

# Design and Implementation of Algorithms (CS:4980:0003) Spring 2019

## Class Schedule

The course meets 12:30–1:45 pm Tuesday and Thursday at 218 MLH (MacLean Hall).

## Instructor and Office Hours

Kasturi Varadarajan: 101D MacLean Hall, 335-0732, [kasturi-varadarajan@uiowa.edu](mailto:kasturi-varadarajan@uiowa.edu)  
Office hours: Monday 3:00–4:30, Wednesday 1:30–3:00.

## Teaching Assistant

Zhishuai Guo: [zhishuai-guo@uiowa.edu](mailto:zhishuai-guo@uiowa.edu)  
Office hours: Tuesday 2:00–3:00 pm, Friday 12:00–1:00 pm, 101N

## Course Web Page

[www.cs.uiowa.edu/~kvaradar/sp2019/dia.html](http://www.cs.uiowa.edu/~kvaradar/sp2019/dia.html). I will publish this url on ICON as well. This page is where the homeworks will be posted. Use ICON to look up grades, homework solutions, etc.

## What this Course is About

This course has two main goals. The first is to develop an understanding of fundamental algorithm design techniques. Here we will focus on ways of approaching algorithm design, and practice communicating our ideas effectively. The second goal is to develop experience with designing and programming algorithms with a view to practical efficiency. These two goals usually interact, but not in a straightforward way.

Topics that we plan to cover include (i) recursive thinking, leading up to divide-and-conquer, backtracking, and dynamic programming, (ii) graph algorithms and related data structures, (iii) greedy algorithms, (iv) randomized algorithms, and (v) dealing with intractability. This is preliminary, and the actual course may have small variations.

We will rely on lecture notes, mostly the ones from Jeff Erickson at <http://jeffe.cs.illinois.edu/teaching/algorithms/>

This page includes a textbook, but also more advanced material under the heading *More Algorithms Lecture Notes*. We will use both resources.

## Prerequisites

Undergraduate discrete structures and data structures are the official prerequisites.

More specifically, we will assume some comfort with counting and estimating things (the kind we learn in discrete structures), experience with writing programs, and with estimating

and communicating running time (for example, what it means to say “this algorithm’s worst case running time is  $O(n^2)$ ”). We will also assume that when we talk about algorithms, you are comfortable at seeing how they might translate into programs. Computer science undergrads typically pick these skills up in their data structures and algorithms courses.

## Grading

The grading will be based on (approximately) nine homework assignments (30 percent), two midterms (20 percent each), a final (25 percent), and class participation (5 percent). Four of the nine homeworks will involve programming, and the remaining will be shorter and involve pen and paper work.

The policy on late homework is that you have a quota of four days for the entire semester that you may use for late submissions. So for example, there will be no penalty if you submit the third homework two days late, the fifth two days late, and the rest of the homework assignments on time. Once you use up your quota of four days, any homework submitted late will not be accepted and you will get 0 points for that homework. No individual homework can be late by more than two days. (I don’t count the weekends/holidays – if an assignment is due 1:45 pm on Thursday, and you submit it by 1:00 pm the following Monday, you will be two days late.)

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 – if you submit 10 hours after the deadline, for example, your quota is depleted by one day.

## Exam Dates

The midterms will be on Thursday, February 28, and Thursday, April 11, in class. The final will be during finals week; the time and place will be announced after the Registrar’s office determines them.

## Collaboration

No collaboration is allowed on the exams. For homework, discussing ideas is fine but obtaining solutions from others is not allowed. I recommend, however, that each of you first give your best shot at doing the homework on your own. This way, you will be better prepared for the exams, but more importantly, you will learn more.

The work that you turn in (whether programs or otherwise) must be your own. Also be sure to acknowledge your collaborators.

## Departmental Information

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

## **Administrative Home**

The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course. Please visit the following website for the portion of the syllabus pertaining to CLAS teaching policies and resources:

<https://clas.uiowa.edu/faculty/teaching-policies-resources-syllabus-insert>