TCSS 371: Machine Organization Master Syllabus
Version: Fall 2014
(Approved: Oct. 2013)

Catalog Description
Develops the hardware basis for computing systems, and the relationship between hardware and software. Covers digital logic, machine organization, instruction set architecture and assembly language. Introduces the translation of a high level language (such as C) into machine instructions. Prerequisite: a minimum grade of 2.0 in TCSS 333.

Preconditions
Prior to taking the class, student must:

- Be able to write medium sized programs in C including dynamic memory allocation via malloc
- Understand logic operations such as "and," "or," "xor," and "not."
- Be able to use an integrated development environment (IDE).
- Understand simple programming data structures.

Course Objectives
The objectives of this course are to teach students:

- the fundamentals of computer organization (CPU, Memory and I/O) and Instruction Set Architecture.
- digital logic related to implementation of the above.
- the basic machine cycle and computational operations.
- essential features of assembly language.
- to use C to simulate a simple load-store architecture

Student Learning Outcomes
Upon successful completion of the course, students should be able to:

- understand the function of basic digital logic circuits
- design simple logic circuits after specifying their behavior using a truth table
- translate between assembly instructions and machine code
- explain the instruction execution cycle
- write small programs in assembly language including function calls
- explain how function calls in C are implemented in assembly language using the stack

Relationship of course to CSS student learning outcomes: This course supports and assesses the achievement of the following elements of the programobjectives:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to use current techniques, skills, and tools necessary for computing practice.

Relationship to UWT student learning goals (to be added to syllabus handed out to students)

- *Inquiry and Critical Thinking*: Students will acquire skills and familiarity with modes of inquiry and examination from diverse disciplinary perspectives, enabling them to access, interpret, analyze, quantitatively reason, and synthesize information critically.
- *Communication/Self-Expression*: Students will gain experience with oral, written, symbolic and artistic forms of communication and the ability to communicate with diverse audiences. They will also have the opportunity to increase their understanding of communication through collaboration with others to solve problems or advance knowledge.

Topics Covered

- Introduction to computer organization
- Digital logic
- Instruction set architecture
- The architecture of the LC-3
- Assembly language programming
- I/O, interrupts and traps
- Subroutines and stacks