Welcome to ECE 244! This course will provide you with understanding of various features of the C++ programming language, including: classes and objects, data hiding and encapsulation, operator overloading, constructors and destructor, inheritance, parameter passing and pointers. It will also give you understanding of how fundamental object-oriented features, such as encapsulation and inheritance contribute to software reuse. In addition, it will cover several key data structures used in programming today, including arrays, linked lists, trees and graphs. Finally, it will enable you to analyze the run-time execution time of simple algorithms using the common Big-O notation and to apply this analysis to choose among alternative solutions to a problem. The laboratory component of the course will allow you to demonstrate your ability to design of C++ code that realizes a specification and to use current tools, such as compilers, debuggers, etc., to write, test, debug and execute your code.

Instructors

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Calendar Description

Provides a foundation in programming using an object-oriented programming language. Topics include: classes and objects, inheritance, exception handling, basic data structures (lists, tree, etc.), Big-O complexity analysis, and testing and debugging. The laboratory assignments emphasize the use of object-oriented programming constructs in the design and implementation of reasonably large programs.

Course Web Site

Information on ECE 244, including important announcements, a copy of this handout, copies of assignment handouts, and course marks may be found on the web site for the course. Please visit the web site on a regular basis for up-to-date information. The web site also provides discussions where you can post questions regarding the course. Instructors and TAs will monitor these discussions on a regular basis.

To access the course website, go to: http://q.utoronto.ca/ and log in using your UTORid and password. If you need information on how to activate your UTORid and set your password for the first time, please go to www.utorid.utoronto.ca.
Once you have logged in to the portal using your UTORid and password, look for the link of your course websites. If you don't see the course listed here but you are properly registered for the course in ROSI, go to the library for help.

**E-mail**

All UofT students are required to have a valid UTORmail email address. You are responsible for ensuring that your UofT email address is properly entered in the ROSI system.

Forwarding your utoronto.ca email to a Hotmail, Gmail, Yahoo or other type of email account is not advisable. In some cases, messages from utoronto.ca addresses sent to Hotmail, Gmail or Yahoo accounts are filtered as junk mail, which means that emails from your course instructor may end up in your spam or junk mail folder.

**Textbook and Other Reference**

The following book is required, and it will serve as the main reference for the course.


The book is available at the University of Toronto bookstore and may be available at the University of Toronto Engineering Stores as well. Also, an electronic version of the book is available, at a discounted price, from: [www.coursesmart.com](http://www.coursesmart.com). Search for the book using the author or the title.

Please note that it is **not necessary** to buy the latest edition; any edition past the 6th edition (i.e., 7th, 8th or the 9th) is adequate for the purposes of the course.

Reference material and excellent tutorials on the C++ programming language can also be readily found on the Web. We recommend in particular:

- C plus plus: [http://www.cplusplus.com](http://www.cplusplus.com)

**Timetable**

The following is the timetable for the course. You are to attend three lectures, one tutorial, and one lab session per week. Please **attend only the lectures, tutorial, and labs session for your officially designated section**, as indicated on your timetable.
### Lecture Section 1 (Abdelrahman)
- **Monday**: 2-3pm, SF1101
- **Wednesday**: 2-3pm, SF1101
- **Thursday**: 2-3pm, SF1101

### Lecture Section 2 (Shaghaghi)
- **Monday**: 10-11am, MC254
- **Tuesday**: 11-12noon, MC254
- **Thursday**: 10-11am, MC254

### Lecture Section 3 (Abdelrahman)
- **Monday**: 11-12noon, BA1180
- **Wednesday**: 11-12noon, BA1180
- **Thursday**: 11-12noon, BA1180

### Tutorials
- **Tutorial 1**: Monday, 1-2pm, GB303
- **Tutorial 2**: Monday, 1-2pm, GB304
- **Tutorial 3**: Monday, 1-2pm, SF2202
- **Tutorial 4**: Monday, 1-2pm, HA403
- **Tutorial 5**: Tuesday, 5-6pm, BA1220
- **Tutorial 6**: Tuesday, 5-6pm, GB304

### Labs
- **Lab 1**: Thursday, 3-5pm, SF1012/SF1013
- **Lab 2**: Thursday, 3-5pm, SF1012/SF1013
- **Lab 3**: Tuesday, 1-3pm, SF1012/SF1013
- **Lab 4**: Tuesday, 1-3pm, SF1012/SF1013
- **Lab 5**: Monday, 9-11am, SF1012/SF1013
- **Lab 6**: Monday, 9-11am, SF1012/SF1013

### Laboratory Assignments

The lab assignments consist of a number of programming exercises using the C++ programming language. A handout describing each assignment will be made available on the web site for the course. The lab assignments do take a substantial amount of your time. Hence, it is important to start as early as possible on your assignments and to avoid procrastination.

All the labs will be in room SF1012/SF1013. While lab use and remote access are possible any time, you are strongly encouraged to regularly attend your scheduled lab period; a Teaching Assistant (TA) will be available to answer any questions and offer help during these periods.

Please consult with the handout titled “Laboratory Information” for more details on the lab assignments, their schedule, and other related information.

### Tutorials

The tutorials are intended to review basic programming concepts and revisit material already covered in the lectures in a more interactive setting, where questions can be asked frequently and freely. Attending the tutorials is not mandatory. No new material will be introduced and often only basic material will be reviewed. Some tutorials may elaborate on laboratory assignments.
Topic Outline

The following is a list of the topics, and the corresponding reference. Chapters are from the 10th edition of the “Problem Solving with C++” textbook; earlier editions may have slightly different chapter numbers, but essentially the same content. Please keep in mind that this list of topics is tentative and is intended to serve as only a general guide. A more detailed outline of the topics will be made available in the first week of classes. Further, lecture-by-lecture reference to the textbook will be given in class.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of C++; compilation</td>
<td>Textbook – Chapters 1-9, 12</td>
</tr>
<tr>
<td>Pointers</td>
<td>Textbook – Chapter 9</td>
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<tr>
<td>Classes and objects</td>
<td>Textbook – Chapter 10, 11</td>
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<tr>
<td>Recursion</td>
<td>Textbook – Chapter 14</td>
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<tr>
<td>Inheritance</td>
<td>Textbook – Chapter 15</td>
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<tr>
<td>Templates</td>
<td>Textbook – Chapter 17.1</td>
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<tr>
<td>Linked Lists, Trees and Graphs</td>
<td>Textbook – Chapter 13; Lecture notes</td>
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<tr>
<td>Complexity of Algorithms</td>
<td>Lecture notes; Textbook – Chapter 18.3</td>
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</tbody>
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Marking and Evaluation

There will be several programming assignments during the term. There will also be one midterm test tentatively scheduled on October 24th, 2019, 6-8pm. The final date, location and seating assignment for the midterm will be confirmed and announced in class and posted on the course’s web site. A final exam will be given during the final exams’ period. The composition of the final mark is as follows:

Assignments 25%
  Assignment 1 2%
  Assignment 2 3%
  Assignment 3 4%
  Assignment 4 6%
  Assignment 5 6%
  Assignment 6 4%
Midterm Test 30%
Final Exam 45%