ESE 344 SOFTWARE TECHNIQUES FOR ENGINEERS
Stony Brook University, ECE, Prof. Murali Subbarao, Spring 2023

(Subject to minor changes)

Catalog Description
This course covers software techniques for solving electrical and computer engineering problems in the C++ programming language. Design, implementation, and application to engineering problems of non-linear data structures and related advanced algorithms are covered. This includes binary trees, trees, graphs, and networks. OOP features such as Polymorphism, templates, Exception handling, File I/O operations, as well as Standard Template Library are used in the programming projects.

Credits 3, Prerequisites: ESE 224

Text book:

1. M. A. Weiss, Data Structures and Algorithm Analysis, Pearson, 4th Edition, 2014, ISBN-13: 978-0132847377.

   Author website: http://users.cs.fiu.edu/~weiss/
   Source code: http://users.cs.fiu.edu/~weiss/dsaa_c++4/code/

2. Data Structures and Program Design in C++,
   R. L. Kruse and A. J. Ryba, Prentice-Hall, Inc., 1999, ISBN 0-13-768995-0
   Search online to find a free download file from one or another website.

References: Online resources.

Syllabus:

1. C++ programming basics, I/O, classes, inheritance, templates, polymorphism, Exceptions, OOP, STL
2. Algorithm analysis
3. Arrays, strings, multi-dimensional arrays
4. Lists, Stacks and Queues
5. Binary trees
6. Trees

   Mid-term Test 1

7. Hashing
8. Heaps
9. Searching and sorting
10. Sets
11. Graphs

    Mid-term Test 2

12. Network Flow problems
13. Algorithm design techniques
14. Advanced data structures

Final take-home problem set.

This course will have about four programming projects in C++. On average, a student may have to spend about 10 hours per week on this course.

GRADING

Part I: Assignments
Programming projects : 35 %
Homeworks: 10 %

Part II : Tests
Test 1: 1 hr. 15 mins. : 25 %
Test 2: 1 hr. 15 mins. : 25 %

Final take-home problem set.

Late submission policy: Projects submitted 1 to 2 days late will be graded out of 75% of the maximum. Homeworks are not accepted late as each homework carries a very small weight.

Grading Policy

In the written tests part, out of a maximum of 55 points, you must get at least 30 points to pass the course. Final grades are assigned based on absolute percentage of total marks as below.

A : 93—100 , A- : 88—92 , B+ : 83—87, B : 78—82, B- : 73--77
C+ : 70—72, C : 65—69, C- : 61—64, D+ : 56—60, D : 51—55, F : 0--50

Course Learning outcomes: Students should have:

1. Understood and implemented advanced data structures including arrays, linked lists, binary trees, trees, and graphs.
2. Understood and implemented algorithms for engineering applications that use the data structures -- trees, graphs, and networks.
3. Used C++ programming language, its advanced features, and object oriented style of programming in solving engineering problems.

Student Accessibility Support Center Statement:

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact the Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748.

They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. https://www.stonybrook.edu/commcms/studentaffairs/sasc/facstaff/syllabus.php

[In addition, this statement on emergency evacuation is often included, but not required): Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following website: https://ehs.stonybrook.edu/programs/fire- safety/emergency-evacuation/evacuation-guide-people-physical-disabilities

- To access mental health services, call Counseling and Psychological Services at 631-632- 6720; Counselors are available to speak with 24/7.

- For updated information on the Academic Success and Tutoring Center please check www.stonybrook.edu/tutoring for the most up-to-date information.

- For IT Support: Students can visit the Keep Learning website at https://sites.google.com/stonybrook.edu/keeplearning for information on the tools you need for alternative and online learning. Need help? Report technical issues at https://it.stonybrook.edu/services/itsm or call 631-632-2358.

- For information on Library services and resources please visit the Continuity of Library Operations guide.