

Washington State University
School of Electrical Engineering and Computer Science

Cpt S 223: Advanced Data Structures

Course Syllabus

Spring 2013

Times: MWF 12:10pm - 1:00pm

Location: Sloan 175

Instructor: [Nirmalya Roy](#)

Instructor's Office Location and Hours: EME 127, W &F 2:00pm -3:00pm, or by appointment

Instructor's Email: nroy at eecs dot wsu dot edu

Course Descriptions: This course is about data structures, methods of organizing large amounts of data so they can be used efficiently, and algorithm analysis, the estimation of the running time of algorithms. Different kinds of data structures to be discussed include abstract data types (lists, stacks, queues), trees (e.g. binary search trees, splay trees, B-trees), hash tables, heaps or priority queues, disjoint sets, and graphs. Algorithms for sorting and searching, trees, and graphs will also be discussed together with their analysis. The various data structures and algorithms are to be implemented in C++ using the object-oriented programming paradigm.

Course Objectives: At the end of this course, you should be able to:

- Assess how the choice of data structures and algorithms impacts the performance of programs;
- Choose the appropriate data structures and algorithms to use for a specified problem or application;
- Implement the data structures and algorithms in C++ using the object-oriented programming paradigm; and
- Solve problems using the various data structures and algorithms and write programs for their solutions.

Course Prerequisites: Cpt S 122 (Data Structures), Math 216 (Discrete Structures) or equivalent

Required Textbook:

- *Mark Allen Weiss, Data Structures and Algorithm Analysis in C++ (3rd Edition), Addison-Wesley, 2006. ISBN: 032144146X; ISBN-13: 9780321441461*

Reference Textbook:

- *P.J. Deitel & H.M. Deitel, C++: How to Program (8th ed.), Prentice Hall, 2012. ISBN-10: 0132662361; ISBN-13: 9780132662369*

Course Requirements and Grading:

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|------------------------------|-----|
| Homeworks and Quizzes | 25% |
| 4 Programs | 30% |
| 2 Midterm Exams & Final Exam | 45% |

Tentative Course Schedule:

(Subject to change as the semester progresses)

| Week | Date | Monday | Date | Wednesday | Date | Friday |
|------|------|---------------------|------|-----------------------|------|---------------------|
| 1 | 1/7 | Introduction | 1/9 | Math Review | 1/11 | Math Review |
| 2 | 1/14 | Math Review | 1/16 | Math Review | 1/18 | C++ Review |
| 3 | 1/21 | No Class | 1/23 | C++ Review | 1/25 | Algorithm Analysis |
| 4 | 1/28 | Algorithm Analysis | 1/30 | Algorithm Analysis | 2/1 | Algorithm Analysis |
| 5 | 2/4 | Abstract Data Types | 2/6 | Abstract Data Types | 2/8 | Abstract Data Types |
| 6 | 2/11 | Trees | 2/13 | Trees | 2/15 | Trees |
| 7 | 2/18 | No Class | 2/20 | Trees | 2/22 | Trees |
| 8 | 2/25 | Review | 2/27 | Midterm Exam 1 | 3/1 | Discussion |
| 9 | 3/4 | Hash Table | 3/6 | Hash Table | 3/8 | Hash Table |
| 10 | 3/11 | No Class | 3/13 | No Class | 3/15 | No Class |
| 11 | 3/18 | Heaps | 3/20 | Heaps | 3/22 | Heaps |
| 12 | 3/25 | Disjoint Sets | 3/27 | Disjoint Sets | 3/29 | Disjoint Sets |
| 13 | 4/1 | Review | 4/3 | Midterm Exam 2 | 4/5 | Discussion |
| 14 | 4/8 | Graphs | 4/10 | Graphs | 4/12 | Graphs |
| 15 | 4/15 | Graphs | 4/17 | Graphs | 4/19 | Graphs |
| 16 | 4/22 | Sorting | 4/24 | Sorting | 4/26 | Sorting |
| 17 | 5/2 | Final Exam | | | | |

There will be several homeworks for this course. The homeworks are assigned during the semester and are due one week after they are handed out. No late homeworks will be accepted. All homeworks must be turned in by the beginning of class on the day they are due. If you are not finished, turn in whatever you have completed. It is your responsibility to schedule your time so that you can turn the homeworks in on time. The homeworks assigned are good preparations for the midterm and final exams.

External Sources: The homeworks must be completed individually. Discussion among students at a very high level is tolerated but each member of the discussion must cite the other members on his or her homeworks. As a rule of thumb, if during the discussion you write anything or read anything someone else wrote, it is too detailed. The use of any other resource other than the course texts, teaching

assistant, or instructor is prohibited. By turning in the homeworks, you are certifying that the answers are your own work.

There will be several pop quizzes in the class. It would generally be given during the last 15 minutes of the class period. Students need to write the answer in the class and return it to the instructor before the class ends.

There will be four (4) programming projects for this course. The programming projects would involve implementing the various data structures and algorithms discussed in the course. The programs must be written in C++ in Microsoft Visual Studio.

Instructions and due dates for the programming projects will be given in the project specifications. No late programming projects will be accepted. Please start working on the programming projects as soon as the project specifications are given. All the programming projects are to be done individually. Projects will be graded not only based on their correctness but also based on their overall design, good coding style, and proper documentation. By turning in the programming projects, you are certifying that the lines of code are your own work and were not copied from someone or somewhere else (e.g. Internet).

There will be two midterm exams and a final exam for this course. These are closed-notes, closed-books exams. You must take the exams at the official time and place. The exam coverage is cumulative, i.e. materials from the beginning of the course may be tested in either midterm or final exam. You may use calculators but not computers. By enrolling in this course, you are agreeing to the homework and project due dates and exam schedules above. Forming or joining a study group is highly recommended to prepare for an exam.

The URL for the course webpage is <http://eecs.wsu.edu/~nroy/courses/spring2013/cpts223/>. This course will also use the Angel Learning Management System (LMS) (<http://lms.wsu.edu>) this semester. You are responsible for regularly consulting the course webpage and the LMS for any course announcements or updates.

Cheating: Anyone cheating on work in this course will receive a failing grade for the work and will be subject to the university's academic dishonesty policy. Cheating involves giving assistance or receiving assistance on work assigned in this course. If you have any questions regarding a homework, project, or exam, see the instructor or teaching assistant. The Washington State University statement on academic integrity can be found at <http://www.eecs.wsu.edu/~schneidj/Misc/academic-integrity.html>.

If you require an accommodation based on disability, I would like to meet with you in my office, during the first week of the semester, to make sure you are appropriately accommodated.

Please visit the University's Office of Emergency Management website <http://oem.wsu.edu/Emergencies> to be familiar with what to do in the event of emergencies.

If you have any questions or concerns about this course, please feel free to e-mail or to talk to the instructor or teaching assistant. Please put CPTS223 as the subject heading when you wish to contact the instructor through e-mails.