A.  Protocol

Course Name:  Assembly Language Programming  
Course Number:  CSC323  
Credits:  3  
Prerequisites:  Co-Requisite: CSC 328 Data Structures  

Maximum Class Size (face-to-face):  35  
Maximum Class Size (online):  N.A.  

B.  Objectives of the Course: 
Upon completion of this course the student will be able to:

1) Convert numbers to their sign-magnitude, ones complement, and twos complement representations and give the ranges of possible values in an n-bit space.  
2) Determine if an overflow occurs for arithmetic performed on n-bit numbers.  
3) Discuss the basic architecture of a computer.  
4) Write and discuss briefly the fetch-execution of the computer.  
5) Write and discuss the machine instruction format of instructions.  
6) Enter, assemble, link, and execute a assembly language program.  
7) Use a variety of directives for allocating memory.  
8) Use registers in programs.  
9) Use assembly instructions to create selection structures.  
10) Use assembly instructions to create looping structures.  
11) Use assembly instructions to create linked lists.  
12) Use assembly instructions to create data structures.  
13) Use the Debugger with an assembly language program.  
14) Allocate memory for integers of various sizes and perform operations on those memory locations.  
15) Write the instructions to convert data between memory locations of different sizes.  
16) Use direct assignments in programs.  
17) Allocate arrays and manipulate them using the Assembly language.  
18) Write and discuss indirect addressing and implement various forms of indirect addressing.  
19) Allocate character locations and manipulate character data.  
20) Implement subprograms in the Assembly language, including parameter passing and recursion.  
21) Allocate floating-point memory locations and perform floating-point operations.  

C.  Catalog Description:  
In this course the student will study an Assembly language. In doing so, the student will develop some concepts related to the architecture and operations of the computer. Programs will be written and implemented using the instructions in this assembly language. Constructs, such as selection, looping, and subprograms, will be implemented. Co-Requisite: CSC 328 Data Structures. Three credits.  

D.  Outline of the Course:  
1) Introduction  
   a. Discussion of contemporary computer architectures  
   b. Evolution of computer languages  
   c. Reasons to study assembly language programming
2) Review of Numbers
   a. Integer Base Conversion
      i. Base x to decimal
      ii. Decimal to base x
   b. Fraction Base Conversion
      i. Base x to decimal
      ii. Decimal to base x
   c. Notations and Conversions
      i. Hexadecimal and binary
      ii. Octal and binary
      iii. Base x' and base x
      iv. Operations
         1. Addition
         2. Subtraction
         3. ANDing
         4. ORing
         5. XORing
      v. Binary Arithmetic operations
         1. Addition
         2. Subtraction
         3. Sign magnitude
         4. 1's complement notation
         5. 2's complement notation

3) Introduction to a computer with the IPO Introduction to the architecture and the Assembly language
   a. General concepts
      i. Main memory
      ii. Byte-forward and byte-backward representations
      iii. Central processing unit
      iv. Machine instruction format
   b. Fetch-execute cycle
   c. Integer instructions
      i. Symbols and allocation of storage
      ii. Data move instructions
      iii. Arithmetic instructions
      iv. Constant operands
      v. Input and output
      vi. Program creation, assembly, linking, and execution

4) Repetition and selection structures
   a. Branch instructions
      i. Conditional branching
      ii. Unconditional branching
   b. Pretest logical loops
   c. Selection structures
   d. Counter-controlled loops
   e. Other looping structures
   f. Compound conditions

5) Debugger

6) Integer data types
   a. Directives
   b. Move and arithmetic instructions
   c. Test, compare, and looping instructions
   d. Size conversion instructions

7) Operand expressions
   a. Constants of nondecimal bases
   b. Direct assignment statements

8) Arrays and indexing
a. Indexing
b. Matrices

9) Indirect addressing

10) Character manipulation
a. Character codes and character data
b. Character manipulation
   i. Sorting
   ii. Finding words
   iii. Finding substrings

11) Subprograms
a. Stack operations
b. Simple subprograms
c. Passing parameters

12) Floating-point and decimal instructions

E. Teaching Methodology:

1) Traditional Classroom Methodology:
This course will be taught using the lecture/discussion method and cooperative group method during appropriate sections of the course.

2) Online Methodology:
This course will not be taught online.

F. Text:
Irvine Assembly Language for x86 Processors (Sixth Edition)
ISBN 9780136022121

G. Assessment Activities:

1) Traditional Classroom Assessment
The final grade will be determined as a percentage from the following evaluation methods with varying weights at the discretion of the instructor:

   a. Examinations
   b. Quizzes
   c. Assignments
   d. Programs
   e. Attendance
   f. Performance

2) Online Assessment
No online assessments will be given.

H. Accommodations for Students with Disabilities:

   Accommodations for Students with Disabilities

Students with disabilities:
- Reserve the right to decide when to self-identify and when to request accommodations.
- Will register with the Office for Students with Disabilities (OSD) each semester to receive accommodations.
- Might be required to communicate with faculty for accommodations, which specifically involve the faculty.
- Will present the OSD Accommodation Approval Notice to faculty when requesting accommodations that involve the faculty.
Requests for approval for reasonable accommodations should be directed to the Office for Students with Disabilities (OSD). Approved accommodations will be recorded on the OSD Accommodation Approval notice and provided to the student. Students are expected to adhere to OSD procedures for self-identifying, providing documentation and requesting accommodations in a timely manner.

Contact Information:

- Location: Azorsky Hall – Room 105
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