Instructor:
Lynn Marshall  ME4230  lynnmar@sce.carleton.ca

TAs:
Information on the TAs will be on the lab schedule in cuLearn.

Office Hours:
Monday 12:35pm-1:25pm and Tuesday 11:35am-12:25pm.

Course Objective:
Introduction to engineering problem solving. Defining and modeling problems, designing algorithmic solutions, using procedural programming, selection and iteration constructs, functions, arrays, converting algorithms to a program, testing and debugging. Program style, documentation, reliability. Applications to engineering problems; may include numerical methods, sorting and searching.

Learning Outcomes:
By the end of this course students should be able to
1) identify the data/inputs/assumptions, and the objectives of the problem from the description
2) evaluate arithmetic and logical expressions
3) execute a set of instructions (flowchart or pseudo-code, or C++) with assignments, selection, conditional and loop statements including functions and arrays.
4) implement C++ programs
5) modify and correct C++ programs

Graduate Attributes:
• 1.4.S - Knowledge base: Discipline-specific concept SCE-1: Programming and Algorithms
• 2.1 - Problem analysis: Problem definition
• 2.2 - Problem analysis: Approach to the problem
• 2.3 - Problem analysis: Use of assumptions
• 2.4 - Problem analysis: Interpreting the solution - validity of results
• 5.3 - Use of engineering tools: Tools for design, experimentation, simulation, visualization, and analysis

Course Web Site:
All course materials will be posted on cuLearn.

Textbook and References:
There are two required text books:
• *Problem Solving with Computers*, Bryant, Marshall, Wallace, Prometheus Press. Cost C$22. Instructions on where/when you can purchase a copy will be posted on the web site.
• *ECOR 1606 Fall 2018 zyBook*. Instructions for subscribing are on cuLearn.

Links to Software, libraries, additional resources:

Further Reading:
• Texts: There are a large number of introductory C++ programming texts available. Some are better than others but in general any such text will serve the student who wants a "second opinion". One good possibility is *Engineering Problem Solving with C++* by Delores M. Etter and Jeanine A. Ingber (Pearson Prentice-Hall).
• Web resources: There are a large number of C and C++ programming resources on the web. Specific links will be provided as the term progresses but [http://www.cplusplus.com](http://www.cplusplus.com) is a very complete resource that we will use regularly in lectures.
Evaluation and Marking Scheme:

Lab Exams: 45%  (Early Feedback Exam 5%, Lab Midterm 10%, Lab Final 30%)
Written Exams: 50%  (Midterm 10%, Final 40%)
Assignments: 5% (zyBooks)

Labs:

There are 11 labs. Labs #3, #7 and #10 are lab tests.

<table>
<thead>
<tr>
<th>Lab</th>
<th>Topic</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tutorial (selection and iteration)</td>
<td>Sept 10, 14, 18-20</td>
</tr>
<tr>
<td>2</td>
<td>Tutorial (using C--)</td>
<td>Sept 17, 21, 25-27</td>
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<tr>
<td>3</td>
<td>Early Feedback Test</td>
<td>Sept 24, 28, Oct 2-4</td>
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<tr>
<td>4</td>
<td>Tutorial (Dev C++ Debugger)</td>
<td>Oct 1, 5, 9-11</td>
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<td>5</td>
<td>Tutorial (The Dev C++ Environment)</td>
<td>Oct 12-18</td>
</tr>
<tr>
<td>6</td>
<td>Tutorial (Lab Midterm Preparation)</td>
<td>Oct 19, Oct 29-Nov 1</td>
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<tr>
<td>7</td>
<td>Lab Midterm</td>
<td>Nov 2-8</td>
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<tr>
<td>8</td>
<td>Tutorial (Function Intro)</td>
<td>Nov 9-15</td>
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<tr>
<td>9</td>
<td>Tutorial (Functions)</td>
<td>Nov 16-22</td>
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<tr>
<td>10</td>
<td>Lab Final</td>
<td>Nov 23-29</td>
</tr>
<tr>
<td>11</td>
<td>Tutorial (Arrays)</td>
<td>Nov 30 – Dec 6</td>
</tr>
</tbody>
</table>

Exams:

There will be three laboratory exams (an early feedback exam, a lab midterm, and a lab final) and two written tests (a midterm and a final). In the laboratory tests students will use computers. In the written tests students will answer questions on paper.

The laboratory exams will take place on the dates indicated on the lab schedule. The midterm will be held during class time on **Wed Oct 17th (Section B) or Thu Oct 18th (Section A)**. The final will be held during the University’s examination period. All exams will be closed book. Students will, however, be supplied with standard reference sheets.

Students who miss an exam will receive a mark of zero unless they have a legitimate reason for being absent and provide appropriate documentation dated within one day of the exam and presented to their instructor within five working days. In this case the weight of the missed exam will normally be transferred to the following exam of the same type (e.g. the weight of the early feedback lab test will be transferred to the lab midterm). The exception is that there will be a make-up written midterm.

The lab final is a mandatory course element and students that do not write this exam will receive a final mark of ABS. Special arrangements will apply in the case of the lab final. Only students who miss the lab final and provide appropriate documentation will be permitted to write a make-up lab final. Those who miss the make-up lab final will be given a final grade of ABS. Make-ups will be during one of the other lab sections if possible. A make-up will be scheduled (only if needed) on the last day of classes.

Unless they receive permission from the instructor ahead of time, students are required to write exams in their registered lecture or lab section.

The final exam is for evaluation purposes only and will not be returned to students. Students will be able to make arrangements with the instructor to see your marked final examination after the final grades have been made available.
General Regulations:

• **Copyright on Course Materials**: The materials created for this course (including course outline, slides, posted notes, labs, project, assignments, quizzes, exams and solutions) are intended for personal use and may not be reproduced or redistributed or posted on any web site without prior written permission from the author(s).

• **Attendance**: Students are expected to attend all lectures and lab periods. The University requires students to have a conflict-free timetable. For more information, see the current Undergraduate Calendar, Academic Regulations of the University, Section 1.2, Course Selection and Registration and Section 1.5, Deregistration. Requests to accommodate a missed midterm exam, lab periods, etc., because of conflicts with jobs or vacation plans will not be considered.

• **Health and Safety**: Every student should have a copy of our Health and Safety Manual. A PDF copy of this manual is available online: [http://sce.carleton.ca/courses/health-and-safety.pdf](http://sce.carleton.ca/courses/health-and-safety.pdf).

• **Deferred Term Work**: Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases this must occur no later than three (3.0) working days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. For more information, see the Academic Regulations of the University, Section 2.6, Deferred Term Work.

• **Appeal of Grades**: The processes for dealing with questions or concerns regarding grades assigned during the term and final grades is described in the Academic Regulations of the University, Section 2.7, Informal Appeal of Grade and Section 2.8, Formal Appeal of Grade.

• **Academic Integrity**: Students should be aware of their obligations with regards to academic integrity. Please review the information about academic integrity at: [https://carleton.ca/registrar/academic-integrity/](https://carleton.ca/registrar/academic-integrity/)

• **Academic Accommodations**: Requests for 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**
    Please contact your instructor 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: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)
  - **Religious obligation**
    Please contact your instructor 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: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)
  - **Academic Accommodations for Students with Disabilities**
    If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC 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 your instructor as soon as possible to ensure accommodation arrangements are made. carleton.ca/pmc
  - **Survivors of Sexual Violence**
    As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and is survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more
information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

Accommodation for Student Activities
Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor 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. [https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf](https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf)

Additional Information:

**Email Communication:**
As required by University regulation, students are required to consistently read their Carleton email. The instructors will be using this email account to communicate important and timely messages. Not reading these emails is not a valid excuse for missing a deadline or any other course related announcement.

Emails to the instructor must be professional in nature and in writing. All emails must be from the student’s Carleton account. The title must contain the course name. The body must contain the student’s name, student number, and, if applicable, lab and/or lecture section.

Example Title: ECOR1606 A Midterm

The instructor attempts to answer all emails in a timely and helpful manner, within two working days. Replies will not be sent to emails concerning matters already covered in class, or posted on the course website or class wide emails.

**zyBooks Mark Calculation:**
Mark calculation is automated. Students who have an incorrect version of the zyBook (i.e. anything other than Fall 2018) or have not provided their correct email address and student number will get 0, no exceptions!

All work must be completed by 11:55pm Fri Dec 7th.

To achieve full credit for assignments, a student must complete 70% of the assigned tasks (i.e. 70% complete as reported by zyBooks) for each of the first 10 chapters of the textbook covered in the course. The percentage complete for a chapter is the average of the orange participation activities and the blue challenge activities for the non-optional exercises. Students that complete more than 70% will receive pro-rated bonus credit for this work (i.e. to a max of 7/5 if 100% of the first 8 chapters completed) only if at least 70% of the tasks within each of the 10 assigned chapters is completed. The textbook contains significant additional material (shown as optional) that is not covered in ECOR 1606. Students are welcome to complete this for extended learning but NO credit for this material will be awarded.

**Midterm Bonus:** Students that have completed at least 70% of the assigned tasks for each of zyBooks chapters 1 through 4 and 100% of chapters 9 and 10 before the written midterm (deadline 11:55pm Tue Oct 16th) will receive a bonus of 1 for their assignment mark. Allowing a potential 8/5 grade on assignments when combined with the term end mark. This Midterm Bonus is an all or nothing mark with no partial award so students receive either 1 or 0. No extensions will be granted.

Do not conclude that, because the assignments are “only” worth 5% of your final mark, they are not worth doing. Doing the assignments is the one of the best way of acquiring the skills that you need to pass this course.

Here is pseudo-code that you can use to calculate your zyBook mark (out of 5, with a maximum of 8; i.e. up to 3 bonus marks):
let $p_1, p_2, p_3, p_4, p_5, p_6, p_7, p_8, p_9, p_{10}$ be the % complete of the first 10 chapters at 11:55pm Tue Jun 19th
let $pm_1, pm_2, pm_3, pm_4, pm_9, pm_{10}$ be the % complete of the first 4 and last 2 chapters at 11:55pm Wed May 23rd

if ( all of $p_1, p_2, p_3, p_4, p_5, p_8, p_9, p_{10}$ >= 70 ) then
  mark = $5 + ( ( \text{sum of } p_1 \text{ to } p_8 ) / 560 ) / 120$
else
  mark = 0
  i = 1
  while (i <= 8) do
    mark = mark + min ( 1, $p_i / 70.0$ ) * 0.625
    i = i + 1
  endwhile
endif

if ( all of $pm_1, pm_2, pm_3, pm_4$ >= 70 and $pm_9$ and $pm_{10}$ both == 100) then
  mark+=1
endif

Problem Sets:

There are optional problem sets that should be completed every 2 weeks throughout the term. These provide students with additional opportunity to apply the course materials. Solutions will be provided.

Programming and Problem Solving is a language-learning process and thought-process skill and this is best achieved through employing the skills and language in the same way that immersion is the best way to learn a second language. The problem sets provide an opportunity to solve problems and create programs

Tentative Week-by-Week Schedule:

This is intended only as a general guide to what will be covered and is subject to change.

<table>
<thead>
<tr>
<th>Week</th>
<th>Material</th>
<th>Text (Bryant et al.)</th>
<th>Text (zyBooks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to course, selection and iteration</td>
<td>Ch 1</td>
<td>Ch 1</td>
</tr>
<tr>
<td>2</td>
<td>Selection and iteration, Programming in C--</td>
<td>Ch 1; Ch 2</td>
<td>Ch 1 - 4</td>
</tr>
<tr>
<td>3</td>
<td>Programming in C--</td>
<td>Ch 2</td>
<td>Ch 1 - 4</td>
</tr>
<tr>
<td>4</td>
<td>Selection and iteration in computer programs</td>
<td>Ch 3</td>
<td>Ch 1 - 4</td>
</tr>
<tr>
<td>5</td>
<td>More examples, multi-way if, do while</td>
<td>Ch 3</td>
<td>Ch 3,4</td>
</tr>
<tr>
<td>6</td>
<td>Moving from C-- to C++, midterm exam</td>
<td>Ch 4</td>
<td>Ch 4</td>
</tr>
<tr>
<td>7</td>
<td>C to C++, breaks, for loops</td>
<td>Ch 4; Ch 5</td>
<td>Ch 4</td>
</tr>
<tr>
<td>8</td>
<td>Output formatting</td>
<td>Ch 5</td>
<td>Ch 5, 8.1-8.3</td>
</tr>
<tr>
<td>9</td>
<td>Functions</td>
<td>Ch 6</td>
<td>Ch 6</td>
</tr>
<tr>
<td>10</td>
<td>Functions, Arrays</td>
<td>Ch 6; Ch 7</td>
<td>Ch 6,7</td>
</tr>
<tr>
<td>11</td>
<td>More arrays</td>
<td>Ch 7</td>
<td>Ch 7</td>
</tr>
<tr>
<td>12</td>
<td>Input/output (input errors, reading from files)</td>
<td>Ch 8; Ch 9</td>
<td>Ch 8.4-8.5</td>
</tr>
</tbody>
</table>