JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Computer Science 601.231
AUTOMATA and COMPUTATION THEORY
Spring, 2018 (3 credits, EQ)

Instructor
Professor Xin Li, lixints@cs.jhu.edu, www.cs.jhu.edu/~lixints
Office: Malone Hall 215, 410-516-5847
Office hours: Wednesdays 10:30 am–12:00 pm or by appointment

Course Assistants
TA: Kuan Cheng, kcheng17@jhu.edu
Office hours: Thursdays 10:30am – 11:30am, Malone 338

CA: Eric Cochran, ecochra5@jhu.edu; Yi (Ethan) Lee, ylee157@jhu.edu;
Office hours: Fridays 3:00 - 4:00 pm, Malone 222

Xiaoyan (Coco) Li, xli152@jhu.edu; Kevin Peng, kpeng7@jhu.edu
Office hours: Mondays (Except for 2/5/18) 3:00 - 4:00 pm, Malone 203

Meetings
Tuesday and Thursday, 1:30–2:45 pm, Hodson 210

Textbook
Required: Michael Sipser, *Introduction to the Theory of Computation, Second Edition*.

Online Resources
Any related online material will be posted at the course website http://www.cs.jhu.edu/~lixints/class/spring18.html.

Course Information

- This course is an introduction to the theory of computing. topics include design of finite state automata, pushdown automata, linear bounded automata, Turing machines and phrase structure grammars; correspondence between automata and grammars; computable functions, decidable and undecidable problems, P and NP problems, NP-completeness, and randomization. Students may not receive credit for 601.231 and 601.431 for the same degree.
- **Prerequisites**
  Discrete Math or permission.
- **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

- Finite automata and regular languages; context-free languages; Turing machines and computability; Diagonalization; Time complexity.

Course Expectations & Grading
There will be approximately eight homework problem sets, two mid-term exams and one final exam. Grading will be based on the following rule:

- learning paragraph writing (approximately every weak): 10%.
- Homework: 30%.
- Two Mid-term exams: 30%.
- Final exam: 30%.

Grades will be given approximately according to the following rules:

- A grade (A- to A+): overall grade above 85 OR top 30%.
- B grade (B- to B+): overall grade above 75 OR top 60%.
- C grade (C- to C+): overall grade above 60 OR top 90%.
- Below C grade: overall grade below 60 AND bottom 10%.

Key Dates
The two mid-term exams will be held in class on March 1 and April 3. The final exam will be cumulative and will take place from 9am to 12pm on May 11. No make-up exams will be given, so plan accordingly. For the midterms, 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/spring18.html
Gradescope: https://gradescope.com/ **coursecode**: MKY74K
Piazza: https://piazza.com/jhu/spring2018/en601231

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, and will be submitted in Gradescope. No late homework will be accepted.

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/`
- Graduate students: `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`.