

Instructor

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 Office hours: TR 2:55PM–3:55PM, W 1:25PM–2:25PM, by appointment

Prerequisites

CMPSC 360 (Induction is an extremely important tool in this course and students are expected to be proficient in it)

Meetings

MW 2:30 PM–3:45 PM, EAB 103

Textbook

Required: Dexter C. Kozen, *Automata and Computability*, Springer, 1997

Reference: Peter Linz, *An Introduction to Formal Languages and Automata*, Jones & Bartlett Learning

Course Description

The primary goal of this course is to explore formal language theory, including regular, context free, recursive, and recursively enumerable languages. Notations for specifying these languages (regular expressions, finite automata, context free grammars and Turing machines) are emphasized. Applications of these languages, including pattern recognition, scanning, parsing, specification of programming language syntax and Unix shell programming, are also discussed. Study of these topics should provide a solid theoretical basis for students to draw on in studying diverse areas such as algorithm analysis, complexity theory and compiler construction.

Course Objectives

- Understand the classes of languages in the Chomsky hierarchy and their corresponding automata
- Prove the containment hierarchy of classes of languages
- Learn fundamental applications of formal languages

Course Outcomes

After taking this course, students should be able to

- Determine the class of a language in the Chomsky hierarchy, including regular, context-free, context-sensitive, recursive, and recursively enumerable languages
- Describe a language in the Chomsky hierarchy using a corresponding abstract computational models, including finite automata, pushdown automata, and Turing machines
- Convert among equivalent computational models for a language, including among DFAs, NFAs, and regular expressions and between PDAs and CFGs

Course Topics

- Finite automata and regular languages / regular expressions
- Pushdown automata and context-free grammars
- Turing machines and recursively enumerable languages / recursive languages
- Computability, decidability, and halting problem

Course Expectations & Grading

Students are expected to attend all lectures and do all reading assignments as well as homework assignments. There will be approximately 6-7 homeworks and quizzes, 2 exams, and a final exam. *No calculators or any electronic devices are allowed in this class.* Class work will be counted as follows.

Homework & Quizzes: 20%, Exam 1 (~week 5): 25%, Exam 2 (~week 10): 25%, Final: 30%

All submitted materials must be placed inside a pocket folder with the course name and section number, your name, and your PSU Access Account ID on the outside cover. ***Your observation of this format is mandatory and you will be penalized for not following the format.*** All assignments are due **at the beginning of the class** on the designated due date. ***No late homework will be accepted. No make-up exams or quizzes will be given except for medical emergencies or valid University conflicts.*** The Course will use the following grading system.

(90, 100] : A	(85, 90] : A-	(82, 85] : B+	(80, 82] : B	(75, 80] : B-
(70, 75] : C+	(65, 70] : C	(55, 65] : D	[0, 55] : F	

Additional Information

You can find more detailed and up-to-date version of this information at cs.hbg.psu.edu/additional-syllabus-info.

1. Email Contact

Announcements will be sent through email if needed. It is the responsibility of the student to regularly check his/her PSU email. If you need to contact the instructor regarding any questions or concerns related to the course via email, *you must have your subject line start with the course name (for example, "CMPSC122") for immediate attention.*

2. Academic Dishonesty

The University defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. All students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts (refer to Senate Policy 49-20 and Penn State Harrisburg Academic Integrity Policy). Dishonesty of any kind will not be tolerated in this course. Dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students, tampering with program outputs, improper use of the internet and electronic devices, unauthorized collaboration, and alteration of graded assignments. Students who are found to be dishonest will receive academic sanctions and will be reported to the University's Office of Student Conduct for possible further disciplinary sanctions (refer to Senate Policy G-9). *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 complete 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.

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 as you are always encouraged to do, rather than from other students. (3) Cite any questionable sources of help you may have received.

Report any violations you witness to the instructor.

3. Learning Center

The Russell E. Horn Sr. Learning Center may have a tutor who can assist you in this course. Use the online scheduler to see if your particular course is supported. You can make an appointment in one of the four ways listed below:

website	Online Scheduler	Phone	In person
harrisburg.psu.edu/learning-center	psuh.mywconline.com	717-748-6475	SEC201

An appointment is recommended, though not required. If you have a request for tutoring help with a course that is not on the course list of the online scheduler, send an email to tutorrequest@psu.edu and we will try to find you an option. Our Academic Skills Consultants can help with time management, organization, and study skills. We also have tutors who can help you deliver speeches and improve your presentations.

4. Disability Access

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has a Student DisAbility Resources office. Student DisAbility Resources at Penn State Harrisburg is located in SEC 205. The Disability Services Coordinator, Alan Babcock, can be reached via email at aub15@psu.edu or phone 717-948-6025. To receive consideration for accommodations, you must contact Student DisAbility Resources (SDR), participate in an intake interview, provide documentation of your disability, and complete a Self-Assessment. Additional information is available on the Disability Services website (<http://harrisburg.psu.edu/disability-services>). If the documentation supports requests for reasonable accommodations, SDR will provide you with an accommodations letter, which you will give to your professors. You will receive accommodations after you give your accommodations letters to your professors. You should share your accommodations letters with your professors as early in the semester as possible. Professors do not provide accommodations retroactively.

5. Counselling Services

Students may face a variety of concerns over the course of their time at PSH such as depressed mood, anxiety, stress, family concerns, body image, substance use, sexuality and many others that may interfere with their ability to focus on their studies. Counseling Services provides FREE mental health and social support for all currently enrolled students. Staffs follow strict legal and ethical guidelines concerning the confidentiality of counseling. Counseling services is located in SEC 205 and can be reached by phone at (717) 948-6025. You can find more information at the Counseling Services webpage: <http://harrisburg.psu.edu/counseling-services>.

6. Education Equity

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, harassment, and/or incivility due to age, ancestry, color, disability, gender, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity at the Report Bias site: <http://equity.psu.edu/reportbias/statement>. Direct all inquiries regarding the nondiscrimination policy to our Penn State Harrisburg Office of Student Affairs at the following link <https://harrisburg.psu.edu/webform/office-student-conduct-incident-report-form>.

7. Mandated Reporting

As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I also have a mandatory reporting responsibility related to my role as an educator. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep information you share private to the greatest extent possible. However, per University policy AD85, I am required to share information regarding sexual misconduct or information about a crime with the University including incidents of sex-based discrimination and harassment (discrimination, harassment, sexual harassment, sexual misconduct, dating violence, domestic violence, stalking, and retaliation). While faculty are ethically bound to report any information as it relates to University policy, we are also a resource and want to be sure you are aware of the services available to you.