

# CPEN 414 Computer Architecture

## Learning Outcomes

- Develop an in-depth understanding of computer architecture.
- Understanding of system level analysis and design approaches through example.

## Catalog Description

Advanced issues and techniques in computer architecture and design. Survey of architectures; instruction set design; software influences on architecture; processor implementation and simulation; pipelining; memory; multiprocessing; I/O subsystems; networks.

## Instructor Information

Dr. Dali Wang

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Office Hours: T, TH: 1:00 PM – 3:00 PM, F: 10:00 AM – 12:00 noon, or by appointment.

**Text Book:** *Computer Architecture a Quantitative Approach, 4th Edition*,  
J.L. Hennessy & D.A. Patterson, Morgan Kaufmann Publishers, 2006

**Prerequisite Courses:** CPEN 315: Digital Systems Design or CPSC 330: Computer Organization.

## Prerequisites by Topic

- Basic CPU design
- Basic Memory Design
- Understanding of Computer Organization
- Combinational circuit design
- Sequential circuit design

## Course Topics (tentative)

Fundamentals (Chapter 1).

Instruction Set Principles and Examples (Appendix B).

Pipelining (Appendix A).

Instruction-Level Parallelism (ILP) (Chapter 2).

Advanced Instruction-Level Parallelism (Chapter 3)  
Memory Hierarchy (Appendix C)  
Memory Hierarchy Design (Chapter 5)  
Multiprocessors (Chapter 4)  
Storage Systems (Chapter 6)  
Others (Verilog project, VLIW, Embedded Processors – time permit)

### **Course Goals:**

The following is a list of selected objectives in two ratings (you will need this information for the course evaluation later this semester):

I = important, E = essential

Gaining factual knowledge (terminology, classifications, methods, trends): E

Learning fundamental principles, generalizations, or theories: I

Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course: I

### **Late Lab/Homework Policy**

In general late homework are not accepted. There is a one-week grace period for laboratory assignments, but there will be a 20% reduction in grade. I will give extensions on homework assignments for extenuating circumstances (i.e. documented illness, TDY...), but you must contact me for each such case (preferably in advance).

### **Grading Policy**

Exams: 50%

Homework and Projects: 50%

where A: 100-90, B: 89-80, C: 79-70, D: 69-60, F: 59-0. Within the range for each letter grade, a plus/minus system will be used to delineate grades.

### **Computer Usage**

Laboratory assignments may require use of Sun computers in the Hunter Creech Laboratory. If you need to work on campus, please make time in your schedules to do these lab assignments. Evening and weekend passes to the Hunter Creech Laboratory can be obtained from the Department secretary on the first floor of Gosnold Hall.

### **Disability Statement**

Any student who believes that she or he is disabled should make and appointment to see me to discuss your needs. In order to receive an accommodation, your disability must be on record in the office of career & counseling services (telephone: 594-7047, CC 146).

**Student Success**

We want you to succeed at CNU; therefore I may notify the Academic Advising Center if you seem to be having problems with this course. Someone may contact you to help you determine what help you need to succeed. You will be sent a copy of the referral form. I invite you to see me at any time that I can be of assistance in helping you with the course material.

**Additional Note**

I am strongly committed to continually improving every course I teach, and student feedback is essential for making improvements. Your feelings about the course (good or bad) are very important to me. Any feedback (ideas, suggestions, comments) you can provide would be greatly appreciated.

## **University Honor Pledge**

I pledge to support the Christopher Newport University Code for Academic Work in CPEN 414/521/523. I will refrain from dishonesty or deception, such as cheating or plagiarizing, which are honor violations, on any and all academic work. I am further aware that as a member of the academic community I should report any suspected violations to the professor or Examiner of the Academic Hearing Board as stated in the Student Handbook (section I-B, page 21).

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Signature & Date