ECE 2620 (C++, Algorithms & Data Structures) [FALL 2019]

Course Coordinator: Dr. Sarvesh Kulkarni

1   General Information for Section 002

Class : MWF 8:30 am - 9:20 am, in Tol. 426
Lab: Tu 1:00 pm - 2:50 pm in Tol. 427A

Instructor: Dr. Richard Perry (richard.perry@villanova.edu)
Office: Tol. 435
Office Hours: MWF 9:30 am - 3:00 pm, or by appointment

TA: TBA (tba@villanova.edu)
Office: TBA
Office Hours: TBA, or by appointment

Textbook: This course uses an online, interactive textbook. You **must** sign up for a textbook account as follows:
1. Go to learn.zybooks.com, click on the grey "Create Account" button on the top-right corner of the page. Fill out all the form to create your account.
2. Enter zyBook code *VILLANOVAECE2620Fall2019*
3. Enter all requested information and click "Subscribe".
The cost to subscribe is $77; any applicable returning student discounts (if you have been a prior subscriber) will be applied automatically. Student subscriptions will be valid through 01/05/2020.

2   Student Evaluation and Grading Scheme

As long as you adhere to the class attendance policy (described later in this section), you will be awarded grades based on your performance in individually assessed components as follows.

Homework: 20% weightage ... 10% for pre-class, 10% for after-class
Laboratory: 25% weightage
Quizzes: four quizzes, 15% total weightage
Two examinations: 40% weightage total
Comprehensive Final Exam (Optional): 40% weightage (replaces the above two examination scores IF you score higher points)

   Marks will be scaled so as to let the class average stand at a B-. The policy for appeals for regrading examination answers will be discussed in class.

Class:
There are two kinds of HW assignments: pre-class HW, and post-class HW. Pre-class HW assessment will be online and automatic - you need to only complete your reading assignments and answer questions posed by the online textbook BEFORE class. Post-class HW must be completed using the software development kit (SDK) provided, and the files must be uploaded to "Blackboard" (the course management software) before the posted deadline. For HW assignments that do not require programming, you may handwrite your solutions and either hand them in, or upload a single scanned pdf file before the posted deadline. Late HW assignments will be assessed a 10%

penalty per day, up to the posted cut-off date. After the cut-off date, HW assignments WILL NOT be accepted. If you do not finish your HW, turn in your incomplete work to receive partial credit.

A roll call will not be taken at the start of each class. However, you are expected to attend ALL classes unless officially excused. If you miss five or more classes, you may receive a failing grade regardless of your actual performance on examination and assignments (described earlier in this section). Furthermore, since examination questions will be based on the material taught in class and the prescribed reading from the course textbook, missing classes will put you at a severe disadvantage. So, attend all classes, and be sure to take notes attentively.

The class attendance policy is listed HERE. You may use our online form HERE to request an excused absence:

Lab:
The laboratory component will be graded on factors such as successful completion of lab assignments (according to specification) and timely submission of lab reports. Late lab assignments will be assessed a 10% penalty per day, up to the posted cut-off date. After the cut-off date, lab submissions WILL NOT be accepted.

Lab assignments require you to use your own laptop, exclusively. You may also need to demonstrate your working programs on your own laptop. Therefore, an essential (and implicit) component of your grade is keeping your laptop in good working order and getting it serviced in a timely manner, if it malfunctions. Please take this responsibility seriously if you value your grade.

3 Course Information

3.1 Objectives

The goals: (i) proficiency in C++ using object oriented techniques, (ii) a study of commonly used data structures and their implementation in C++, (iii) operations on these data structures using C++, and (iv) concepts in computational complexity and algorithm analysis.

3.2 Course topics

This course is designed to be your second college-level course in programming. Therefore, it is assumed that you have acquired sufficient proficiency in the C programming language to enable you to program simple algorithms with confidence. If you have trouble with programming in C, please spend the first two weeks relearning those skills. C++, as you may have guessed, is an extension of C, but with a very different paradigm.

The following topics will be covered in this class, but not necessarily in this order. Your pre-class HW assignments posted on "Blackboard" will clearly indicate the sections that you must read fron your online textbook before each class. These marked sections will constitute your detailed course syllabus.

1. Introduction to C++: Abstract data types, classes, members, objects, inheritance, templates, polymorphism and pointers.
2. Concepts in the 'Theory of Computation': Turing machines and computability.
3. Algorithm Analysis: Algorithmic complexity and running time analysis.
4. Lists, Stacks, Queues and Binary Trees: Implementation using arrays, pointers, and operations (insertion, deletion, search) on them.
5. Sorting Algorithms: Bubble sort, quicksort, mergesort, radix sort.
6. Hashing: Hash functions, implementation (with collision resolution).

This is an ambitious schedule, and we have to leave out some topics listed above. At times, when the topic seems easy (to me), we may proceed at a faster pace. However, if you have trouble keeping up, you are encouraged to interrupt me in class at any time in order to seek clarifications.

3.3 Laboratory

No lab sessions will be held for the first week of the semester. All programs must be written in C++ using *Anjuta* SDK and compiled using the GNU C++ compiler under the Linux operating system. Please be sure to bring a university-approved laptop to the lab; Linux installation is not guaranteed for non-standard laptops, especially MacBooks.

4 Administrative Information and Special Accommodations

It is the policy of the university to make reasonable academic accommodations for qualified individuals with disabilities. If you are a person with a **non-physical** disability, please register with the office of Learning Support Services (LSS) by emailing Learning.support.services@villanova.edu or by phoning 610-519-5176 as soon as possible. Registration is *required* in order to receive accommodations.

The Office of Disability Services (ODS) collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The ODS provides Villanova University students with **physical disabilities** the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed disability and plan to utilize academic accommodations, please contact Gregory Hannah, advisor to students with disabilities at 610-519-3209 or visit the office on the second floor of the Connelly Center.

5 Examinations

Requests for make-up examinations due to business trips shall be on **PRIOR** arrangement and shall be taken **EARLIER** than the one on our regular schedule. Make-up examinations due to health reasons and unforeseen circumstances will be administered on a case by case basis, if suitable and compelling reasons are documented/provided.

The examination guidelines for this course are as follows:

- You must arrive at the examination room within 5 minutes of the start of a quiz, and within 10 minutes of the start of the longer tests (midterms, finals, etc.). You are not allowed to leave the examination room for any reason before finishing your examination; once you leave the examination room, your examination is deemed to have concluded.
- All quizzes are deemed to be "closed-book" and "closed-notes". For longer tests such as midterm and final examinations, you may bring only *one* handwritten cheat sheet (8.5" x 11") to the examination. You are allowed to write on both sides on that cheat sheet in a font-size that enables you read what you have written without the use of any magnifying devices!
- Cell phones MUST be turned OFF and stored away for the duration of the examination.
- You must sign the following statement on the midterm and final examinations: "I have neither given nor received any unauthorized assistance in the completion of this exam."

6 Academic Integrity

An environment of academic integrity and ethical decision-making is essential to our learning process, and we hope this will stand you in good stead in your working life as graduates of Villanova University. As engineers, our code of conduct requires us to place honor and integrity at the forefront of everything we do. As engineering students, it is expected that you will begin to adopt these values and instill them into your work habits. Students violating the academic integrity policy will receive a zero on that assignment or exam and the violation will be reported to the Associate Dean for Academic Affairs. The University's academic integrity policy can be found HERE.

For the purpose of this course, students are allowed to collaborate on a *limited basis* in their HW and Laboratory assignments. The collaboration is limited to asking questions and general directions in search of solutions. Students may not ask their peers to show them their work, or ask their peers for details of answers. No collaboration is permissible during quizzes or examinations. If in doubt, please consult the instructor first.

7 Student Learning Outcomes

How this course contributes to your overall engineering education as defined by the Accreditation Board for Engineering and Technology (ABET):

STUDENT LEARNING OUTCOMES						
1	2	3	4	5	6	7
X					X	X

- 1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- 6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- 7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.