COMP ENG 2SH4

Principles of Programming
Fall/Winter 2017/18
Course Outline

CALENDAR/COURSE DESCRIPTION

Fundamental concepts of programming languages: data types, assignment, control constructs, basic data structures, iteration, recursion, exceptions; imperative and object-orientated paradigms; composing and testing small programs.

PRE-REQUISITES AND ANTI-REQUISITES

Prerequisite(s): ENGINEER 1D04 and registration in a program in Electrical and Computer Engineering
Antirequisite(s): COMPSCI 2SC3, SFWRENG 2S03

SCHEDULE

Lectures: Tuesday, Wednesday & Friday 9:30 am – 10:20 am in TSH 120
Tutorial: Monday 8:30 am – 9:20 am in BSB 147
Labs: Every Other Week: L01 Monday 2:30 pm - 5:20 pm ; L02 Monday 2:30 pm - 5:20 pm ; L03 Tuesday 2:30 pm - 5:20 pm ; L04 Tuesday 2:30 pm - 5:20 pm ; L05 Wednesday 2:30 pm - 5:20 pm ; L06 Wednesday 2:30 pm - 5:20 pm ; L07 Thursday 2:30 pm - 5:20 pm ; L08 Thursday 2:30 pm – 5:20 pm ; L09 Friday 2:30 pm – 5:20 pm ; L10 Friday 2:30 pm – 5:20 pm ; L11 Thursday 5:30-8:20 pm
Midterm 1: October 20, 6:30 – 8:30 pm, location TBA
Midterm 2: November 17, 6:30 – 8:30 pm, location TBA

INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION

Dr. Sorina Dumitrescu, ITB-A222, sorina@mail.ece.mcmaster.ca, ext: 26486, office hours Tuesday and Wednesday at 10:40-11:30 starting Sept. 12, or by appointment.

INSTRUCTIONAL ASSISTANT CONTACT INFORMATION

Yarden Segal, ITB-A103, segaly@mcmaster.ca, ext. 26112

TEACHING ASSISTANT CONTACT INFORMATION

Teaching Assistants’ office hours will be posted on the course website.

Zhixiang Chi, ITB-A103, chiz@mcmaster.ca, ext. 26112
Hamidreza Fazlali, ITB-A103, fazlalih@mcmaster.ca, ext. 26112
Saadi Hamed Hassani, ITB-A103, hassanih@mcmaster.ca, ext. 26112
This course will be administered via Avenue to Learn. To access the course's Avenue to Learn page go to http://avenue.mcmaster.ca/

**COURSE OBJECTIVES**

To give an understanding of fundamental program design concepts, and hands-on experience designing and implementing computer programs. Emphasis will be on developing practical skills to write working programs to solve engineering problems, including testing and debugging.

**ASSUMED KNOWLEDGE**

Writing programs in Python to solve simple problems.

**COURSE MATERIALS**

**Required Texts:**
- Title: COMP ENG 2SH4 Principles of Programming - Custom Edition for McMaster University

**Additional References (not required)**

**Calculator:**
The use of calculator will **not be permitted** during tests and examinations.
## COURSE OVERVIEW

<table>
<thead>
<tr>
<th>Date/Week</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept. 5-15</td>
<td>C built-in data types, operators, console and file I/O, selection and repetition statements; structured program development.</td>
<td>Chapters 2, 3, 4</td>
</tr>
<tr>
<td>Sept. 18-22</td>
<td>C functions, arrays and strings.</td>
<td>Chapters 5, 6</td>
</tr>
<tr>
<td>Sept25-Oct.4</td>
<td>C strings, pointers, pointers and functions, pointer arithmetic, relationship between pointers and arrays. C double pointers, arrays of pointers, string arrays, dynamic memory allocation.</td>
<td>Chapters 7, 8</td>
</tr>
<tr>
<td>Oct. 6</td>
<td>C structures, arrays of structures, structures and functions</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>Oct. 16-18</td>
<td>Introduction to Java programming. Primitive Java, Java arrays.</td>
<td>Chapters 10, 11</td>
</tr>
<tr>
<td>Oct. 20-25</td>
<td>Java classes and objects.</td>
<td>Chapters 12, 13</td>
</tr>
<tr>
<td>Oct.27-Nov.8</td>
<td>Array-based lists and linked lists.</td>
<td>Chapters 13, 16, 17</td>
</tr>
<tr>
<td>Nov. 10-15</td>
<td>Recursion (in C and Java)</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>Nov. 17-21</td>
<td>Bitwise Operators (in C and Java)</td>
<td>Chapter 9</td>
</tr>
<tr>
<td>Nov.22-Dec.6</td>
<td>Java inheritance and polymorphism. Abstract Classes and Interfaces.</td>
<td>Chapters 14, 15, 17</td>
</tr>
<tr>
<td></td>
<td>Generics</td>
<td></td>
</tr>
</tbody>
</table>

## LABORATORY OVERVIEW

| Date/Week     | Topic                                                                 | Readings          |
|---------------|                                                                      |-------------------|
| Sept. 18-29   | Write simple C programs using loops and decision statements, arithmetic, relational and logic operators. | Chapters 2, 3, 4  |
| Oct. 2-20     | Write programs using C functions and arrays.                         | Chapters 5, 6      |
| Oct.23-Nov.3  | Write programs using C strings, pointers, arrays of strings, dynamic memory allocation, structures. | Chapters 7, 8, 9   |
| Nov. 9-20     | Programming in Java                                                 | Chapters 10-13     |
| Nov.23-Dec.3  | A sorted linked list implementation in Java                          | Chapters 13, 16    |

## LABORATORY OPERATION

The lab assignments are programming tasks and will be posted on Avenue To Learn about two weeks before the lab starts. Students are encouraged to work and even finish the assignment before their lab session. They have to attend the lab session and to demonstrate their solution in front of a TA. In other words, they have to show that the code runs on various inputs, answer questions regarding the algorithm and the implementation, reproduce portions of their code in front of the TA, etc. The source code and the report (if a report is required) have to be submitted online on Avenue To Learn before the end of the lab session. More details will be discussed in class.

The students have to attend the lab from the beginning of the lab session. They are allowed to leave the lab room only after they demonstrate their code. All demos end at 5:20 pm. Students who arrive late will be considered absent!
ASSessment

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max(Midterm 1, Final Exam)</td>
<td>15%</td>
</tr>
<tr>
<td>Max(Midterm 2, Final Exam)</td>
<td>15%</td>
</tr>
<tr>
<td>Laboratories</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam (2.5 hours)</td>
<td>45%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

For passing the course the weighted average of the final and midterm exams has to be at least 50%. The weighted average is computed as follows: $\frac{15}{75} \times (\text{Mid1} + \text{Mid2}) + \frac{45}{75} \times \text{Final}$.

Note that students who do not write the midterms will have the weight transferred to the final exam automatically.

In case a lab is missed with the absence being reported in a McMaster Student Absence Form (MSAF), the missed lab solution has to be demonstrated during the lab make-up sessions, which will be held during Dec. 4-6.

ACCREDITATION LEARNING OUTCOMES

Note: The Learning Outcomes defined in this section are measured throughout the course and form part of the Department’s continuous improvement process. They are a key component of the accreditation process for the program and will not be taken into consideration in determining a student’s actual grade in the course. For more information on accreditation, please ask your instructor or visit: [http://www.engineerscanada.ca](http://www.engineerscanada.ca).

In this course, indicators related to the development of the following attributes will be measured: a) use of engineering tools (indicator 5.2); b) communication skills (indicators 7.1 and 7.3).

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Indicators</th>
<th>Measurement Methods(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the principles of procedural programming and apply them using the C programming language.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master the C syntax. Understand and use C functions, arrays, pointers, strings, structures, double pointers, dynamic memory allocation.</td>
<td></td>
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</tr>
<tr>
<td>Write working programs in C.</td>
<td></td>
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</tr>
<tr>
<td>Understand the principles of object oriented programming and apply them using the Java programming language.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master the Java syntax. Understand and use Java functions, arrays, classes and objects.</td>
<td></td>
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</tr>
<tr>
<td>Write Java classes. Write small working Java programs.</td>
<td>5.2</td>
<td>Java assignment</td>
</tr>
<tr>
<td>Demonstrates an ability to respond to technical and non-technical instructions and questions.</td>
<td>7.1</td>
<td>Lab interview</td>
</tr>
</tbody>
</table>
Constructs effective oral or written arguments as appropriate to the circumstances.

### ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at [http://www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

### ACADEMIC ACCOMMODATIONS

Students who require academic accommodation must contact Student accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contact by phone at 905.525.9140 ext. 28652 or e-mail at sas@mcmaster.ca. For further information, consult McMaster University’s Policy for [Academic Accommodation of Students with Disabilities](http://www.mcmaster.ca/academicintegrity).

### NOTIFICATION OF STUDENT ABSENCE AND SUBMISSION OF REQUEST FOR RELIEF FOR MISSED ACADEMIC WORK

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work”: [http://www.mcmaster.ca/msaf/](http://www.mcmaster.ca/msaf/).
NOTICE REGARDING POSSIBLE COURSE MODIFICATION

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

ON-LINE STATEMENT FOR COURSES REQUIRING ONLINE ACCESS OR WORK

In this course, we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

Electrical and Computer Engineering Lab Safety

Information for Laboratory Safety and Important Contacts

This document is for users of ECE instructional laboratories in the Information Technology Building.

This document provides important information for the healthy and safe operation of ECE instructional laboratories. This document is required reading for all laboratory supervisors, instructors, researchers, staff, and students working in or managing instructional laboratories in ECE. It is expected that revisions and updates to this document will be done continually. A McMaster University lab manual is also available to read in every laboratory.

General Health and Safety Principles

Good laboratory practice requires that every laboratory worker and supervisor observe the following:
1. Food and beverages are not permitted in the instructional laboratories.
2. A Laboratory Information Sheet on each lab door identifying potential hazards and emergency contact names should be known.
3. Laboratory equipment should only be used for its designed purpose.
4. Proper and safe use of lab equipment should be known before using it.
5. The course TA leading the lab should be informed of any unsafe condition.
6. The location and correct use of all available safety equipment should be known.
7. Potential hazards and appropriate safety precautions should be determined, and sufficiency of existing safety equipment should be confirmed before beginning new operations.
8. Proper waste disposal procedures should be followed.

**Location of Safety Equipment**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fire Extinguisher</strong></td>
<td>On walls in halls outside of labs</td>
</tr>
<tr>
<td><strong>First Aid Kit</strong></td>
<td>ITB A111, or dial “88” after 4:30 p.m.</td>
</tr>
<tr>
<td><strong>Telephone</strong></td>
<td>On the wall of every lab near the door</td>
</tr>
<tr>
<td><strong>Fire Alarm Pulls</strong></td>
<td>Near all building exit doors on all floors</td>
</tr>
</tbody>
</table>

**Who to Contact**

**Emergency Medical / Security:** On McMaster University campus, call Security at extension 88 or 905-522-4135 from a cell phone.

**Non-Emergency Accident or Incident:** Immediately inform the TA on duty or Course Instructor.

**University Security (Enquiries / Non-Emergency):** Dial 24281 on a McMaster phone or dial 905-525-9140 ext. 24281 from a cell phone.

**See TA or Instructor:** For problems with heat, ventilation, fire extinguishers, or immediate repairs.

**Environmental & Occupational Health Support Services (EOHSS):** For health and safety questions dial 24352 on a McMaster phone or dial 905-525-9140 ext. 24352 from a cell phone.

**ECE Specific Instructional Laboratory Concerns:** For non-emergency questions specific to the ECE

**In Case of a Fire (Dial 88)**

When calling to report a fire, give name, exact location, and building.

1. Immediately vacate the building via the nearest Exit Route. Do not use elevators!
2. Everyone is responsible for knowing the location of the nearest fire extinguisher, the fire alarm, and the nearest fire escape.
3. The safety of all people in the vicinity of a fire is of foremost importance. But do not endanger yourself!
4. In the event of a fire in your work area shout “Fire!” and pull the nearest fire alarm.
5. Do not attempt to extinguish a fire unless you are confident it can be done in a prompt and safe manner utilizing a hand-held fire extinguisher. Use the appropriate fire extinguisher for the specific type of fire. Most labs are equipped with Class A, B, and C
extinguishers. Do not attempt to extinguish Class D fires which involve combustible metals such as magnesium, titanium, sodium, potassium, zirconium, lithium, and any other finely divided metals which are oxidizable. Use a fire sand bucket for Class D fires.

6. Do not attempt to fight a major fire on your own.
7. If possible, make sure the room is evacuated; close but do not lock the door and safely exit the building.

**Clothing on Fire**
**Do not use a fire extinguisher on people**
1. Douse with water from safety shower immediately or
2. Roll on floor and scream for help or
3. Wrap with fire blanket to smother flame (a coat or other nonflammable fiber may be used if blanket is unavailable). Do not wrap a standing person; rather, lay the victim down to extinguish the fire. The blanket should be removed once the fire is out to disperse the heat.

**Equipment Failure or Hazard**
*Failure of equipment may be indicative of a safety hazard - You must report all incidents.*
Should you observe excessive heat, excessive noise, damage, and/or abnormal behaviour of the lab equipment:
1. Immediately discontinue use of the equipment.
2. In Power Lab, press wall-mounted emergency shut-off button.
3. Inform your TA of the problem.
4. Wait for further instructions from your TA.
5. TA must file an incident report.

**Protocol for Safe Laboratory Practice**
*Leave equipment in a safe state for the next person - if you’re not sure, ask!*
In general, leave equipment in a safe state when you finish with it. When in doubt, consult the course TA.

**Defined Roles**

<table>
<thead>
<tr>
<th>Role</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA</td>
<td>The first point of contact for lab supervision</td>
</tr>
<tr>
<td>ECE Lab Supervisor</td>
<td>Steve Spencer- ITB 147 <a href="mailto:steve@mail.ece.mcmaster.ca">steve@mail.ece.mcmaster.ca</a></td>
</tr>
<tr>
<td>ECE Chair</td>
<td>Tim Davidson- ITB A111 <a href="mailto:davidson@mcmaster.ca">davidson@mcmaster.ca</a></td>
</tr>
<tr>
<td>ECE Administrator</td>
<td>Kerri Hastings- ITB A111 <a href="mailto:hastings@mcmaster.ca">hastings@mcmaster.ca</a></td>
</tr>
<tr>
<td>ECE Course Instructor</td>
<td>Please contact your specific course instructor directly</td>
</tr>
</tbody>
</table>