

*CS : 4980 : 0002 (22C : 196 : 002) Topics in Computer Science II*  
**Algorithmic Excursions**

### **Class Schedule**

11:00 am –12:15 pm Tuesday and Thursday at 27 MacBride Hall (MH).

### **Instructor**

Kasturi Varadarajan: 101D MacLean Hall, 335-0732, [kasturi-varadarajan@uiowa.edu](mailto:kasturi-varadarajan@uiowa.edu)  
Office hours: 1:30–3:00 Wednesday, 3:30–5:00 Thursday.

### **Course Web Page**

[www.cs.uiowa.edu/~kvaradar/sp2016/excursions.html](http://www.cs.uiowa.edu/~kvaradar/sp2016/excursions.html). This is also accessible from the ICON page for this course.

### **Content**

In this course, we explore some advanced topics in algorithm design and analysis that are of broad interest. We study (1) approximation algorithms, that output approximately optimal solutions, focusing on geometric examples; (2) randomized schemes such as sampling and sketching; (3) algorithms in the data stream model, where the space allowed to the algorithm is typically sublinear and only a few passes through the input are allowed; (4) the multiplicative weights update method and some of its applications.

We also study topics beyond typical worst-case analysis. We examine parameterized complexity, where the input is characterized by one or more parameters in addition to the usual input size. We consider input models where the input is an ‘easy’ instance corrupted by random noise, and review algorithm design in this setting.

We expect to use material drawn from a few different sources.

- *Geometric Approximation Algorithms*, by Sariel Har-Peled; this will serve as a useful reference for about a third of the course.
- We will add more references to the course page later.

### **Prerequisites**

A strong background in an undergraduate level algorithms course, together with an understanding of the basic methodology of analyzing randomized algorithms is expected. The latter translates to an understanding of random variables, expectation, linearity of expectation, Markov and Chebyshev inequalities, Chernoff bounds, and their typical uses in analyzing randomized algorithms.

## **Grading**

Each student will be responsible for a week's worth of lecture notes (slightly more if needed). This will account for 20 percent of the grade. Homeworks will account for 40 percent of the grade – I expect there will be three to four homeworks. Class participation will account for 10 percent of the grade. And a review or survey paper will account for the remaining 30 percent. There will be no exams.

Scribed lecture notes are due within the next week after the week the student is responsible for.

The policy on late homeworks is that you have a quota of six days for the entire semester that you may use for late submissions. A maximum of three late days can be applied to any one homework. Once you use up your quota of six days, any homework submitted late will not be accepted.

When you submit a homework  $X$  days late, your quota gets decreased by  $X$  irrevocably. You can only be late by an integer number of days, obtained by rounding up.

## **Departmental Information**

Department of Computer Science, 14 Maclean Hall. The office of the DEO, Prof. Alberto Segre, is located here.

## **Collaboration**

For homework problems, collaboration is allowed, assuming each of you has first spent some time (about 45 minutes) working on the problem yourself. However, no written transcript (electronic or otherwise) of the collaborative discussion should be taken from the discussion by any participant. Furthermore, discussing ideas is okay but viewing solutions of others is not. It will be assumed that each of you is capable of orally explaining the solution that you turn in, so do not turn in something you don't understand. Students are responsible for understanding this policy; if you have questions, ask for clarification.

## **Administrative Home**

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at <http://clas.uiowa.edu/students/handbook>.

## **Electronic Communication**

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences.

## **Accomodations for Disabilities**

A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See [www.uiowa.edu/~sds/](http://www.uiowa.edu/~sds/) for more information.

## **Academic Honesty**

All CLAS students have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (see CLAS Academic Policies Handbook).

## **Making a Suggestion or a Complaint**

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident. (See CLAS Academic Policies Handbook).

## **Understanding Sexual Harassment**

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

## **Reacting Safely to Severe Weather**

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Department of Public Safety website.