School of Applied Engineering and Technology Syllabi

NJIT Syllabi

Spring 1-1-2020

CPT 315-452: Computer Architecture

Sal Washah

Digital Commons @ NJIT Computer Architecture CPT 315 Syllabi NJIT
Syllabi
Spring 2020
CPT 315: Computer Architecture (Revised for Remote
Learning). This class is designed to be online
S. Washah, PhD

NEW JERSEY INSTITUTE OF TECHNOLOGY
Department of Engineering Technology

Title	Computer Architecture	Number	CPT 315
Prerequisites	CPT 310	Semester	SPRINT 2020

Professor Name: S. Washah, PhD   **Email (Primary): swashah@njit.edu**
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Text:
Structured Computer Organization (6th Edition) [Hardcover]
by Andrew S. Tanenbaum , Todd Austin
Publisher: Prentice Hall; 6 edition (August 4, 2012)
Language: English
ISBN-10: 0132916525
ISBN-13: 978-0132916523

Office Hours: Online Only ON-LINE DURING SCHOOL CLOSURE
CANVAS WILL BE USED AS COURSE WEBSITE.

COURSE DESCRIPTION:

Computer design fundamentals for computer technology, Von Neumann computer architecture: processor, memory and I/O. Processor organization: registers, ALU, and control. Memory organization and memory bus, I/O organization: I/O bus, memory mapped I/O. Number representations and ALU designs. Fundamentals of assembly language, lab exercises in assembly language are used throughout to illustrate concepts.

The course provides an accessible introduction to computer hardware and architecture which serve as a useful resource for all computer professionals and engineers who need an overview or introduction to computer architecture. This course takes a modern structured, layered approach to understanding computer systems.

Course Objective: Introduce computer system organization and design at a level that provides the foundations for the student to understand computer functionality and needs, and to implement and test assembly language programs

Course Outline:

Chapter01-Introduction

Chapter02-Computer Systems Organization

Chapter03-The Digital Logic Level

Chapter04-The Microarchitecture Level

Chapter05-The Instruction Set Architecture Level

Chapter06-Operating System Machine Level

Chapter07-The Assembly Language Level

Chapter08-Parallel Computer Architectures

Chapter 12 - ASSEMBLY LANGUAGE Programming

- What is Assembly Language? Advantages of Assembly Language;
- Assembly Environment Setup
- Installing NASM
- Assembly Basic Syntax
- The data Section; The bss Section; The text section
- Comments; Assembly Language Statements
- Syntax of Assembly Language Statements
- The Hello World Program in Assembly
- Compiling and Linking an Assembly Program in NASM.
- Assembly Memory Segments; Memory Segments;

- Assembly Registers; Processor Registers; Data Registers; Pointer Registers; Index Registers; Control Registers; Segment Registers Example:
- Assembly System Calls; Linux System Calls; Example
- Addressing Modes: Register Addressing; Immediate Addressing; Direct Memory Addressing; Direct-Offset Addressing; Indirect Memory Addressing;
- The MOV Instruction: SYNTAX; EXAMPLE
- Assembly Variables; Allocating Storage Space for Initialized Data; Allocating Storage Space for Uninitialized Data;
- Multiple Definitions; Multiple Initializations
- Assembly Constants
- The EQU Directive; Example:

- The %assign Directive; The %define Directive
- Arithmetic Instructions
- SYNTAX: EXAMPLE.
- The DEC Instruction: SYNTAX; EXAMPLE:
- The ADD and SUB Instructions: SYNTAX; EXAMPLE:
- The MUL/IMUL Instruction: SYNTAX: EXAMPLE: EXAMPLE:
- The DIV/IDIV SYNTAX and EXAMPLE:
- Logical Instructions The AND Instruction Example: The OR Instruction
    - The XOR Instruction
    - The TEST Instruction
    - The NOT Instruction

  - Assembly Conditions
    - The CMP Instruction SYNTAX; EXAMPLE
    - Unconditional Jump; SYNTAX: EXAMPLE:
    - Conditional Jump Example:
  - Assembly Loops Example:
  - Assembly Numbers
  - ASCII Representation
  - BCD Representation Example:
  - Assembly Strings
  - String Instructions
    - MOVS. LODS. CMPS. SCAS.

Assessment Strategy

- ➢ Homework Assignments & Class Work Activities (Individually) :-------- 40%
- ➢ Final Project (Individually)--- 25%
- ➢ Final Exam Accumulative (Individually) ------------------------------------ 25%
- ➢ Class Participation / Activities --- 10%

➢ Total -- 100%

Instructor Discretion: The instructor reserves the right to modify policies to improve the execution of this course.

Course Policies

Computer Requirement and Access to the Internet

Access to the Internet is required for this course. NJIT provides on campus access to the Internet to all students. Details as how to access the Internet as well as other resources at NJIT may be found in the Student Quick Start Guide.

Deadlines/Late Work/Make-ups

Specific policies concerning the acceptance of late work and make-ups are discussed in the sections covering course requirements. In general, work will be accepted late without penalty or allowed to be made-up only if there are extraordinary circumstances beyond students' control for not being able to complete work on time. Students may need to contact the Dean of Students' office and have it determine that the reasons given for not doing the work on time are valid.

Extraordinary Circumstances

Being locked out of the class because of late paying tuition is not considered an extraordinary circumstance beyond a student's control unless it can be documented that the Bursar's Office or Financial Aid has made an error.

Inability to access the Internet or Moodle is not considered an extraordinary circumstance beyond a student's control unless the outage is for 12 hours or more and due to a failure of NJIT's systems, not the student's Internet service provider or computer.

Incompletes

Incompletes will be given only to students who cannot finish the course on time due to major reasons outside of their control (e.g. illness, family tragedy, military service). Students may need to contact the Dean of Students' office and have it determine that the reasons given for not doing the work on time are valid.

Students with disabilities

Students with disabilities needing accommodations of any nature so as to have a fair opportunity to perform in the class need to contact the counseling center. Staff at the counseling center will determine what constitutes a reasonable accommodation and inform the instructor of what it is.

Honor Code

   You are expected to follow NJIT's honor code, which can be found at http://www.njit.edu/doss/policies/honorcode/.

COMPUTER:

DURING SCHOOL CLOSURE, ACCESS TO A COMPUTER WITH HIGH SPEED INTERNET CONNECTION, *WEBCAM (INTERNAL OR EXPTENAL), MICROPHONE AND AUDIO (INTERNAL OR EXTERNAL), AND *WINDOW/APPLE OPERATING SYSTEM IS REQUIRED. (WEBCAM AND WINDOW/APPLE OPERATING SYSTEM ARE FOR ONLINE EXAM WITH ONLINE PROCTORING SERVICE.)