COURSE SYLLABUS

1 ECE 2161 - C++ Algorithms & Data Structures Lab

2 Meeting Information

1 credit, 2 contact hours (One 150-minute session per week)

a. **Section 001:**
Lab: Thu 1:00 pm - 03:30 pm, **Tolentine 303A**

b. **Section 002:**
Lab: Tue 4:30 pm - 7:00 pm, **Drosdick 036**

3 Course Instructor(s), TA(s)

a. **Section 001:**

Lab Instructor:	Dr. Sarvesh Kulkarni
Office Hours:	MW 10:30 am - 12:30 pm, or by appt.

TA(s):
Ms. Prathibha Keshavamurthy
pkeshava@villanova.edu

Office Hours:	MW 12:30 - 1:30 pm, Tue 12:30 - 1:00, 3:30 - 4:00 pm, or by appt.
Room:	Drosdick 307

b. **Section 002:**

Lab Instructor:	Mr. Amit Kumar
Office Hours:	Email instructor, or by appt.

TA(s):
None N.A.

Office Hours:	N.A., or by appt.
Room:	N.A.

Special notes on instructor(s), TA(s) go here, if specified

4 Textbook

ECE 2160: C++, Algorithms & Data Structures, zyBooks, 2024. OPTIONAL.

a. **Other Supplemental Materials:** Slides and notes for ECE 2160 Lectures.

b. **Misc. Notes:**
The slides and notes for ECE 2160 lectures are posted on Blackboard on that course's main web page. In addition, subscription to the textbook used in the ECE 2160 course is strongly recommended. If you have opted-in to Villanova's Textbook Access Program, the interactive course textbook may be accessed AT NO EXTRA CHARGE by following the instructions posted in a separate pdf file in this folder.

If you have taken ECE 2160 in a prior semester and no longer have access to the course textbook, you may use any standard C++ programming reference book. In addition, please contact the instructor to obtain copies of ECE 2160 class notes and slides.

5 Specific Course Information

a. **Catalog Description**
Installation, familiarization with Linux and its IDE, C++ programming exercises incorporating classes and objects, templates, pointers, dynamic variables, file access, measurements of running times of two sorting algorithms, implementation of linked lists, queues and stacks using composition.

b. **Prerequisites:** ECE 1260 and ECE 1261; **Co-requisites:** ECE 2160

c. Required for BS CpE

6 Learning Objectives

a. On conclusion of this course, students will be able to: 1. Program proficiently in C++ using object oriented techniques and good code documentation practices, 2. To program non-GUI C++ applications under the Linux operating system with the aid of an open source SDK (Anjuta) and compiler (g++), 3. Implement and use pointer-based data structures such as linked lists, stacks, queues and binary search trees in C++, 4. Program and measure the running time of at least two searching algorithms not covered in class by the process of self-learning, and verify that the observed running times are in rough conformance with the theoretical expression for asymptotic running time complexity.

b.

ABET Student Outcomes														
1a	1b	2a	2b	2c	2d	3	4a	4b	4c	5	6a	6b	7a	7b
											X	X	X	X

The above student outcomes are defined by the Accreditation Board for Engineering and Technology (ABET) as:

6a. an ability to develop and conduct appropriate experimentation

6b. an ability to analyze and interpret data, and use engineering judgment to draw conclusions

7a. an ability to acquire new knowledge as needed, using appropriate learning strategies

7b. an ability to apply new knowledge as needed, using appropriate learning strategies

7 List of Covered Topics

1. Programming in C++ using the Anjuta SDK running on Ubuntu Linux
2. Writing modular programs using interactive menus, functions, classes and templates
3. Source code organization over multiple files
4. Pointers and dynamic variables
5. File I/O operations
6. Measurement of running times of algorithms
7. Implementation of the following pointers-based user-defined data structures using composition techniques: DLLS, Stacks, Queues and BSTs (time permitting).

8 Tentative Schedule

Tentative schedules for all sections follow. Be sure to refer to the schedule for your specific section, if more than one is provided.

Tentative Schedule for **All Sections**

Week #	Dates	Topics
1	8/26 – 8/30	No labs this week
2	9/2 – 9/6	**9/2: Labor Day break;** Virtual machine, Ubuntu Linux & SDK installation
3	9/9 – 9/13	Lab 1: A first program in C++: Menu-driven radius, circumference, area calculations
4	9/16 – 9/20	Lab 1: Catchup
5	9/23 – 9/27	Lab 2: Rewrite lab 1 with classes, and over more than one file
6	9/30 – 10/4	Lab 3: Rewrite lab 2 using Templates & Class Constructors
7	10/7 – 10/11	Lab 4: Pointers, dynamic arrays & file processing
8	10/14 – 10/18	**Fall break**
9	10/21 – 10/25	Lab 5: Measurements & comparison of the running time of two sorting algorithms
10	10/28 – 11/1	Lab 5 Contd.
11	11/4 – 11/8	Lab 6: DLLS, Stacks & Queues
12	11/11 – 11/15	Lab 6 Contd.
13	11/18 – 11/22	Lab 7: A student database system using Binary Search Trees – file i/o, search, edit, delete, full record dump (traversal) of student records
14	11/25 – 11/29	**11/{27-29}: Thanksgiving break**, No labs this week
15	12/2 – 12/6	Lab 7 Contd.
16	12/9 – 12/11	Lab 7 Contd.
17	12/16 – 12/20	No labs this week

9 Grading Policy

Lab scores will be aggregated into a single final percentage score. This percentage score will be converted to a letter grade on the following scale: A(93 – 100), A–(90 – 92.9), B+(87 – 89.9), B(83 – 86.9), B–(80 – 82.9), C+(77 – 79.9), C(73 – 76.9), C–(70 – 72.9), D+(67 – 69.9), D(63 – 66.9), D–(60 – 62.9), F(<60).

Thus, for instance, if there are six lab assignments in the semester and your scores are 85/100, 90/100, 80/100, 90/100, 190/200 and 160/200, then your final score is 695/800 i.e. 86.9%. Thus, your final grade is B+.

10 HW Assignment and Laboratory Report Submission Policy

Laboratory assignments will be graded on factors such as their successful completion in accordance with stated specifications, the timely submission of source code and laboratory reports (if asked for), and adequate code documentation.

Late 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** unless compelling medical or personal reasons are provided along with supporting documentation.

Please be sure to bring a university-approved laptop to the lab. All programs must be written in C++ using Anjuta SDK and compiled using the GNU C++ compiler under the Ubuntu Linux operating system. You may also need to demonstrate your working programs on your own laptop if we have trouble compiling and running it on our systems. 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. You must also back up your work on an external USB or cloud drive, just in case your laptop becomes inoperable. Please take this responsibility seriously if you value your grade.

11 Attendance Policy

General Rules

The full version of the official Villanova class attendance policy is posted at https://live-villanova-catalog.cleancatalog.io/class-attendance, but the main points are as follows.

A roll call will not be taken but attendance is required in all lab sessions. Lab sessions are for getting help interactively for your lab assignments. The first fifteen minutes of each lab session are especially important to attend since the instructor will provide directions for successful completion of that week's assignment.

However, please note that most lab assignments will require a few additional hours outside of lab sessions in order to finish your assignment. Also please realize that the instructor's and TA's office hours are not meant to be used as substitutes to lab attendance.

Whenever possible, students should inform the instructor if they plan to be late or absent from class. In all cases, documentation is required to petition for *excused* absences to the Associate Dean for Student and Strategic Programs, Dr. Stephen Jones. The excused absence form is posted at: https://forms.office.com/r/1RsFK4qhBk.

Excused absences do not count towards a failure in the course for first year students. Absence from class does not release the student from assigned work. Students who miss an in-class obligation such as an exam, a presentation, etc., due to an excused absence will not be penalized - the instructor may offer a make-up test, arrange an alternative time for a presentation, exempt a student from the assignment, or provide another arrangement. In the case of illness or injury, the form must be submitted within 24 hours of missing a class. The University's list of excused absences for all students includes the following:

1. Participation in NCAA athletic competitions
2. Participation in special academic events such as: conferences, field trips, project competitions, etc., and in official university business such as student representatives attending meetings related to university governance
3. Attendance at significant events of the immediate family such as: funerals, weddings, etc.
4. Religious holidays - see the University's policy on Religious Holidays
5. College-approved participation in placement activities such as: job interviews, graduate school interviews, job fairs

6. Legally required absence such as: jury duty, court appearance, short-term military service
7. Documented serious illness or disability

Personal Days

Personal Days are NOT allotted for laboratory sessions and courses that meet once a week. For all other courses that meet at least twice a week, students are entitled to excused absences for any reason that may contribute to their personal wellness. The following rules apply.

Students must advise the instructor by email *before* class of their intent to utilize a Personal Day as the reason for their absence. A Personal Day will not be approved retroactively. Students may, but are not required, to provide additional information regarding their absence. A Personal Day does not grant an automatic extension for items due. Students remain responsible for all assignments, exams, presentations, etc. due on that date. The instructor may apply her/his discretion on a case-by-case basis to determine whether an extension on a deliverable item is appropriate.

For classes that meet thrice a week (50 mins $\times$ 3), TWO personal days are allowed in the semester. These personal days may not be used ...

1. on consecutive class days
2. in the same week
3. immediately preceding or following a University holiday or break period, and
4. on days when exams, presentations or other major assignments are scheduled.

For classes that meet twice a week (75 mins $\times$ 2), ONE personal day is allowed in the semester. This personal day may not be used ...

1. immediately preceding or following a University holiday or break period, and
2. on days when exams, presentations or other major assignments are scheduled.

12 Examination Policy

The College of Engineering has adopted the following general examination guidelines:

1. Students must arrive before the start of the examination. Under exceptional circumstances a student may need to arrive late, but he/she can enter the examination room no later than 5 minutes after the start of the exam.
2. All cell phones and smart devices must be turned off and stored away until the student exits the exam room, unless explicitly permitted by the instructor.
3. The official Villanova class attendance policy must be followed when requesting excuses for absences or lateness to an examination.
4. Each student must write and sign the following statement, "I have neither given nor received any unauthorized assistance in the completion of this examination."
5. In the case of virtual exams, the instructor may implement video proctoring or other measures to ensure academic integrity. For consent purposes, the instructor will announce ahead of time to students if they plan to use any form of video proctoring during an assessment and whether a recording will take place.

13 Academic Integrity Policy

The College of Engineering is committed to creating an environment of academic integrity and ethical decision-making that we hope is reflected in the actions of our students and graduates. As Villanova students, integrity is central to the University mission. 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 on the following web page:
https://live-villanova-catalog.cleancatalog.io/academic-integrity-0.

14 Use of Artificial Intelligence

The use of AI-generated textual content, mathematical analyses or program code is NOT permitted in this course. If questions arise about the authorship of your work, you may be asked to verify your authorship by either submitting to an oral examination/assessment by the instructor, or by submitting evidence of your work in the form of drafts, notes and version histories.

15 Adherence to the Student Code of Conduct

Students are expected to act in a professional and respectful manner to their fellow students, faculty, and staff. Students should become acquainted with and understand the responsibilities set forth in the Student Handbook, especially those in the sections on Policy and Regulations. Adherence to university regulations is expected and required for successful completion of the program of studies. Enforcement within the classroom of policies regarding classroom behavior is the responsibility of the faculty member. All other discipline problems are to be referred to the Dean of Students.

16 Inclusive Classroom

This classroom is a place where you will be treated with respect; we welcome individuals of all ages, backgrounds, beliefs, ethnicities, gender, gender identities and expressions, sexual orientation, and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment to allow all among us to learn and flourish.

17 Students with Disabilities

It is the policy of the university to make reasonable academic accommodations for qualified individuals with disabilities. If you are a person with a disability (non-physical) 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. In addition, please contact the instructor during office hours in order to make the appropriate arrangements.

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 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 and

register with Gregory Hannah, advisor to students with disabilities at 610-519-3209 or visit the office on the second floor of the Connelly Center.

18 Tutoring Services

Villanova's tutoring services include The Writing Center, The Learner's Studio, and The Center for Speaking and Presentation. These services are offered free of charge to students. Drop in as-needed or book a regular weekly session to supercharge your academic success. Sessions can be 30 or 60 minutes in length.

Register for an account and book sessions in advance at villanova.mywconline.com. If you don't see your class listed, request a tutor for a missing subject at: tutorrequest.villanova.edu For more information, contact Juliana Struder at juliana.studer@villanova.edu or at 610-519-5862.

19 Online Expectations

Some or all sessions of this class may be recorded for educational purposes and for later playback. In order to foster a professional environment, please wear appropriate clothes, refrain from eating, mute your microphone when you are not talking so as to eliminate background noise, and select an appropriate setting free of distractions. You may turn off your webcam for privacy reasons unless explicitly instructed not to do so by the instructor (such as during the conduct of online examinations).

20 Electronics Policy

The use of electronic devices, such as phones, laptops, tablets, calculators, etc., during class is generally allowed, unless their use causes a disturbance to others. During examinations, the use of any electronic device is prohibited, unless it is expressly authorized by the instructor.

Students are prohibited from making any audio or visual recordings (including taking photographs) of lectures, discussions, or other classroom activities, unless a student (1) has written permission in advance from the instructor, or (2) is permitted to record under terms and conditions as approved by the University's Office of Disability Services or Learning Support Services. Students who have received approval to record classes as an academic accommodation must provide supporting documentation from the Office of Disability Services or Learning Support Services in advance of any recording. Students may use authorized recordings only for the purposes of individual study in the course, and may not disseminate or share them with a wider audience without explicit permission.

21 Copyright Policy

The materials used in Villanova University courses ("Course Materials") generally represent the intellectual property of course instructors, third parties and/or the university which may not be disseminated or reproduced in any form for public distribution (e.g., sale, exchange, etc.) without the written permission of the course instructor. Course materials include all written or electronic documents and materials, including syllabi, current and past examination questions/answers, and presentations such as lectures, videos, slides, etc., provided by a course instructor. Course materials may only be used by students enrolled in the course for academic (course-related) purposes.

Published course readings (book chapters, articles, reports, etc.) available in "Blackboard" are copyrighted materials. These works are made available to students through licensed databases or fair use. They are protected by copyright law, and may not be further disseminated or reproduced

in any form for distribution (e.g. uploading to websites, sale, exchange, etc.) without the permission of the copyright owner.

Follow these links for more information on Intellectual Property, Copyright, and Computer Acceptable Use.

22 Professorial Duties

It is important to note that teaching is one of the many duties that professors perform as part of their job responsibilities. In addition to teaching, professors perform research, advise graduate students, edit journals and review journal articles, serve on committees for the university and professional societies, travel to conferences to remain abreast of current developments and to present their results... to name just a few commitments.