



**Computer Science 600.471**  
**THEORY OF COMPUTATION**  
**Fall, 2016 (3 credits, EQ)**

**Instructor**

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**Teaching Assistant**

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Office: Malone Hall 260  
Office hours: Wednesdays 3:00–4:00 pm

**Meetings**

Tuesday and Thursday, 12:00–1:15 pm, Gilman 17

**Textbook**

Required: Sanjeev Arora and Boaz Barak, *Computational Complexity: A Modern Approach*.  
Recommended: Michael Sipser, *Introduction to the Theory of Computation, 2nd Edition*.

**Online Resources**

Any related online material will be posted at the course website <http://www.cs.jhu.edu/~lixints/class/fall16.html>.

**Course Information**

- This is a graduate-level course studying the theoretical foundations of computer science. Topics covered will be models of computation from automata to Turing machines, computability, complexity theory, randomized algorithms, inapproximability, interactive proof systems and probabilistically checkable proofs. Students may not take both 600.271 and 600.471, unless one is for an undergrad degree and the other is for a graduate degree.
- **Prerequisites**  
Discrete Math or permission. Probability theory strongly recommended.
- **Selective Elective**

**Course Goals**

Specific Outcomes for this course are that:

- Students will learn to establish a formal foundation of the theory of computation.
- Students will learn to analyze and solve problems formally and mathematically.

This course will address the following Criterion 3 Student Outcomes:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline (a)
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution (b)

**Course Topics**

- The computational model and computability; Time complexity; Diagonalization; Space complexity; Boolean circuits; Interactive proofs.

## Course Expectations & Grading

There will be four or five homework problem sets, one mid-term exam and one final exam. Grading will be based on the following rule:

- Homework: 40%.
- Mid-term exam: 30%.
- Final exam: 30%.

## Key Dates

The mid-term exam will be held in class on October 11. The final exam will be cumulative and will take place from 2pm to 5pm on December 15. No make-up exams will be given, so plan accordingly. For the midterm, you may bring a single, 8.5x11 inch, handwritten sheet of paper (you may use both sides). For the final exam you may bring two sheets. No calculators are allowed (they won't be necessary).

## Assignments & Readings

Assignments and further readings will be posted on the course website <http://www.cs.jhu.edu/~lixints/class/fall16.html>

## Ethics

The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful, abiding by the *Computer Science Academic Integrity Policy*:

Cheating is wrong. Cheating hurts our community by undermining academic integrity, creating mistrust, and fostering unfair competition. The university will punish cheaters with failure on an assignment, failure in a course, permanent transcript notation, suspension, and/or expulsion. Offenses may be reported to medical, law or other professional or graduate schools when a cheater applies.

Violations can include cheating on exams, plagiarism, reuse of assignments without permission, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Ignorance of these rules is not an excuse.

Academic honesty is required in all work you submit to be graded. Except where the instructor specifies group work, you must solve all homework and programming assignments without the help of others. For example, you must not look at anyone else's solutions (including program code) to your homework problems. However, you may discuss assignment specifications (not solutions) with others to be sure you understand what is required by the assignment.

If your instructor permits using fragments of source code from outside sources, such as your textbook or on-line resources, you must properly cite the source. Not citing it constitutes plagiarism. Similarly, your group projects must list everyone who participated.

Falsifying program output or results is prohibited.

Your instructor is free to override parts of this policy for particular assignments. To protect yourself: (1) Ask the instructor if you are not sure what is permissible. (2) Seek help from the instructor, TA or CAs, as you are always encouraged to do, rather than from other students. (3) Cite any questionable sources of help you may have received.

On every exam, you will sign the following pledge: "I agree to complete this exam without unauthorized assistance from any person, materials or device. [Signed and dated]". Your course instructors will let you know where to find copies of old exams, if they are available.

[In addition, the specific ethics guidelines for this course are:

- (1) *Collaboration policy*: While you should first think about homework problems on your own, I encourage you to discuss homework problems with your classmates. However, you must write up your own solutions. Students found sharing the same paragraph in their homework will receive 0 point for

the homework, and risk further punishment such as automatic failure and report to the University. Furthermore, you must acknowledge any collaboration by writing the names of your collaborators on the front page of the assignment. You don't lose points by having collaborators.

- (2) *Citation policy:* Try to solve the problems without reading any published literature or websites, besides the class text. If, however, you do use a solution or part of a solution that you found in the literature or on the web, you must cite it. Furthermore, you must write up the solution in your own words. You will get at most half credit for solutions found in the literature or on the web. Using solutions from other resources without citation is considered plagiarism and will result in 0 point and potential further punishment as in (1).
- (3) *Late Policy:* Homework are due at the beginning of the class. For each assignment you have two late days. A day here means 24 hours (i.e., from 12pm to 12pm next day). Any time after 12pm the first day until 12pm the next day is counted as one day. If you hand in your homework one day late, you will receive 80% of the points you earn. If you hand in your homework two days late, you will receive 60% of the points you earn. Homework later than two days will not be graded.

Report any violations you witness to the instructor.

You can find more information about university misconduct policies on the web at these sites:

- Undergraduates: [e-catalog.jhu.edu/undergrad-students/student-life-policies/](http://e-catalog.jhu.edu/undergrad-students/student-life-policies/)
- Graduate students: [e-catalog.jhu.edu/grad-students/graduate-specific-policies/](http://e-catalog.jhu.edu/grad-students/graduate-specific-policies/)

### **Students with Disabilities**

Any student with a disability who may need accommodations in this class must obtain an accommodation letter from Student Disability Services, 385 Garland, (410) 516-4720, [studentdisabilityservices@jhu.edu](mailto:studentdisabilityservices@jhu.edu).