CSC 6580 - Design and Analysis of Algorithms
Section 002
Fall 2016
MW 6:00-7:20PM
1125 Science Hall

Instructor:
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Teaching Assistant:
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Course Description:
Best case, worst case, and expected case complexity analysis; asymptotic approximations;
solutions of recurrence equations; probabilistic techniques; divide-and-conquer; the greedy
approach; dynamic programming; branch and bound; NP-completeness; parallel algorithms.

Supplementary information for the course is available at http://blackboard.wayne.edu. Log on
with your Access ID for class notes, lecture slides, class announcements, the course syllabus, and
other information for the course.

Credit Hours: 3 Credit Hours (Lecture)

Prerequisite:

CSC 3110: Algorithm Design & Analysis (or equivalent undergraduate “algorithms and data
structure” course) is the official “hard” course prerequisite. A moderate level of mathematical
maturity is required in this course. A significant portion of the homework and exams will require
formal proofs.

Prof. Nathan Fisher
CSC 6580
Text(s) Book:


*The Design and Analysis of Computer Algorithms,* Aho, Hopcroft, and Ullman, 1974. (Optional reference; on reserve at UG Library)

Course Contents:

Randomized algorithms and probabilistic analysis (e.g., quicksort and skiplists); dynamic programming; greedy algorithms; amortized analysis; advanced data structures (e.g., Fibonacci heaps); graph algorithms; intractability theory; approximation algorithms; linear programming; and parallel algorithms. A schedule of topics and reading assignments may be found on the Blackboard website. Please check this site often for any changes to the schedule or announcements.

Course Learning Objectives:

Upon successful completion of this class, the student will be able to:

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<th>#</th>
<th>CSC 6580 Course Learning Objectives</th>
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<tbody>
<tr>
<td>1</td>
<td>Use formal proof techniques to argue about the correctness of an algorithm.</td>
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<td>2</td>
<td>Apply asymptotic analysis for the (worst-case, best-case, or average-case) analysis of algorithm time or space complexity.</td>
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<td>3</td>
<td>Analyze randomized algorithm and/or data structures by using probability theory to derive asymptotic bounds on expected run times.</td>
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<td>4</td>
<td>Use optimal substructure to develop either dynamic programming or greedy algorithm solutions for optimization problems.</td>
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<td>5</td>
<td>Employ different methods of amortized analysis (aggregate analysis, accounting, and potential method) when analyzing data structure operations.</td>
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<td>6</td>
<td>Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.</td>
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<td>7</td>
<td>Define NP-completeness and synthesize new proofs of NP-completeness.</td>
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Assessment:

_Two Midterm Exams: 50%
Final Exam: 35%
Homeworks (approximately 6): 15%_
Grading Scale:

- 90-100% A
- 85-89% A-
- 80-84% B+
- 75-79% B
- 70-74% B-
- 65-69% C+
- 60-64% C
- 55-59% C-
- 54 or Below F

Grading Policies:

Grades will not be curved for the course, and you will receive the grade that you earn through your performance on the homeworks and exams. There will be no individual exceptions to the grading policy, and, therefore grades of a C or F are possible (even for graduate students). Please be sure that you have the appropriate background (i.e., you did sufficiently well in your undergraduate algorithms course) for the course. In addition, the course material, homeworks, and exams are expected to be quite challenging and time-consuming; you should ensure that you fully devote the proper amount of time to understanding the topics from lectures and homeworks.

Any re-grading request will result in the entire assignment/exam being re-graded; this may result in either an increase or decrease in the total score. Furthermore, the re-grading request must be made in writing (or email) with a justification for request.

Exams:

All exams are in-class, and closed-book and closed-notes. We will have two (non-cumulative) midterm exams; the dates of these exams will be announced early in the semester. We will have a cumulative final exam. According to the final exam schedule on the Registrar’s website, the location and time of the final exam for this course is tentatively set for December 14, 2016 from 6:00-8:30pm. It is your responsibility to let me know immediately at the beginning of the semester if you have another exam that conflicts with this date and time.

Class Attendance/Participation:

Lecture attendance is mandatory. If you need to miss a lecture (for a valid reason recognized by the University), you must notify me in advance of the lecture. A course in which students attend and actively participate in the discussion of ideas is always much more enjoyable and stimulating. I plan to reward those who participate class by increasing their final grade by up to half a letter grade. I also reserve the right to similarly decrease the grade of those who routinely come to class late, skip class, read the newspaper, talk, text/chat, or sleep in class, etc.

Homework Policy:

Homework assignments will be given at least every two weeks. Students can expect most homework assignments to be very time-consuming. Students are encouraged to work together on the problem sets. Note that this says work together -- copying homework solutions from another student will be considered cheating. Collaboration during exams (even take-home exams) or
unacceptable collaboration or plagiarism on homeworks will also be considered cheating. A student caught cheating will receive a grade of “F” for the course and face charges with the University Judicial Officer. For more on what constitutes "acceptable collaboration" in this course and academic misconduct in general, see the collaboration policy document in Blackboard under "Course Documents", the University’s Student Code of Conduct (http://www.doso.wayne.edu/assets/codeofconduct.pdf), and Academic Dishonesty section in this syllabus (below).

Homework assignments are due in class at the beginning of lecture on the due date given. **No late homeworks will be accepted without prior approval.**

**Religious Holidays:**

Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

**Student Disabilities Services:**

- If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-202-4216 (Videophone use only). Once your accommodation is in place, someone can meet with you privately to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.
- Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student’s accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

**Academic Dishonesty - Plagiarism and Cheating:**

Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

Prof. Nathan Fisher  
CSC 6580
• **Cheating:** Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student’s test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.

• **Fabrication:** Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

• **Plagiarism:** To take and use another’s words or ideas as one’s own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

• **Other** forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student’s access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

**Course Drops and Withdrawals:**

In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Pipeline. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at: [http://reg.wayne.edu/pdf-policies/students.pdf](http://reg.wayne.edu/pdf-policies/students.pdf)

**Student services:**

• The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit [www.success.wayne.edu](http://www.success.wayne.edu) for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).

• The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit [http://clasweb.clas.wayne.edu/writing](http://clasweb.clas.wayne.edu/writing) to obtain information on tutors, appointments, and the type of help they can provide.
**Class recordings:**

Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student’s personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why s/he cannot, such as discussion of confidential or protected information.