#2 (Branching)** |
| **11** | **Subroutines**   * Introduction to Stack * Saving and restoring variable in stack |  |
| **12** | **Subroutines**   * CALL and RET statements * Simple subroutines | **Assignment #2 (Branching, Bit Manipulation, Stack and Subroutine)**  **Quiz#3 (Bit Manipulation)** |
| **13** | **Subroutines**   * Parameter passing through stack * Solve examples cover above concepts |  |
| **14** | **MUL and DIV Instruction**  MUL and DIV Instruction | **Quiz#4** **(Stack and Subroutine)** |
| **15** | **Revision** |  |
| **16** | **Revision** |  |
|  | **MID TERM** |  |
| **17** | **MID TERM PAPER REVIEW** |  |
| **18** | **Display Memory**   * Introduce with video Memory * Familiarize with ASCII and attribute |  |
| **19** | **Display Memory**   * Screen Calculation and Printing * Solve examples covers above concepts |  |
| **20** | **String Instructions**   * Introduce basic string instructions with the help of examples. * Further elaborate the concept of string instructions. * LES and LDS instruction. | **Assignment #3 (Display Memory, String Instructions)**  **Quiz#5 (Display Memory)** |
| **21** | **Software Interrupts**   * Basic introduction of interrupts * BIOS and DOS interrupts |  |
| **22** | **Software Interrupts**   * Explain the concept of IVT(interrupt Vector Table ) * Hooking and Unhooking |  |
| **23** | **Software Interrupts**   * Hooking and Unhooking |  |
| **24** | **Software Interrupts**   * Hooking and Unhooking | **Quiz#6 (Software Interrupts)** |
| **25** | **Real Time interrupts and Hardware Interfacing**   * Introduction of Hardware Interrupts | **Assignment #4 (Software Interrupts)** |
| **26** | **Real Time interrupts and Hardware Interfacing**   * I/O Ports |  |
| **27** | **x64 programming**   * x64 programming |  |
| **28** | **x64 programming**   * x64 programming |  |
| **29** | **MMX**   * MMX |  |
| **30** | **MMX**   * MMX | **Quiz#7 (x64 programming, MMX) Optional** |
| **31** | **Revision** |  |
| **32** | **Revision** |  |
|  | **FINAL TERM EXAM** |  |