## Course Outline

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| Title | **Computer Organization & Assembly Language** |
| **Code** | CS-3201-3 |
| **Credit Hours** | 4 Cr. Hrs.  No. of Lectures/Week 2  Duration 1.5 Hrs.  No. of Labs/Week 1  Duration 3 Hrs. |
| **Prerequisite** | DLD |
| **Follow Up** | Operating System |
| **Category** | Computer Science |
| **Aims and Objectives** | The students will be capable to   * To learn about computer organization. * Acquire knowledge that is specific to Intel 80x 86 processor families, as well as knowledge that is universal. * Write programs based on the interaction between Assembly Language & Operating System. * To know the internal working of the microcomputer. * To be able to design a basic computer with hard wired control |
| **Text Book/s** | * Assembly Language Programming and Organization of the IBM PC by Ytha Yu and Charles Marut * Computer system Architecture by M. Morris Mano (Third Edition) |
| **Reference Material** | * “The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor, Pentium II, Pentium III, Pentium 4” by **Barry B. Brey,** (Sixth Edition) * “Assembly Language for Intel Based Computers” by **Kip R. Irvine,** (Fourth Edition). |
| **Instructional Aids/Resources** | * + Multimedia Slides for different topics   + Handouts |
| **Assessment Criteria** | |  |  |  |  | | --- | --- | --- | --- | | **Sessional 25%** | **Mid 35%** | **Final 40%** | **Total 100%** | | Quizzes and Tests 04 | Required: | Required: |  | | Assignment and Presentations 04 | Paper 35 | Paper 40 |  | | Term paper 0 |  |  |  | |  |  | |

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| **Week** | **Lecture** | Topics |
| 1 | 1 | Introduction  * History & Evolution of Intel Microprocessor And Assembly Language * Applications and Advantages of Assembly Language  Computer Organization  * The Components of a Microcomputer System * Instruction Cycle |
| 2 | Memory Architecture  * Memory Representation & Hierarchy * Data, Address, Control Busses |
| 2 | 3 | Intel 8086 family of Microprocessors  * Organization of Intel 8088/8086 Processor * Registers and their categories * Function of Registers |
| 4 | Memory Addressing  * Real Mode Memory Structure * Memory Segmentation (Segment/Offset Scheme**)** |
| 3 | 5 | * Assembly Language Syntax * Program data * Variables * Different Variants of MOV instruction |
| 6 | * Some Basic Instructions   + XCHG,ADD, SUB, INC, DEC,NEG |
| 4 | 7 | * Program Structure * Memory Models * Data Segments * Stack Segment * Code Segment * Input and Output Instructions |
| 8 | * The Processor Status and Flags Register |
| 5 | 9 | * Flow Control Instructions   + Unconditional Jump   + Various Conditional Jumps   + Looping Structures |
| 10 | * Logic Instructions   + AND, OR,XOR, NOT, TEST   + Related Programming examples |
| 6 | 11 | * Shift Instructions * Related Programming examples |
| 12 | * Rotate Instructions * Related Programming examples |
| 7 | 13 | * Procedures to Input Binary, Decimal, Hexadecimal Numbers |
| 14 | * Procedures to output Binary, Decimal, Hexadecimal Numbers |
| 8 | 15 | * Machine Code of MOV Instruction |
| 16 | * **Course Review** |
| 9 | 17 | * The Stack * PUSH and POP Instructions * CALL and RET instructions |
| 18 | * CALL and RET continued * Related Programming examples |
| 10 | 19 | * MUL instruction * DIV instruction * Related Programming examples |
| 20 | * Addressing Modes |
| 11 | 21 | * Addressing Modes Continued * Related Programming examples |
| 22 | * XLAT instruction * Related Programming examples |
| 12 | 23 | String InstructionsMOVSB/W, LOADSB/W, STOSSB/W  * Related Programming examples |
| 24 | * SCASB/W, CMPSB/W * Related Programming examples |
| 13 | 25 | * File Operations * Reading a File * Writing a File * Programming Examples |
| 26 | * INT Structure |
| 14 | 27 | * Organization of the Basic Computer * Computer Instructions for Basic computer (Memory Reference, Register Reference and I/O instructions) * Addressing modes |
| 28 | * Instruction Cycle * Timing and Decoding * RTL of the instructions |
| 15 | 29 | * Complete flow chart for the Basic Computer Operation. |
| 30 | * Design of the Control unit of the basic computer |
| 16 | 31 | Design of ALU for the basic computer |
| 32 | * **Course Review** |