

# COT5405: ANALYSIS OF ALGORITHMS

## Syllabus

“People who analyze algorithms have double happiness. First of all they experience the sheer beauty of elegant mathematical patterns that surround computational procedures. Then, they receive a practical payoff when their theories make it possible to get other jobs done more quickly and more economically...” Donald E. Knuth

### Basic Information

- Semester: Fall 2019
- Schedule: T 8-9, R 9
- Location: NEB 0100
- Professor: Christina Boucher
- TA: Johnathan (David) Smith

### Main Theme

The study of algorithms is aimed at creating techniques that will enable a computer to perform a certain task in an efficient manner. An algorithm is a set of well-defined instructions for accomplishing some task, often explained by analogy with a culinary recipe. To analyze an algorithm is to determine the amount of resources (such as time and storage) necessary to execute it. Usually the efficiency or complexity of an algorithm is stated as a function relating the input length to the number of steps (time complexity) or storage locations (space or memory complexity) required to execute the algorithm. In this course, we will study various algorithmic paradigms (such as divide-and-conquer, greedy, dynamic programming), various analysis techniques (such as worst- case, expected, approximate), various problem domains (such as searching, sorting, graph theory, geometric, and combinatorially hard) problems.

### Coursework

Grades will be based on one midterm and one final test (each 30%) and a presentation (10%).

- Midterm test: There will be a take-home mid-term test that the students will do in groups of 4 to 5. 5 days will be given to complete the test. Further guidelines will be provided mid semester.
- Final Test: There is a final test. The specific time and location will be announced in class as the test date approaches. The exam will be closed book.

- Presentation: There is a presentation that will be done in pairs. It is informal 5 to 10-minute presentation. It is strongly encouraged that all students attend.

The grading scale will be A = 100 to 80, B = 79 to 70, C=69 to 60, and D = 59 and lower. I reserve the right to be more lenient if I decide to use a curve.

## Course Material

There are no required textbooks but several recommended ones that will be mentioned during class.

- Recommended Textbooks:
  1. Algorithm Design. J. Kleinberg and E. Tardos. (Addison Wesley, 2005).
  2. Computers and Intractability. M. R. Garey and D. S. Johnson, (Freeman, 1979).
  3. Computer Algorithms. E. Horowitz, S. Sahni and S. Rajasekaran. (Computer Science Press, 1997).
- Conferences: STOC, FOCS, SODA, APPROX, RANDOM, SoCG, LATIN, ESA
- Journals: Journal of Algorithms, Algorithmica, Theoretical Computer Science, SIAM Journal on Computing, Journal of the ACM, International Journal of Computational Geometry and Applications

## Course Policies

- Regrading Policy: You are free to ask me or one of the TAs why an answer did not get full credit. However, such verbal discussions will never result in extra points. Actual regrade requests must be made in writing, and then turned in to any of the TAs. Attach a separate page to your assignment/exam with the requested regrade and the reasons for the regrade. In no case may you write on the assignment/exam itself after it is graded. Requests must be made within one week of when we return the graded assignment/exam to class.
- Make-up Policy: Make-up test for the midterm and the final will be given only if you have a written official documentation of a valid excuse and you contact me prior to the exam.
- Distractions: This is a large class and I expect you to be extra careful not to cause any distraction in the classroom. Absolutely no phone calls or text messaging during the class.

Also, please be on time to the lectures. If you are more than a couple of minutes late do not enter the classroom.

- **Announcements:** Students are responsible following the announcements on UF E- learning (Canvas). Schedule updates regarding the tests, presentations, and office hours will appear there.
- **Accommodations for Students with Disabilities:** Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.
- **The University's Honesty Policy:** All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others. The following link contain additional information relating to academic honesty: - <http://regulations.ufl.edu/chapter4/4041.pdf>