

COMP ENG 2SH4
Principles of Programming

COURSE OUTLINE

Please refer to course website for updated information.

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

Lecture: Monday, Wednesday & Thursday 10:30am-11:20am

Tutorial: Friday 9:30am – 10:20am

Lab:

- L01 Mon 2:30 pm- 5:20 pm – Sept 23, Oct 7, Oct 28, Nov 11, Nov 25
- L02 Mon 2:30 pm - 5:20 pm – Sept 16, Sept 30, Oct 21, Nov 4, Nov 18
- L03 Tue 2:30 pm - 5:20 pm – Sept 24, Oct 8, Oct 29, Nov 12, Nov 26
- L04 Tue 2:30 pm - 5:20 pm – Sept 17, Oct 1, Oct 22, Nov 5, Nov 19
- L05 Wed 2:30 pm - 5:20 pm – Sept 25, Oct 9, Oct 30, Nov 13, Nov 27
- L06 Wed 2:30 pm - 5:20 pm – Sept 18, Oct 2, Oct 23, Nov 6, Nov 20
- L07 Thu 2:30 pm - 5:20 pm – Sept 26, Oct 10, Oct 31, Nov 14, Nov 28
- L08 Thu 2:30 pm – 5:20 pm – Sept 19, Oct 3, Oct 24, Nov 7, Nov 21
- L09 Fri 2:30 pm – 5:20 pm – Sept 27, Oct 11, Nov 1, Nov 15, Nov 29
- L10 Fri 2:30 pm – 5:20 pm – Sept 20, Oct 4, Oct 25, Nov 8, Nov 22

INSTRUCTOR

Dr. Mohamed Hassan

Email: mohamed.hassan@mcmaster.ca

Office: ITB-A318

Office Hours: TBA, Will be posted on the course website

TEACHING ASSISTANTS

Contact information and office hours are provided on the course website.

- Ali, Muhammad Khawar
- Zaidi, Ahmed
- Cui, Yexin
- Scott, Alexander
- Goldstein, Cyrille
- Barkmaki, Alireza
- Rasethuntsa,
- Zhang, Han
- Zendehboodi, Sara
- Armanfard, Fatemeh
- Chatterjee, Abhijit

COURSE WEBSITE/S

<http://avenue.mcmaster.ca>

COURSE OBJECTIVES

By the end of this course, students should be able to:

- Understand fundamental program design concepts.
- acquire a hands-on experience designing and implementing computer programs.
- Gain 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:

[1] Title: COMPENG 2SH4 Principles of Programming - Custom Edition for McMaster University
ISBN: 9781323695203, Pearson Custom Library

Recommended Texts:

- [1] S. B. Zakhour, S. Kannan, and R. Gallardo, The Java Tutorial: A Short Course on the Basics, 5th Ed., Addison-Wesley, ISBN: 0132761696.
- [2] Bruce Eckel, "Thinking in Java", 4th Ed., Prentice Hall, 2006, ISBN: 0131872486

Calculator:

Only the McMaster Standard Calculator (Casio fx-991 MS or MS Plus) will be permitted in tests and examinations. This is available at the Campus Store.

Other:

A laptop is needed for classroom quizzes

COURSE OVERVIEW

Week	Topic	Readings
1-2	C built-in data types, operators, console and file I/O, selection and repetition statements; structured program development.	Chapters 2, 3, 4, lecture notes
3	C functions, arrays and strings.	Chapters 5, 6, lecture notes
4	C strings, pointers, pointers and functions, pointer arithmetic, relationship between pointers and arrays. C double pointers, arrays of pointers, string arrays, dynamic memory allocation.	Chapters 7, 8, lecture notes
5	C structures, arrays of structures, structures and functions	Chapter 9, lecture notes
6	Introduction to Java programming. Primitive Java, Java arrays.	Chapters 10, 11, lecture notes
8	Java classes and objects.	Chapters 12, 13, Lecture notes
9-10	Array-based lists and linked lists.	Chapters 13, 16, 17, lecture notes
11	Recursion (in C and Java)	Chapter 5, lecture notes
12	Bitwise Operators (in C and Java)	Chapter 9, lecture notes
13-	Java inheritance and polymorphism. Abstract Classes and Interfaces. Generics.	Chapters 14, 15, 17, lecture notes

A more detailed timeline is available on the course web site.

At certain points in the course it may make good sense to modify the schedule. The instructor may modify elements of the course and will notify students accordingly (in class, on the course website).

LABORATORY OVERVIEW

Lab	Topic
1	Write simple C programs using loops and decision statements, arithmetic, relational and logic operators.
2	Write programs using C functions and arrays.
3	Write programs using C strings, pointers, arrays of strings, dynamic memory allocation, structures.
4	Linked lists and arrays in Java
5	A sorted linked list implementation in Java

LABORATORY OPERATION

- At the beginning of every term, every Undergraduate student using an ECE Lab is required to complete the ECE Lab Safety Quiz (one completed quiz covers every course that term). The quiz and other information is provided on the webpage: <https://www.eng.mcmaster.ca/ece/resources#health-safety>
- Access to all labs is restricted in the interest of security and safety. Information on accessing and using the lab can be found on the webpage: <https://www.eng.mcmaster.ca/ece/labs-and-health-safety#Labs-Access-and-Use>
- Please obtain your own Access Card for use during regular building hours / The TA will open the lab at regularly scheduled lab times
- The labs for this course will be held in ITB-AB111

ASSESSMENT

Component	Weight
Quizzes	10 %
MAX(Midterm, Final Exam)	20 %
Laboratories	30 %
Final Exam	40 %
Total	100 %

Note that students who do not write the midterm will have the weight transferred to the final exam automatically (no MSAF is needed).

If the Final Exam mark is higher than the Midterm mark, then the weight of the Midterm will be shifted to the Final Exam automatically.

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>.

Outcomes	Indicators	Measurement Method(s)
Understand the principles of procedural programming and apply them using the C programming language.		Quizzes, Lab, Exam
Master the C syntax. Understand and use C functions, arrays, pointers, strings, structures, double pointers, dynamic memory allocation.		Quizzes, Lab, Exam

Write working programs in C.	Lab
Understand the principles of object-oriented programming and apply them using the Java programming language.	Quizzes, Lab, Exam
Master the Java syntax. Understand and use Java functions, arrays, classes and objects.	Quizzes, Lab, Exam
Write Java classes. Write small working Java programs.	Quizzes, Lab
Demonstrates an ability to respond to technical and non-technical instructions and questions.	Quizzes, Lab, Exam
Constructs effective oral or written arguments as appropriate to the circumstances.	Lab, Exam

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 www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:

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

ACADEMIC ACCOMMODATIONS

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to the Engineering Student Services office normally

within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations.

Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

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".

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

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.

www.eng.mcmaster.ca/ece

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

Fire Extinguisher

On walls in halls outside of labs

First Aid Kit

ITB A111, or dial "88" after 4:30 p.m.

Telephone

On the wall of every lab near the door

Fire Alarm Pulls

Near all building exit doors on all floors

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 laboratories, please contact 24103.

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

TA	The first point of contact for lab supervision
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ECE Lab Supervisor	Steve Spencer- ITB 147	steve@mail.ece.mcmaster.ca
ECE Course Instructor	Please contact your specific course instructor directly	
ECE Administrator	Kerri Hastings- ITB A111	hastings@mcmaster.ca
ECE Chair	Tim Davidson- ITB A111	davidson@mcmaster.ca