Topic 0. Introduction

COMP ENG 2SH4

Principles of Programming

McMaster University, 2015

Instructor: Sorina Dumitrescu

Instructor's Info

- Instructor: **Sorina Dumitrescu**
- Office: ITB/A222
- Email: sorina@mail.ece.mcmaster.ca
  - Include **2SH4** in the subject line
  - Include **your full name and student ID number** at the end of the email
  - I will only answer emails sent **from your McMaster account**
- My Office Hours :
  - **Tuesdays, Thursdays from 9:30 to 10:30 am**
  - By appointment
  - More office hours before tests

Course Objective

- To give an **understanding** of fundamental **program design concepts**.
- To give hands-on **experience designing and implementing computer programs**, including testing and debugging.
- Introduce the following programming languages
  - **C, Java, Matlab**

TED Talk

- https://www.youtube.com/watch?v=h07V4MwK8CA

Uses of C

- C is widely used to develop systems that require performance:
  - Operating systems
  - Embedded systems
  - Real-time systems
  - Communications systems

Uses of Java

- Java is used
  - To develop large scale enterprise applications
  - To enhance the functionality of web servers
  - To provide applications for consumer devices, etc.

Uses of Matlab

- Matlab is used for high performance **scientific computation** and **visualization**
  - Matrix computation,
  - Data analysis,
  - Signal processing,
  - 2D and 3D graphics, etc.
- Matlab has **toolboxes** for Communications, Optimization, Symbolic Mathematics, Image Processing, etc.

Top Popular Programming Languages – IEEE Spectrum

- Go to
- http://spectrum.ieee.org/static/interactive-the-top-programming-languages-2015#index
- IEEE stands for:
- Institute of Electrical and Electronics Engineers

Approximate Outline

- C Programming ~ 7 weeks
  - Console I/O, data types, operators, selection and repetition statements ~ 1.5 weeks
  - Functions, arrays, 2D arrays ~ 1.5 weeks
  - Pointers, arrays of pointers, dynamic memory allocation ~ 2 weeks
  - Structures, bitwise operators, file processing, recursion ~ 2 weeks

Approximate Outline

- Introduction to Java: ~ 4 weeks
  - Concepts of object-oriented programming
  - Classes, class members, objects
  - Inheritance, class hierarchies
  - Polymorphism
- Introduction to Matlab ~ 1 week:
  - Matrices and arrays manipulation
  - Plotting
  - Scripts and functions

Required Text

- COMP ENG 2SH4 - Custom Edition for McMaster University
- ISBN: 1269266926, Pearson Custom Library.
- Composed of 11 chapters from Deitel & Deitel, **C How to Program**, and 7 chapters from Deitel & Deitel, **Java How to Program. Late Objects**

Additional Resources (Not Required)

- Any reference book on C and Java.
- **The C Programming Language**, 2nd Edition. Kernighan, Ritchie. Prentice Hall, 1998.
- **The Java Tutorials** – available online for free
- **Thinking in Java, 4th Ed.,** Bruce Eckel ,Prentice Hall, 2006 -- free online resource
- **Getting Started with Matlab 7**, R. Pratap, Oxford University Press, 2006,

Course Website

- Course Website:
  - On Avenue to Learn
  - http://avenue.mcmaster.ca
- Check the website regularly for
  - Announcements
  - LAB exercises and specific requirements
  - Lecture notes
  - Tutorial notes
  - Practice questions for tests
  - Info about office hours
  - Past Exams

Course Organization

- **3 1h-lectures/week**:
  - Tue, Thu, Fri: 8:30 - 9:20 TSH-B128
- **A 3h-lab session every other week**
  - Lab sessions start on Sept. 21 in ITB-AB111
  - 5 lab sessions in all-> 15% of the final course mark
- **An 1h-tutorial session/week**
  - Discussion of lab assignments and/or similar problems
  - Practice questions for tests.

Assessment

- Final exam (2.5 hours): 50%;
- Midterm 1 (1.5 hours): 15%;
- Midterm 2 (2 hours): 20%;
- 5 lab assignments: 15%

Midterms Dates

- **Midterm 1: date TBA at 6:30-8:00 PM.**
- **Midterm 2: Nov. 26 at 6:30-8:30 PM.**

Exams Format (approximate)

- **Write small programs or portions of a program**
  - Similar in spirit to the lab exercises, practice questions posted online, textbook exercises or exercises discussed in the tutorial.
- Short answer questions:
  - Evaluate an expression
  - Write the output of a small program
- Find the error in a piece of code and correct it
- Variations of the above

Laboratories

- Labs start the week of **Sept. 21.**
- 5 lab sessions in all.
- The programming exercises for each lab will be posted online 1~2 weeks before the lab starts.
- You have to start working on the lab exercises well before your lab session in order to complete everything on time.
- You are encouraged to complete the work before your lab session.
- **You have to demonstrate the solution in front of a TA and submit it electronically by the end of your lab session to get the assigned mark.**

Laboratories

- The demonstrations have to be performed **on the computers in the lab.**
- When you demonstrate your code you will be asked
  - **To run it on some specified inputs**
  - **To explain or reproduce on paper portions of your code**
  - **To answer questions related to your algorithm, choice of variable names, etc.**
- **If you are not able to explain or reproduce a portion of your code, this will be considered evidence that that part is not written by you and you will receive a mark of ZERO for the WHOLE LAB.**
- This instance of **academic dishonesty** will also be **reported** to the University Office of Academic Integrity.

Laboratories

- Your code has to be submitted online **by the end of the lab session** or as specified in the lab requirements.
- **Each lab assignment will be discussed during the last tutorial before the lab starts.**
- Every week there will be office hours offered by TAs to assist with lab assignments.

LABS Schedule

- Labs start the week of Sept. 21 (week 3)
- Lab sections L01,03,05,07,09 held the weeks of
  - Sept. 21 (lab 1),
  - Oct. 5 (lab 2)
  - Oct. 26 (lab 3)
  - Nov. 9 (lab 4)
  - Nov. 23 (lab 5)

LABS Schedule

- Lab sections L02,04,06,08,10 held the weeks of
  - Sept. 28 (lab 1)
  - Oct. 19 (lab 2)
  - Nov. 2 (lab 3)
  - Nov. 16 (lab 4)
  - Nov. 30 (lab 5)
- Recess week : Oct. 12-17

i>clickers

- i>clickers will be used during lectures and tutorials to answer questions.
- Not used for assessment.
- Use the i>clicker that you have from last year.

MSAF'ed Work

- If you submit an MSAF for a midterm, the weight will be transferred to the final exam.
- If you MSAF a lab assignment, then the demo for that assignment is deferred to
  - Dec. 7 or 8
  - or the week of Nov. 24 (if there are many deferred labs)
  - Exact instructions will be posted on Avenue in November

More Info

- TA's office hours in the lab (ITB/AB111)
  - Start next week (Sept 14)
  - To be posted on the course website soon
- For lab access go to the Docucentre in JHE.
- Software to be used for lab assignments
  - Cygwin C/C++ compiler
  - Java SE Development Kit
  - Netbeans IDE with C/C++ plugin
- See the **Installation guide** posted on the course website.

How to Succeed

- Attend lectures, tutorials and labs.
- Review the lecture notes and read the required textbook material.
- Solve the lab exercises and the practice questions posted online.
- Solve other exercises from the textbook.
- **PRACTICE, PRACTICE, PRACTICE!**

Following topics
(Topics 1, 2 & 3 ~ 1.5 weeks)

- C Programming
  - Console I/O.
  - Basic data types.
  - Operators.
  - Selection statements.
  - Loops.
  - **Textbook material: Chapters 2,3,4.**

Homework

- READ
- Chap. 1 (Introduction to Computers, the Internet and the Web)
- Chap. 2 (Introduction to C Programming), sections 1-4
- Topic 1 lecture notes
- Install a C compiler and run the code from lecture notes and from the textbook.