

# CARLETON UNIVERSITY

Department of Systems and Computer Engineering

SYSC 5704

Elements of Computer Systems

Fall 2012

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## Course Handout

### Instructor:

Dr. Greg Franks, Room 5204CB, Ph: 520-2600 ext 1749, greg@sce.carleton.ca

### Course Description and Objectives:

The purpose of this course is to give a foundation in computer systems and systems software. It is intended for those who are familiar with programming in high-level languages (C, C++, Pascal, Java, etc.) but have little undergraduate training or working experience in the principles of computer science or computer systems engineering. Recent graduates of Computer/Electrical Engineering or Computer Science degree programs may not take the course. Such students would normally proceed directly to courses for which SYSC 5704 is a prerequisite.

### Objectives

1. An understanding of the *Von Neuman Architecture*
2. A basic understanding of machine, assembler and high-level languages.
3. A basic understanding of operating systems.
4. An introduction to the memory hierarchy.
5. An introduction to performance testing and benchmarking.
6. Finally, exploiting this knowledge to write high-performance code.

### Prerequisites:

Programming experience with at least one high level language and permission of the professor.

### Textbook:

Miles Murdocca and Vincent Heuring, *Computer Architecture and Organization: An Integrated Approach*, Wiley

Some other recommended textbooks are:

- Andrew S. Tanenbaum, *Structured computer organization*, 5<sup>th</sup> edition, Prentice Hall.
- William Stallings, *Computer Organization and Architecture: Designing for Performance*, 7<sup>th</sup> edition, Prentice Hall.
- Leland L. Beck, *System Software: An Introduction to Systems Programming*, 3<sup>rd</sup> edition, Addison-Wesley.
- William Stallings, *Operating Systems: Internals and Design Principles*, 5<sup>th</sup> edition, Prentice Hall.
- Andrew S. Tanenbaum and Alfred Woodhull, *Operating systems: design and implementation*, 3<sup>rd</sup> edition, Prentice Hall

Some books will be put on reserve in the library. Supplementary lecture notes will be available from the web page for topics not covered in the text.

## Web Site

The departmental website for the course is <http://www.sce.carleton.ca/courses/sysc-5704/>.

A weekly schedule of lecture topics and textbook readings will be posted. You are expected to consult this schedule often.

## Contacting your Instructor

The instructor will hold weekly office hours for consultation. The times are posted on the course web-site. In addition to academic help, the office hours are the recommended vehicle for discussing course-related concerns.

## Exam:

An open book, no calculators, final exam will be held during the University's formal examination period. The final exam is for the evaluation purposes only and will not be returned to the student. Students who miss the final exam may be granted permission to write a deferred examination (See the Graduate Calendar for regulations on deferred exams).

## Grading Scheme:

To pass the course, all course components must be completed, regular attendance is required, the final exam must be passed, and an appropriate overall mark must be earned:

- Three assignments (30%) due at the beginning of class on the assigned due date. There will be no credit given for late homework assignments.
- Term paper (20%) Students will pick a topic in the field of computer systems and write a paper. The topic must be approved by the professor. Students will present their papers in class toward the end of the semester.
- Final exam (50%), scheduled.

## Medical Certificates:

A medical certificate must adhere to the format required by the Registrar. The format is available as a PDF form through the Registrar's website. All medical certificates must be dated no later than one working day after the exam, and be presented immediately upon return from the illness.

## Academic Accommodation:

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website <http://www2.carleton.ca/equity/accommodation/>.

**Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website <http://www2.carleton.ca/equity/accommodation/>.

**Academic Accommodations for Students with Disabilities:** The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders

(ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact the PMC at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam.

### **Plagiarism:**

Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated. Please refer to the section on instructional offenses in the Undergraduate Calendar for additional information.

### **Health and Safety Information**

The link to the health and safety manual is <http://www.sce.carleton.ca/courses/health-and-safety.pdf>

### **Weekly schedule (Tentative)**

- Week 1: Course Introduction and Historical Overview of Computer Systems.
- Week 2: Basics of Computer Architecture and Organization.
- Week 3: Data Representation.
- Week 4: Languages and the Machine: Assembly and High Level Languages.
- Week 5: Micro Architecture.
- Week 6: Assembly Process and Compilers.
- Week 7: Assembly Process and Compilers
- Week 8: Memory Systems.
- Week 9: Buses and I/O Systems and Networking.
- Week 10: Operating Systems and Concurrency.
- Week 11: Alternative Architectures and Parallel processing.
- Week 12: Program optimization techniques.
- Week 13: Presentations.