Analysis of Algorithms

COP 4531 (Section 1/2) CGS 5427 *
Piyush Kumar

Handout #1, – Course Information

Course Web Site. `http://www.compgeom.com/~piyush/teach/4531/`

Class Mailing List. Announcements for the course, homeworks, reading assignments will be available using email/blackboard and the course web page. Make sure you check both the course web site and your email/blackboard at least once in two days throughout the semester.

Instructor. Piyush Kumar.
URL: `http://www.compgeom.com/~piyush`.
Office Hours: Tuesday, 4:50 to 5:50pm. Alternatively, you may schedule an appointment, either by email or by phone.
Phone: 645-2355
Email: `piyush@acm.org`
Venue: Office Hours will be held at Love 161 (My Office)

Lectures. Tuesday, Thursday at 3:35pm to 4:50pm at MCH 201.

Exams. Finals exams will be held on April 25th, Friday. 3:00pm to 5:00pm. Venue: In Class, Love 301. Midterm will be held on Feb 21st in class. Both exams will be closed book. You will be tested on knowledge, understanding, and application of material discussed in class. You will also have some questions testing your ability to creatively solve new problems, using techniques discussed in class. The final exam will be comprehensive.

Course rationale: Algorithms is a fascinating topic that is ubiquitous in computing. Algorithms are recipes for solving computational problems. This course aims at encouraging you to think efficient and clever solutions to problems that computer engineers and scientists attack in their day to day lives. The course also aims to teach you how to analyze the solutions you come up with (in terms of resources they use to solve the problem at hand), and to check if they are correct in a mathematically rigourous manner. This course involves understanding, creativity and analysis. I hope the course is an enjoyable learning experience.

Course Description. Algorithms is an integral part of computer science and mathematics. So far, you have acquired proficiency in basic data structures and programming. This course is the next step towards becoming an algorithm designer for the real world. We plan to cover the following topics in this course (tentative).

- Basic Algorithmic Analysis.
- Graph Algorithms
- Greedy Algorithms
- Divide and Conquer
- Dynamic Programming
- Network Flows:
- Complexity classes and Approximation Algorithms.

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*Course Reference Number 09448

- Introduction to Computational Geometry

Learning Objectives. The objective of this course is to encourage you to learn how to : (i) design and implement 'new' algorithms in the real world. (ii) map problems to algorithmic problems. (iii) read and understand algorithms published in journals. (iv) develop writing skills to present your own algorithms (v) collaborate and work together with other people to design new algorithms.

Prerequisites. See the prerequisites handout. Grade of C- or better in COP 4530. STA 4442 or STA 3032 and either MAD 3107 or MAD 3105. Finally, it is useful to have experience with C, C++, or Python. (You should be able to code in C++.) Some of the homeworks will ask you to write code.

Textbook. I will assume that each of you own a copy of *Algorithm Design* (Hardcover) by Jon Kleinberg, Eva Tardos ISBN: 0321295358. You should also have access to [CLRS] book.

1. *T. Cormen, C. Leiserson, R. Rivest, and C. Stein.* Introduction to Algorithms. (2nd edition). MIT Press , McGraw-Hill, 2001.

Course Policies

1. **Homeworks:** The best way to learn the material is by solving problems. You are encouraged to work in *pairs*[1], because the best way to understand the subtleties of the homework problems is to argue about the answers. If you do not have a partner, let me know and I'll try to hook you with one. If you want a divorce, you should let me know too. Don't be a leech and let your partner do all the work. Unless you learn how to solve problems, I *promise* that you will get burned on the exams and thus for your final grade.

2. Your solutions should be handed in *Stapled together.*

3. Your solutions should be *very neatly written.* If your solution is unclear, sloppy, or if your solution is hard to understand, you will have points deducted even if your solution is correct. One of the best way to make your solutions clear is to *include pictures* and *examples.*

4. Homework assignments will be due at the *beginning of class* and I will hand out the solutions immediately. **Late assignments** *will not be accepted* because the solutions will be available.

5. It is extremely important that you *start homework assignments early.* The homeworks are very challenging, and if you get behind in your work, you may find it too difficult to catch up. Out of all the graded homework sets, I will drop the min score before calculating the total homework score towards the final grade. Since I drop the lowest score, missing one homework due to an illness should not be a problem.

6. **Grading Criteria:** The grade for this class will be assigned based on the following approximate percentages.

	Approximate Percentage	Variable
Homework	25%	
Two surprise quizzes	20%	
Class Participation	5%	$h \in [0, 50]$
Midterm	20%	$f \in [0, 50]$
Final	30%	

To Pass: $h \geq 30$ and $f \geq 30$ (Necessary but not sufficient condition).

Final Grades: Your final grades (letter grades) will depend on your $(h + f) \in [0, 100]$ score. There is no pre-established scale or curve. I will sort all the $(h + f)$ scores for those who pass and assign letter grades to different non-overlapping intervals (The highest level being A and decreasing thereof). I will at my discretion, use clustering to generate the intervals or use the following intervals (Whichever yields you a *better* grade).

Percent	Letter	Percent	Letter	Percent	Letter
94-100	A+	84-87	B+	74-77	C+
90-93	A	80-83	B	70-73	C
88-89	A-	78-79	B-	0-69	F

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[1]Students who have taken any of my previous courses are forbidden to be in the same pair.

7. I reserve the right to modify these numbers uniformly by 5% each. I reserve the right to de-emphasize the homework grades if there is evidence of students who copy instead of doing the homework themselves.

8. **Surprise Quiz:** There will be two surprise quizzes during the semester. By surprise, I mean that, the night before the quiz, you will not be able to deduce that the quiz will be the next day.

9. **Class Participation:** Participation in class discussions and activities is essential to successful learning and should reflect the your *reading, analysis, and experience in relation to the topic.* In order to help you review reading material, I will provide some review questions after each lecture. This will cover both, material discussed in the current lecture, and material to prepare you for the next lecture. You should be prepared to answer these questions in the next lecture. Apart from this, I will ask other questions in class. You too should feel free to ask questions on material that you do not understand, offer suggestions on improving ideas presented in class, and make other positive contributions to the learning experience in class. All these will count toward class participation.

10. Scribing will be worth *approximately* 4 or 5 percentage points of extra credit (This option is only for people who know LaTeX and XFig or are willing to put the effort to learn it).

11. **Missed exam Policy:** A missed exam will be recorded as a grade of zero. We will follow the university rules regarding missed final exams (see `http://registrar.fsu.edu/dir_class/fall/exam_schedule.htm`), for all the exams, including the final exam.

12. **Grade of 'I' Policy:** The grade of 'I' will be assigned only under the following exceptional circumstances:
    - The final exam is missed with an accepted excuse for the absence. In this case, the final exam must be made up during the first two weeks of the following semester.
    - Due to an extended illness or other extraordinary circumstance, with appropriate documentation, the student is unable to participate in class for an extended period. In this case, arrangements must be made to make up the missed portion of the course prior to the end of the next semester.

13. **Academic Honor Code:** Because a primary goal of the course is to teach professionalism, any academic dishonesty will be viewed as evidence that this goal has not been achieved, and will be grounded for receiving a grade of F (You must read the FSU Academic Honor Code in the Student Handbook and abide by it). Copying/Modifying other people's programs/code will be treated the same as copying in an exam.
    - Every student must write his/her own code and homework. Showing your code or homework to members of other teams, giving it to them, or making it accessible to them (e.g., by making the files world-readable) is academic dishonesty. You are responsible for ensuring that your code/documentation/results/homeworks are adequately protected and not accessible to others. Change permissions of your working directory to 0700 (chmod 0700 {directory}).
    - Consulting code from a textbook, or from the Internet, in order to understand specific aspects of your assignment is fine. However, *copying entire code or large parts of such code will be considered academic dishonesty.* If you borrow small parts of code from these sources, you must acknowledge this in your submission and additionally you must clearly understand and be able to explain how the code works.

    Once again: There is no excuse for cheating in any circumstances. See me before you even *contemplate* cheating.

14. **Accommodation for Disabilities:** If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact the staff in the Student Disability Center and bring a letter to the instructor indicating the need for accommodation. The Student Disability Resource Center will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential. They can be contacted at (850) 644-9566.

15. **Attendance Policy:** The university requires attendance in all classes, and it is also important to your learning. The attendance record may be provided to deans who request it. If your grade is just a little below the cutoff for a higher grade, your attendance will be one of the factors that we consider, in deciding whether to "bump" you up to the higher grade. Missing three or fewer lectures will be considered good attendance. In rare cases, such as medical needs or jury duty, absences may be excused with appropriate documentation. You should let me know in advance, when possible, and submit the documentation I seek. You should make up for any materials missed due to absences.

16. **Syllabus Change Policy:** The syllabus is guide to the course and subject to change with advanced notice.