

# CSE 331, Introduction to Algorithm Analysis and Design

FALL 2011

Mon Wed Fri 1:00-1:50pm, TALBRT 107

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- It is **your responsibility** to make sure you read and understand the contents of this syllabus. If you have any questions, please contact the instructor.
  - Thanks to Carl Alphonse for kindly allowing the use of some language from his syllabus in this document.
  - Please complete the online anonymous feedback form. Filling up the form is optional but I encourage you to fill at least the part about your preferred office hours.
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## Instructor Information

Atri Rudra (<http://www.cse.buffalo.edu/~atri>)

- *Email:* atri "at" buffalo "dot" edu
- *Office:* 123 Bell
- *Phone:* 645-2464
- *In-person Office Hours:* Mondays and Fridays, 2:00- 2:50pm.
- *Online office Hours:* Look for announcements on the course blog.

It is preferable to set up an appointment if you want to talk to me outside of my office hours. However, you can drop by if my office door is open. There will be some “online” office hours. Please follow the course blog for more details.

## TA Information

Jesse Hartloff

- *Email:* hartloff "at" buffalo "dot" edu
- *Office:* Bell 232
- *Office Hours:* Thursdays 1:00- 1:50pm

## Jiun-Jie Wang

- *Email:* jiuunjiew "at" buffalo "dot" edu
- *Office:* Bell 232
- *Office Hours:* Tuesdays 1:00- 1:50pm and Wednesdays 2:00-2:50pm

## Recitations

You should have signed up for one of these three recitation sections:

- Mondays, 12:00-12:50pm (6 Clemens)
- Tuesdays, 8:00-8:50am (138 Bell)
- Fridays, 9:00-9:50am (218 NSC)

Attending the recitations is *very* important, as it will cover material that could not be covered well in the lecture due to time constraints and/or discuss homework problems (and their solutions once the homeworks have been turned in). Also the recitations will provide an opportunity to ask your questions in a smaller gathering.

## Course Description

(*From the course catalog*)

Introduces methods for algorithm design, paradigms such as divide and conquer, greedy, and dynamic programming, and techniques for algorithm analysis, such as asymptotic notations and estimates, as well as time/space tradeoffs. Topics include sorting, searching, scheduling, string matching, graph algorithms, computational geometry, and more.

## Pre-requisites

Data Structures (CSE 250), Discrete Math (CSE 191) and College Calculus II (MTH 142). You need a grade of C<sup>-</sup> or above in these courses. If you do not satisfy the requirement, please come and see me.

## References

We will be using the following textbook:

**Jon Kleinberg and Éva Tardos, “Algorithm Design.” Addison Wesley, 2005.**

Occasionally, we might study topics that are not covered in the textbook. In such cases, supplementary material will be provided.

The following textbooks could be useful references:

Thomas S. Cormen, Charles E. Leiserson, Ronald Rivest, and Clifford Stein, “Introduction to Algorithms (2nd Ed).” MIT Press, 2001.

Sanjoy Dasgupta, Christos H. Papadimitriou and Umesh Vazirani, “Algorithms.” McGraw Hill, 2007.

Donald Knuth, “The Art of Computer Programming Volumes 1, 2, 3, 4.” Addison Wesley.

Alfred V. Aho John E. Hopcroft and Jeffrey Ullman, “Data Structures and Algorithms.” Addison Wesley, 1983.

Richard E. Neapolitan and Kumarss Naimipour, “Foundations of Algorithms (4e).” Jones and Bartlett, 2009.

## Schedule

We will have roughly 13 weeks worth of classes. Here is a tentative list of topics that we will cover (KT refers to the textbook):

- Introduction [KT, Chap 1] (1.5 weeks).
- Asymptotic Analysis [KT, Chap 2] (1 week).
- Graph Basics [KT, Chap 3] (2.5 weeks).
- Greedy Algorithms [KT, Chap 4] (3.5 weeks).
- Divide and Conquer Algorithms [KT, Chap 5] (2.5 weeks).
- Dynamic Programming [KT, Chap 6] (2 weeks).
- NP-completeness and other advanced topics [KT, Chap 8] (1 lecture).

A more detailed schedule will appear at

<http://www.cse.buffalo.edu/~atri/courses/331/schedule.html>

## Class Webpage

<http://www.cse.buffalo.edu/~atri/courses/331/>

## Course Blog

We will be using a blog (<http://cse331.wordpress.com>) for the course in lieu of a course newsgroup. All announcements will be made on the blog. If you are attending the course, you **must** check the blog regularly. I would **strongly** urge you to subscribe to the RSS feed via the link on the blog or sign up for email notifications on the blog. These announcements would include the ones that inform if and when classes/office hours are re-scheduled etc.

Usually, the instructor and the TA will be the only ones who will write the blog entries. There will be an entry for each lecture and homework. (More on the blog posts on lectures in a bit.) You are encouraged to use the comments section to post questions and/or comments. Sometimes, the blog may include side comments or stories that I feel are relevant to the course (but are not directly related to the lectures).

There is a companion blog (<http://cse331studentposts.wordpress.com/>) for student blog posts (more on this in a bit).

## Grading Policy

Here is the split of grades:

- Blog post (3%)

- Scribe (2%)
- Homeworks (25%)
- Exams (70%)

To get an A in the course, you will *have* to obtain a total of 90.00% or more. The rest of the letter grades will be given based on the curve.

See the next few sections for more details on each of the above components.

## Blog Post

You are required to write a blog post on one of the lectures during the course (after the first week). I'll post entries for the first three lectures to give you an idea of how to write such posts. (Also feel free to look at the student blog posts on the blog from last year.) In general, it should be a summary of what was covered in the lecture and your comments on the lecture (if any).

Your posts are due by 5pm the day before the next lecture (i.e. by 5pm on Tuesday, Thursday and Sunday for the Monday, Wednesday and Friday lectures respectively). **No late submissions will be accepted.** If you miss the deadline, you'll get a 0.

You will have to upload your entry on to the course blog yourself on to the companion blog:

<http://cse331studentposts.wordpress.com/>

To do this (i) If you do not have a wordpress account already, you will have to sign up for an account on **wordpress.com**, (ii) Send me via email, the email you used to sign up for wordpress and I'll give you write permission on the blog. Do this no more than *24 hours before* the lecture you will be posting about. (I'll remove your write permission after the deadline.)

There are about 2 students/lecture, so for all lectures there will be two guest bloggers. You can choose the lecture date that works best for you— the slots will be allotted on a first-come-first-serve basis. To do so, send email to **atri "at" buffalo "dot" edu** with your first five preferences. (The schedule page on the course webpage will maintain the assignments.) If no one signs up for a particular lecture, then I will pick a student who has not volunteered at random at the beginning of the lecture. If the chosen student is not present, then the student will get a 0 for the blog post part of the grade.

## Scribe

It is *very highly recommended* that every student be part of a group of at most *three* students. In every lecture, the group should sit next to each other. Throughout the semester, there will be group activities/discussions that every group has to participate in. The activities include (but are not limited to): discussing a proof presented by the instructor, working out an algorithm on an example input and discussing a question posed by the instructor.

Every lecture will have two *scribes*, who will send the instructor a summary of the group's discussion by email by midnight of the day of the lecture. You can choose the lecture date that works best for you— the slots will be allotted on a first-come-first-serve basis. To do so, send email to **atri "at" buffalo "dot" edu** with your first five preferences. (The schedule page on the course webpage will maintain the assignments.) If no one signs up for a particular lecture, then I will pick a student who has not volunteered at random at the beginning of the lecture. If the chosen student is not present, then the student will get a 0 for the scribe part of the grade.

Think of your group as your study group for the semester. This course will require hard work: please feel free to talk to your group about the stuff covered in class. Teach each other material that you learned in class so that you understand it better. You may (and it is encouraged) to make your collaboration group for the homeworks the same as this group.

## Homeworks

Homeworks will be handed out on Fridays in class and will be due in class before the *start* of the next lecture on Friday. There will be **10** homeworks. In addition, there will be a Homework 0, which will be graded but will not count towards your final grade. Homework 0 is just to give you feedback on your proofs so that you can avoid your mistakes in the homeworks that will count towards your grade. Homework 0 will be handed out on the first day of class and will be due on Friday, September 2, 2011. *Submitting Homework 0 is optional.*

**No late submission will be accepted.** (The entire homework schedule is on the schedule page on the course webpage, so please plan accordingly.) However, the *three lowest score on your homeworks will be dropped*. I strongly encourage you to save these three homeworks till the end of the semester when you will be very busy with projects etc. and/or for possible sick days.

Unless mentioned otherwise, collaboration is allowed on the homeworks, subject to the following conditions:

- You are allowed to collaborate provided you have thought about **each problem for at least 30 minutes on your own**. This will help you in the exams.
- You can collaborate on any homework in a **group of size at most 3**, including yourself. Note that you cannot collaborate with different groups for different problems. You must write the name of *everyone* in your group on your submission.
- You can **only discuss the problems with your group till you come up with the proof ideas**: the detailed formal proof is something you should work on alone.
- Your submitted homework must be **written in your own words**. Everything, including the proof idea, has to be written up individually. In particular, at no point of time should you have in your possession the written homework of someone else.

The line between collaboration and cheating can be blurry—when in doubt, play safe. Not only is cheating bad in principle, in practice it is highly unlikely that you'll do well in the exams unless you have worked hard on the homeworks on your own. It is highly recommended that you do not try to test my claim out on yourself.

For more rules and suggestions on homeworks, please refer to the Homework policy document, which can be found at

<http://www.cse.buffalo.edu/~atri/courses/331/handouts/hw-policies.pdf>

## Exams

The mid-term is worth 30% of your grade and the final exam is worth 40% of your grade. *However, if it is to your advantage, then the final exam will be worth 70% of your grade.*

No makeup exams will be given except in *provably extreme circumstances*. Please note the following additional policies/suggestions with respect to makeup exams:

- Notify your instructor 24 hours prior to the exam via e-mail or telephone (voice mail) if you are going to miss an exam. If it is medically *impossible* for you to give prior notice, please obtain a note from a physician detailing the period (and the reason) you were medically incapable of communicating with the instructor.
- If you miss an examination because of sickness or similar reasons, *visit a physician and obtain a note detailing the period and the reason you were medically incapable of taking the exam.*
- The exam dates are stated below. Please plan your travel and other activities accordingly.

- Exam times are stressful and one could forget about the exam time. Please make sure you arrange for multiple reminders so that you do not forget about the exam(s). This is another reason to religiously follow the course blog as there will be numerous reminders about the exam when it gets close to the actual exam date.

## Mid-term exam

There will be an in-class exam on **Monday, October 10** in the usual meeting place and time. The exam will be closed book and notes. However, you can bring in a single 8.5x11 inch hand-written paper (you can use both sides).

## Final exam

The final exam will be held in the classroom (Talbert 107) on **Friday, December 16** from **noon-2:30pm**. Again the exam will be closed book and notes but you can bring in *two* 8.5x11 inch handwritten sheets.

## Study time

In this course, as in any course, you are expected to put in additional time beyond the scheduled class times. Professors generally expect that for each credit hour a typical student will put in 2 – 3 hours of time **each week** outside of class. Since this is a 4 credit course that translates into 8 – 12 hours of time outside of scheduled times, **each week**. During this time you should review your lecture notes, attend office hours as needed, and work on assignments. As a rough guide, you should expect to spend **at least** the following time working on this course, **each week**:

**lectures** 3 hours

**recitation** 1 hour

**individual/group study** 3 hours

**assignments** 5 hours

## Miscellaneous Notes

Here are some other policies/suggestions to keep in mind:

1. Your grade will solely depend on your performance in this semester: you will not get any opportunity to do extra work to improve your grade. It is your duty to make sure you understand what is expected of you. This course will require a fair bit of work so if you are busy this semester, please plan accordingly.
2. If there is a genuine reason for re-grading, please contact the person who graded your homework/exam within *a week* of when the graded material is handed out in class. In particular, if you do not pick up your graded material on time, you lose the opportunity to get back to us within the stipulated time period.
3. See this blog post from Fall 2009 on some tips on how to do well in this course (hint: work hard!)

<http://cse331.wordpress.com/2009/10/24/how-to-do-better-in-this-class/>

4. The 5% of the grade consisting of the blog post and scribe will be the easiest points in the entire course. Do not miss on those by forgetting about the deadlines. If you have preference for certain lecture dates, sign up for them early.

5. If for some reason you cannot do the blog post or scribe for a the date you signed up, you can swap your day with another willing student. However, you can do *only one swap in the entire semester*.
6. You will have to make sure that the day you choose for your scribing duties, no one else from your group does the same.
7. You **cannot** sign up the blog post and the scribe duties for the same lecture, i.e. you will have to do them in two separate lectures.

## Disabilities

If you have a diagnosed disability (physical, learning, or psychological) that will make it difficult for you to carry out the course work as outlined, or that requires accommodations such as recruiting note-takers, readers, or extended time on exams or assignments, you must consult with the Office of Disability Services (25 Capen Hall, Tel: 645-2608, TTY: 645-2616, Fax: 645-3116, <http://www.student-affairs.buffalo.edu/ods/>).

You must advise your instructor during the first two weeks of the course so that we may review possible arrangements for reasonable accommodations.

## Counseling Center

Your attention is called to the Counseling Center (645-2720), 120 Richmond Quad. The Counseling Center staff are trained to help you deal with a wide range of issues, including how to study effectively and how to deal with exam-related stress. Services are free and confidential. Their web site is

<http://www.student-affairs.buffalo.edu/shs/ccenter/>

## Academic Integrity

Source: [http://www.cse.buffalo.edu/undergrad/policy\\_academic.php](http://www.cse.buffalo.edu/undergrad/policy_academic.php)

The academic degrees and the research findings produced by our Department are worth no more than the integrity of the process by which they are gained. If we do not maintain reliably high standards of ethics and integrity in our work and our relationships, we have nothing of value to offer one another or to offer the larger community outside this Department, whether potential employers or fellow scholars.

For this reason, the principles of Academic Integrity have priority over every other consideration in every aspect of our departmental life, and we will defend these principles vigorously. It is essential that every student be fully aware of these principles, what the procedures are by which possible violations are investigated and adjudicated, and what the punishments for these violations are. Wherever they are suspected, potential violations will be investigated and determinations of fact sought. In short, breaches of Academic Integrity will not be tolerated.

## Departmental Statement on Academic Integrity in Homework Assignments

The following statement further describes the specific application of these general principles to a common context in the CSE Department environment, the production of homework assignments. It should be thoroughly understood before undertaking any cooperative activities or using any other sources in such contexts.

*All academic work must be your own. Plagiarism, defined as copying or receiving materials from a source or sources and submitting this material as one's own without acknowledging the particular debts to the source (quotations, paraphrases, basic ideas), or otherwise representing the work of another as one's own, is never allowed. Collaboration, usually evidenced by unjustifiable similarity, is never permitted in individual*

*assignments. Any submitted academic work may be subject to screening by software programs designed to detect evidence of plagiarism or collaboration.*

*It is your responsibility to maintain the security of your computer accounts and your written work. Do not share passwords with anyone, nor write your password down where it may be seen by others. Do not change permissions to allow others to read your course directories and files. Do not walk away from a workstation without logging out. These are your responsibilities. In groups that collaborate inappropriately, it may be impossible to determine who has offered work to others in the group, who has received work, and who may have inadvertently made their work available to the others by failure to maintain adequate personal security. In such cases, all will be held equally liable.*

*These policies and interpretations may be augmented by individual instructors for their courses. Always check the handouts and web pages of your course and section for additional guidelines.*

## Departmental Policy on Violations of Academic Integrity

Any student accused of a violation of academic integrity will be so notified by the course director. An informal review will be conducted, including a meeting between these parties. After this review and upon determination that a violation has occurred, the following sanctions will be imposed. **It is the policy of this department that, in general, any violation of academic integrity will result in an F for the course, that all departmental financial support including teaching assistantship, research assistantship or scholarships be terminated, that notification of this action be placed in the student's confidential departmental record, and that the student be permanently ineligible for future departmental financial support.** A second violation of academic integrity will cause the department to seek permanent dismissal from the major and bar from enrollment in any departmental courses. Especially flagrant violations will be considered under formal review proceedings, which may in addition to the above sanctions result in expulsion from the University.

## Suggestions or Comments?

I would be happy to get feedback from you. You can either

- Talk/send email to the instructor, or
- Use the comments section of the entries in the course blog, or
- Fill in the online feedback form.



**University at Buffalo***Department of Computer Science & Engineering*

CSE 331 — Introduction to Algorithm Analysis and Design

I, \_\_\_\_\_ (PRINT name), acknowledge that I have read and understood the syllabus (and the homework policy document) for this course, CSE 331 *Introduction to Algorithm Analysis and Design*.

I also acknowledge that I understand the definition of academic integrity as outlined in the syllabus, and that I will minimally receive a grade of F in the course if I am found to have breached academic integrity.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_