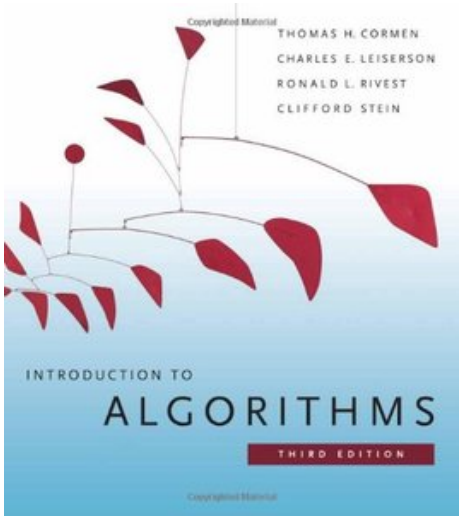

Design and Analysis of Algorithms

CSC 505, Fall 2015 (3 credits)

When & Where?

- Section 001: MW 12:50-2:05 PM, 010011 EB1
- Section 002: MW 5:20-6:35 PM, 02213 EB3
- Section 601: online

Syllabus

Announcements:

HW2 is posted.

Contact

- Please use the Piazza message board to discuss class topics and homework. Do not post homework solutions - this will be considered as cheating.
- For questions about personal grades or requests for meetings please contact the instructor, or the TAs.

- If you want to send a completely anonymous message, please use the Wolfware feedback tool. Keep in mind that we cannot reply to these messages, so if you want a response please contact us directly.
- Thanks a lot for your input!

Instructor

Steffen Heber
Office: 2260 EB2 and 3211A Broughton Hall
Office hours: 2260 EB2, Tuesday 2-3 PM **for on campus students**, Thursday 2-3 PM **for online students**, or by appointment
Phone: 919-517-1118 (EB2) and 919-515-2726 (Broughton Hall)
Email: sheber AT ncsu.edu

Teaching Assistants

Jake Kausler
Office hours: 1229 EB2, Thursday. 9:30-11:30 AM
Email: jgkausle AT ncsu.edu

Shuai Yang
Office hours: 1229 EB2, Monday and Wednesday, 9:00-10:00 AM
Email: syang16 AT ncsu.edu

Qiwen Hu
Office hours: 1229 EB2, Wednesday 2:00-3:00 PM
Email: qhu AT ncsu.edu

Zexi Chen (Jay)
Office hours: 1229 EB2, Friday 10:00-noon
Email: zchen22 AT ncsu.edu

Prerequisites

- calculus and lower level math,
- discrete mathematics, for example CSC 224/226, or a comparable course
- data structures, for example CSC 314/316), or a comparable course
- basic programming skills.

To brush up on your prerequisites, I recommend reviewing sections 3(2), 10, 12(1-3), and Appendix A, B, and C(1-2) of our textbook.

Course Description and Topics

This course provides an introduction to

- performance analysis of algorithms: asymptotic bounds for worst case, best case, average case, NP-completeness.
- algorithms and data structures for classical problems such as sorting, searching, graph problems, etc.
- algorithm design techniques, e.g. recurrence, divide and conquer, dynamic programming, greedy algorithms.

This is an approximate list. We will introduce additional topics as warranted by student interest and time; we will omit topics as time expires. Please check out our Projected Schedule. The schedule includes homework and exam dates**. Disclaimer: all dates are tentative and subject to change, please double-check frequently.**

Learning Outcomes

You will learn how to solve problems using concepts of algorithms and discrete mathematics, e.g.

- how to rigorously analyze correctness, time, and space usage of algorithms
- when and how to use fundamental algorithms and data structures
- how to apply algorithm design strategies such as recursion, divide-and-conquer, and dynamic programming.

Textbook

Introduction to Algorithms - 3rd Edition by TH Cormen, CE Leiserson, RL Rivest, and C Stein. ISBN: 9780262033848.

The textbook is required.

Additional Material

- Study Guide for the Analysis and Design of Algorithms (Steven Skiena)
- Useful Books
- Theoretical Computer Science Cheat Sheet
- Solving Recurrences by Jeff Erickson
- NIST: Dictionary of Algorithms and Data Structures
- The Stony Brook Algorithm Repository
- merge sort animation
- Relevant Algorithm Animations/Visualizations (in Java)
- DFS animation
- Dijkstra animation

- LEDA

Course Structure and Policies

The coursework consists of lectures, readings, homework and exams.

- Lectures might depart from our textbook. Some material presented in class might not be available through the lecture notes, or textbook. You are responsible for all material presented or discussed in class.
- Class attendance is mandatory. For complete attendance and excused absence policies, please see http://policies.ncsu.edu/regulation/reg-02-20-03.
- No laptops or cell phones are allowed during class.
- Readings will generally be taken from our textbook with possible supplements from the literature.
- We will have multiple un-announced in-class quizzes (only for the students in sections 001 and 002), two midterms, and a final exam.
- All exams are closed book exams. However, calculators (not programmable!) are permitted. Sorry, no cell phones are allowed.
- Exams might include material from lectures, assignments, and readings. All exams are closed book exams.
- There will be four homework assignments. All homework assignments are intended to be individual work.

Exam Dates

Midterm 1: September 21 (sections 1 & 2), students in section 601 please schedule the exam during September 22 and 23.
Midterm 2: October 26 (sections 1 & 2), students in section 601 please schedule the exam during October 27 and 28.
Final Exam: Monday 1-4 PM December 14 (section 1), Wednesday 6-9 PM December 9 (section 2), students in section 601 please schedule the exam during December 10 and 11.

Quiz 1 (section 2) solution

Quiz example: mock quiz
Midterm example: mock midterm
Final example: mock final

Homework Policies

There will be four homework assignments. **All assignments for this course are intended to be individual work. Turning in an exam, or assignment which is not the student's own**

work is cheating. Copying of text, code, or other content from the Internet (or other sources) is plagiarism. Any tool/resource must be approved in advance by the instructor and identified and acknowledged clearly in any work turned in, anything else is plagiarism. For more information, please consult the university's Code of Student Conduct.

Homework should be submitted electronically using the Wolfware submit mechanism (Submit Assignments) before the time it is due.

- To avoid reduced marks, please submit **word/latex-formated PDF** file, **NOT scanned writing in pdf format**. Scanned writing is hard to read, takes longer to grade, and produces gigantic files.
- Use "**UnityID_HW#**" as a name of pdf file, where # should be replaced by current homework number.
- Please write your **name and unity ID at the top of your homework in page 1**.

Please try this out well before the due date to make sure that it works for you.

Late Policy: All assignments are due on **9 PM** of the due date. Late submission will result in a 10%/40% point reduction on the first/second day after the due date. No credit will be given for submissions that are three or more days late.

Homework Assignments:

HW1 (docx | pdf) due date: Friday September 4, 9PM. Solution.
HW2 (docx | pdf) due date: Friday October 2, 9PM.
HW3 (|) due date: Friday October 30, 9PM. How to measure running time, taken from *A Guide to Experimental Algorithmics* by C.McGeoch.
HW4 (|) due date: Tuesday November 24, 9PM.

Grading Policies

Grades will be computed with a weighted average using the weights shown below.

	Sections 001 and 002	Section 601
Four Homework Assignments (equal weight)	20%	20%
Multiple unannounced Quizzes (equal weight)	20%	0%
Two Midterm Exams (equal weight)	30%	40%
Final	30%	40%

The following scale will be used:

97-100	A+
93-96.9	A
90-92.9	A-
87-89.9	B+

83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
63-66.9	D
60-62.9	D-
<60	F

- Course grades may be curved up, but they will never be curved down.
- There is a one-week time limit for submission of disputes for exams and homework assignments. The entire exam or homework may be regraded, and not just the disputed question.
- All exams are closed book exams. However, calculators (not programmable!) are permitted. Sorry, no cell phones are allowed.
- There are no makeup exams. If you are forced to miss an exam, an university accepted excuse must be presented. If the excuse is accepted, the score of your final exam will be used to replace the grade of the missed exam. **The score of missed quizzes will be replaced automatically by your final exam score, no excuse is required.**
- **Bad quiz forgiveness rule (applies only to students in sections 001 and 002):** every quiz score that is lower than your score in the final exam will be replaced by the final exam score. This also applies to missed quizzes.
- **Bad midterm forgiveness rule (applies only to students in section 601):** one midterm score that is lower than your final exam score will be replaced by your final exam score.
- Extra credit: there might be extra points in homeworks and exams; the bonus points earned in a particular homework/exam cannot be transferred to other assignments or exams.

Audit requirements: this class cannot be audited.

Policies on incomplete grades: If an extended deadline is not authorized by the Graduate School, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) by the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at http://policies.ncsu.edu/regulation/reg-02-50-03. Additional information relative to incomplete grades for graduate students can be found in the Graduate Administrative Handbook in Section 3.18.F at http://www.fis.ncsu.edu/grad_publicns/handbook/.

Electronically-Hosted Course Components

Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

Electronically-hosted Components: Wolfware message board contains information about syllabus, and tentative timeline. We will be using Piazza for class discussion. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. If you have any problems or feedback for the developers, email team@piazza.com. Find our class page at: https://piazza.com/ncsu/fall2015/csc505/home.

General Policies

Students are responsible for reviewing the PRRs which pertain to their course rights and responsibilities. These include: http://policies.ncsu.edu/policy/pol-04-25-05 (Equal Opportunity and Non-Discrimination Policy Statement), http://oied.ncsu.edu/oied/policies.php (Office for Institutional Equity and Diversity), http://policies.ncsu.edu/policy/pol-11-35-01 (Code of Student Conduct), and http://policies.ncsu.edu/regulation/reg-02-50-03 (Grades and Grade Point Average).

Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at http://policies.ncsu.edu/policy/pol-11-35-01

Academic Honesty

See http://policies.ncsu.edu/policy/pol-11-35-01 for a detailed explanation of academic honesty.

Honor Pledge

Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

Accomodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office (http://www.ncsu.edu/dso), 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at http://policies.ncsu.edu/regulation/reg-02-20-01.

Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy anwill not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://policies.ncsu.edu/policy/pol-04-25-05 or http://www.ncsu.edu/equal_op/. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

End-of-semester Class Evaluations

Online class evaluations will be available for students to complete during the last two weeks of class. Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations. All evaluations are confidential; instructors will never know how any one student responded to any question, and students will never know the ratings for any particular instructors.

Evaluation website: https://classeval.ncsu.edu
Student help desk: classeval@ncsu.edu
More information about ClassEval: http://www2.acs.ncsu.edu/UPA/classeval/index.htm

This syllabus is subject to change.