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

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

Instructional Resources:
- Web Site: http://www.sce.carleton.ca/courses/ecor-1606/f17/
  - Students are responsible for all information posted on the course web site. Information regarding the course will be updated regularly throughout the term. Students should check the web site at minimum in advance of every lecture and lab session.
- Required Textbooks:
  - 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.
  - Carleton University ECOR 1606 Early Summer 2018: Programming in C++ Online zyBook will be used for assignment problems through-out the term. A copy of this is mandatory for ALL students otherwise credit for the assignment portion of the course will not be possible and can be purchased from zyBooks for US$58 and is good until Aug 5th, 2018. You must have the Early Summer 2018 version! NO credit will be granted for previous term versions!
    - Sign in or create an account at https://learn.zyBooks.com/
    - You MUST use your @cmail.carleton.ca or @uottawa.ca Email address.
    - Enter zyBook code CARLETONECOR1606MarshallESummer2018
    - Click Subscribe
- 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 is a very complete resource that we will use regularly in lectures.

Grading Scheme:
Lab Exams:  45%  (Early Feedback Exam 5%, Lab Midterm 10%, Lab Final 30%)
Written Exams:  50%  (Midterm 10%, Final 40%)
Assignments:  5%  (zyBooks)
Academic Integrity:
From the Academic Integrity Policy (found at https://carleton.ca/registrar/academic-integrity/)
“Carleton University is a community of scholars dedicated to teaching, learning and research. Sound scholarship rests on a commitment to a code of academic integrity that stresses principles of honesty, trust, respect, fairness and responsibility. The University demands integrity of scholarship from all of its members including students. The quality and integrity of academic work is paramount in achieving student success.
The University states unequivocally that it demands academic integrity from all its members. Academic dishonesty, in whatever form is ultimately destructive to the values of the University. Furthermore, it is unfair and discouraging to those students who pursue their studies honestly. The integrity of university academic life and the degrees conferred by the university is dependent upon the honesty and soundness of scholarship. Conduct by any person that adversely affects this process is a serious matter. Students who violate the principles of academic integrity through dishonest practices undermine the value of the Carleton degree. Dishonesty in scholarly activity cannot be tolerated. Any student who violates the standards of academic integrity will be subject to appropriate sanctions.”
Students should be aware of their obligations with regards to Academic Integrity (refer to the Academic Integrity Policy for additional details).

Plagiarism:
Marks are conditional upon students being able to explain their work if asked to do so. **Students who are strangely unfamiliar with what is supposedly their own work will have their marks adjusted accordingly.** Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated. Please refer to the section on instructional offenses in the Undergraduate Calendar for additional information.

Examinations:
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 midterm will be held during class time on Thu May 24th. The final will be held during the University’s examination period. It is for evaluation purposes only and will not be returned to students. The laboratory exams will take place on the dates indicated on the lab schedule. 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 written midterm will be transferred to the written final). 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 or after 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.

*There is to be complete silence during all exams. The only questions permitted concern typographical errors in the exam paper. All other questions –what is expected for the answer, or how to interpret a problem – are not permitted.* If you are unsure about a question, you are to state an assumption that does not contradict the exam paper, and answer accordingly. (Please read: Item 10 of Examination Regulations, http://carleton.ca/ses/exams/examination-procedures/examination-regulations/)
Assignments:
Assignments will be posted on the web site as the course progresses based on the student activities within the zyBooks online text. All assignments will be completed on-line within the web text resource and must be completed by 11:55pm Tue Jun 19th. Please do not ask for exemptions and/or extensions as you have the complete term to complete these tasks. Grading is automated within the web resource and will be based on successful completion of the tasks.

Students MUST ensure that they clearly identify themselves (exactly same name as used by Carleton and use their @cmail.carleton.ca Email address) within the on-line text to ensure credit is received for assignments.

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 8 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. 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 all 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 Wed May 23rd) 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.

For those who find the above complicated, 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):

```plaintext
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_6, p_7, p_8, p_9, p_10 >= 70 ) then
    mark = 5 + ( ( sum of p_1 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 will be additional OPTIONAL problem sets posted roughly every 2 weeks throughout the term. These provide students with additional opportunity to apply the course materials. Solutions will be provided at the same time as the subsequent problem set.
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.

Labs

There are two labs per week, starting on Thu May 10th. Check the dates below carefully. Normally, students will complete a practical programming exercise during their scheduled three-hour lab period. The programming exercises will focus on one particular aspect of programming. Programming and problem solving are both practical skills that are only learned through practice. The Tutorial labs provide the opportunity for students to develop their skills with the support of the TA team. For non-exam labs, students who miss their regular lab due to illness or another conflict may attend another lab (without permission of the instructor) to complete and submit their work.

Some lab periods will alternatively be used to conduct lab exams. Lab exams will be similar to regular lab exercises, but exam conditions will prevail, namely: each student will individually prepare and submit their own solution with no talking or electronic communication allowed.

Lab Schedule:

There are 11 labs. Labs #3, #7 and #11 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>May 10</td>
</tr>
<tr>
<td>2</td>
<td>Tutorial (using C--)</td>
<td>May 15</td>
</tr>
<tr>
<td>3</td>
<td>Early Feedback Test</td>
<td>May 17</td>
</tr>
<tr>
<td>4</td>
<td>Tutorial (Dev C++ Debugger)</td>
<td>May 22</td>
</tr>
<tr>
<td>5</td>
<td>Tutorial (The Dev C++ Environment)</td>
<td>May 24</td>
</tr>
<tr>
<td>6</td>
<td>Tutorial (Lab Midterm Preparation)</td>
<td>May 29</td>
</tr>
<tr>
<td>7</td>
<td>Lab Midterm</td>
<td>May 31</td>
</tr>
<tr>
<td>8</td>
<td>Tutorial (Function Intro)</td>
<td>June 5</td>
</tr>
<tr>
<td>9</td>
<td>Tutorial (Functions)</td>
<td>June 7</td>
</tr>
<tr>
<td>10</td>
<td>Lab Final</td>
<td>June 12</td>
</tr>
<tr>
<td>11</td>
<td>Tutorial (Arrays)</td>
<td>June 14</td>
</tr>
</tbody>
</table>

Week-by-Week Course Plan:

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>1</td>
<td>Selection and iteration, Programming in C--</td>
<td>Ch 1; Ch 2</td>
<td>Ch 1 - 4</td>
</tr>
<tr>
<td>2</td>
<td>Programming in C--</td>
<td>Ch 2</td>
<td>Ch 1 - 4</td>
</tr>
<tr>
<td>2</td>
<td>Selection and iteration in computer programs</td>
<td>Ch 3</td>
<td>Ch 1 - 4</td>
</tr>
<tr>
<td>3</td>
<td>More examples, multi-way if, do while</td>
<td>Ch 3</td>
<td>Ch 3,4</td>
</tr>
<tr>
<td>3</td>
<td>Moving from C-- to C++, midterm exam</td>
<td>Ch 4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>C to C++, breaks, for loops</td>
<td>Ch 4; Ch 5</td>
<td>Ch 4</td>
</tr>
<tr>
<td>4</td>
<td>Output formatting</td>
<td>Ch 5</td>
<td>Ch 5, 8.1-8.3</td>
</tr>
<tr>
<td>5</td>
<td>Functions</td>
<td>Ch 6</td>
<td>Ch 6</td>
</tr>
<tr>
<td>5</td>
<td>Functions, Arrays</td>
<td>Ch 6; Ch 7</td>
<td>Ch 6,7</td>
</tr>
<tr>
<td>6</td>
<td>More arrays</td>
<td>Ch 7</td>
<td>Ch 7</td>
</tr>
<tr>
<td>6</td>
<td>Input/output (input errors, reading from files)</td>
<td>Ch 8; Ch 9</td>
<td>Ch 8.4-8.5</td>
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</tbody>
</table>
Academic Obligations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation: write to me 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 Department of Equity Services website: http://www.carleton.ca/equity/.

Religious obligation: write to me 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 Department of Equity Services website: http://www.carleton.ca/equity/.

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). Requests made within two weeks will be reviewed on a case-by-case basis. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

You can visit the Department of Equity Services website to view the policies and to obtain more detailed information on academic accommodation at http://www.carleton.ca/equity/.

Note that for this course, MEC accommodations make use of the highest demand facilities in the MEC and because of the special tools (C-/DevC++) require extra effort from MEC staff to run. Students must indicate to the instructor their intention with regards to writing lab tests in the MEC vs. the regular lab as many students prefer to do their lab tests in the lab with the other students.

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.

Health and Safety:

Every student should have a copy of our Health and Safety Manual. An electronic version of the manual can be found at http://www.sce.carleton.ca/courses/health-and-safety.pdf