



# Randomized Algorithms

CSCI 6220/4030

Mondays and Thursdays, 10:00am–11:50am, Sage 3101

Alex Gittens

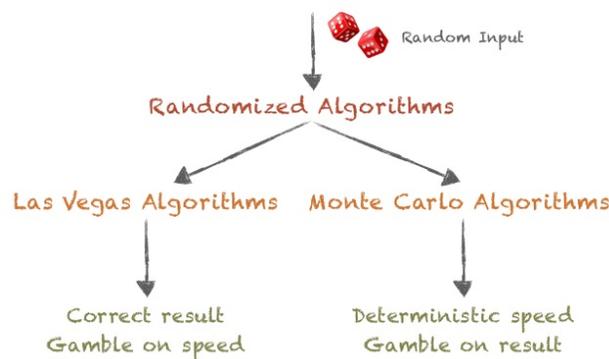
gittea@rpi.edu

Lally 316

Office Hours: Mon, Thurs 9am–9:50am or by appointment

(518) 276-6476

**Course Description:** Randomized Algorithms are the state of the art in contemporary algorithm design. They are usually simple, sometimes even easy to analyze, and they work well in practice. This course provides an introduction to basic concepts in the design and analysis of randomized algorithms.



**Course Text:** *Randomized Algorithms*, by R. Motwani and P. Ragahavan. We will also cover material from other sources (e.g. papers), that will be made available on the course web page.

**Course Website:** <http://www.cs.rpi.edu/~gittea/teaching/fall2017/csci6220-and-4030.html>

**Course Objectives:** At the end of the semester, students will have grasped the fundamentals of randomized algorithm design, and the probabilistic tools and techniques used to analyze randomized algorithms. Among other accomplishments, they will have:

- Mastered basic probability, including the linear of expectation, conditional expectations, the law of total probability, etc.
- Learned how to employ basic tail inequalities including Markov bounds, Chebyshev bounds, Chernoff bounds, and Martingale bounds
- An understanding of the basic complexity classes of randomized algorithms, and the difference between Las Vegas and Monte Carlo algorithms

- Learned how to employ the probabilistic method to establish properties of combinatorial structures
- An understanding of the fundamentals of Markov Chains and the Monte Carlo Method
- Become familiar with the analysis of the performance of randomized data structures

**Grading Criteria:**

Homeworks	35%
In-class Pop Quizzes	35%
Final	30%

Letter grades will be computed from the semester average. Maximum lower bound cutoffs for A, B, C and D grades are 90%, 80%, 70%, and 60%, respectively. These bounds may be moved lower at the instructors discretion.

Students are expected to have writing supplies on hand in each class to complete the in-class pop quizzes. If you are an athlete or for some other reason are not able to attend each class, make alternative arrangements with the instructor in the first two weeks of the course.

**Homework Policy**

All assignments must be typed and are due at the start of class (defined as the first 10 minutes). There will be roughly 5 homework assignments. Homework assignments will be made available via the course web site. Generally, they will have a two-week duration. Students will submit a paper copy of their assignment, preferably typed in LaTeX. Homework assignments must be submitted at the start of class on the specified due date. Late assignments will not be accepted, unless you contact the instructor at least two days before the due date to receive a deferral. Deferrals will be granted at the instructor’s discretion, of course.

**Academic Integrity**

The Rensselaer Handbook of Student Rights and Responsibilities and The Graduate Student Supplement define various forms of Academic Dishonesty and you should make yourself familiar with these. In this course, all assignments that are turned in for a grade must represent the students own work. In cases where help was received, or teamwork was allowed, a notation on the assignment should indicate your collaboration.

Submission of any assignment that is in violation of this policy will result in no credit for that assignment, reporting to the Dean of Students office, and at the instructor’s discretion, a grade of F for the course.

If you have any question concerning this policy before submitting an assignment, please ask for clarification.