

Preliminary
Master Course Syllabus
School of Engineering and Computer Science
Washington State University Vancouver

CS 260
Computer Organization
3 Semester Hours

Catalog Description

Introduction to computer architecture, data representation, design and analysis of instruction sets, implementation of machine instructions, virtual memory and multiprocessing.

Prerequisite Courses

CS 122 – Data Structures

Prerequisite Topics

- Knowledge of an imperative programming language
- Experience designing and implementing programs using dynamic and self-referential data structures.

Measured Course Outcomes

Students taking this course will:

1. Design and analyze simple combinational logic circuits using basic logic gates.
2. Design logic circuits or datapaths using or implementing arithmetic operations, multiplexers, encoders and flip-flops.
3. Design and analyze a finite state machine.
4. Evaluate the performance of an instruction set implementation.
5. Design and analyze the datapath and control logic for a simple instruction set.

Required Textbooks

Computer Organization and Design, The Hardware/Software Interface, David Patterson and John Hessessy, 3rd Edition, 2007 ISBN 978-0-12-370606-5.

or...

Structured Computer Organization, Andrew S. Tannenbaum, 5th Edition, 2006, ISBN 9780131485211

Reference Material

None specified.

Major Topics Covered in the Course

1. Overview of transistors, gates and semiconductor technology
2. Hardware abstractions and data representation
3. Basics of combinational and sequential logic design
4. Datapaths and control logic
5. von Neumann stored program architecture
6. Instruction Set design and analysis
7. Machine performance and pipelining
8. Memory Hierarchy
9. Interrupts and I/O architecture
10. Process management and parallel processing
11. Operating system role in I/O and multi-processing

Projects

Project Area	Weeks
Design and simulation of a datapath with control logic	3

CSAB Category Content

	FUNDAMENTAL	ADVANCED		FUNDAMENTAL	ADVANCED
Data Structures	0	0	Computer Organization and Architecture	3	0
Algorithm & Software Design	0	0	Concepts of Programming Languages	0	0

Oral and Written Communications

There are no significant oral or written communications required in this course.

Social and Ethical Issues

This course contains no significant coverage of social and ethical issues beyond the usual proscriptions against plagiarism and cheating.

Theoretical Content

Topic	Hours
Machine representation of numbers	3

Boolean algebra	6
Finite state machines	6

Problem Analysis

The instructor performs analyses of representative problems in class. All student assignments require the student to analyze problem requirements. A particular emphasis is made in analyzing the space and time tradeoffs of both software and hardware design approaches. Also, the cost/time tradeoffs involved in the design of instruction sets are closely analyzed.

Solution Design

Students are assigned logic or data-path design problems for which they are expected to arrive at designs and/or implementations which meet speed or complexity constraints while performing a specified function. Representative problems are solved in class by the instructor, textbook material and homework problems provide students with the skills and knowledge to be applied to developing their own designs.

CC2001

This course provides coverage of topics in the following areas (hours listed are minimums):

DS2. Basic logic	2
AR1. Digital logic and digital systems [core]	6
AR2. Machine level representation of data [core]	3
AR3. Assembly level machine organization [core]	3
AR4. Memory system organization and architecture [core]	5
AR5. Interfacing and communication [core]	3
AR6. Functional organization [core]	7

Course Coordinator:	Dick Lang
Last Updated:	January 21, 2009 (approval pending)
Syllabus Version Number:	1.3