CptS 317: Automata and Formal Languages
Syllabus

Last updated: January 11, 2022

Course Information

Credit Hours: 3
Semester: Spring 2022
Meeting times and location: MWF, 10:10–11:00, SPRK G0010
Course website: Canvas will be used as the learning management system (LSM) for this course. This includes posting of lecture material, assignments, announcements, and messages; and handling of student submissions and instructor feedbacks.

Instructor Information

Instructor: Assefaw Gebremedhin
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Course Objectives

- Introduce concepts in automata theory and theory of computation
- Identify different formal language classes and their relationships
- Design grammars and recognizers for different formal languages
- Prove theorems in automata theory and language properties
- Determine the decidability and intractability of computational problems

Prerequisites

- CptS 122/132
- Math 216

Text book

- Introduction to the Theory of Computation, Third Edition by Michael Sipser.

Learning Outcomes

At the conclusion of this course students will:

- Have acquired a fundamental understanding of the core concepts in automata theory and formal languages
- Be able to design grammars and automata (recognizers) for different language classes
- Be able to identify formal language classes and prove language membership properties
- Be able to prove theorems establishing key properties of formal languages and automata
- Have acquired a fundamental understanding of core concepts relating to the theory of computation and computational models including decidability and intractability

Grading and course policies

- 7 homeworks (58%) – best 6 out of 7 will be used toward final grade
- 2 midterms (20%)
- 1 final exam (20%)
- class participation (2%)

Homework policy:

- Submissions happen electronically via Canvas.
- All homeworks must be done individually.
- No late submissions (without permission) are allowed.

Exam policy:

- Exact midterm exam dates will be announced in class and also updated in the syllabus as the exams approach.
- The format for the mid-term exams and the final exam will be decided later.

Final letter grades will be given according to the following ranges:

A (93–100%), A- (90–92.99%), B+ (87–89.99%), B (83–86.99%), B- (80–82.99%), C+ (77–79.99%), C (70–76.99%), C- (67–69.99%), D (60–66.99%), F (less than 60%).

Topics

Here is an outline of major topics (modules) of the course.

1. Introduction
2. Regular Languages
3. Context-free Languages
4. Church-Turing Thesis
5. Decidability
6. Reducibility
7. Time Complexity

Tentative Weekly Schedule

See Table 1 for a weekly schedule of topics and assignments.

Week	Topics	Assignments/comments
01 (Jan 12)	Intro to course	HW0 (survey) out
02 (Jan 17)	Intro to automata theory	HW0 in, HW1 out
03 (Jan 24)	Finite Automata	HW1 in, HW2 out
04 (Jan 31)	Regular Expressions	HW2 in
05 (Feb 7)	Nonreguar Languages	HW3 out
06 (Feb 14)	Context-free Languages	HW3 in
07 (Feb 21)	Context-free Grammars	Mid-Term 1, HW4 out
08 (Feb 28)	Pushdown Automata	HW4 in, HW5 out
09 (Mar 7)	CFG and PDA equivalence, DFA minimization	HW5 in;
10 (Mar 14)	**Spring Break**	
11 (Mar 21)	Deterministic CFL, non-context free Languages	Review for MT2
12 (Mar 28)	Turing Machines	Mid-Term 2; HW 6 Out
13 (Apr 4)	Decidable languages	HW6 in; HW 7 out
14 (Apr 11)	Reducibility	HW 7 in
15 (Apr 18)	Time Complexity	Practice
16 (Apr 25)	NP-Completness, Review	
17 (May 2)	Finals Week	Final Exam

Table 1: Tentative week-by-week schedule of topics and assignments. The date shown in parenthesis is just the Monday of that week. Typically, a HW would be out on a Wed of the week, and would be due the Wed the week after.

Policies

Conduct

Students are expected to maintain a professional and respectful classroom environment. In particular, this includes:

- not using disruptive technologies in class
- coming to class on time and remaining throughout the class

Correspondence

All class related correspondence with the instructor will be made via Canvas.

Attendance

Regular attendance is expected. While students may miss class for urgent reasons repeated absences that are not cleared with the instructor will factor into class participation portion of the grade.

Academic Integrity

Academic integrity is the cornerstone of higher education. As such, all members of the university community share responsibility for maintaining and promoting the principles of integrity in all

activities, including academic integrity and honest scholarship. Academic integrity will be strongly enforced in this course. Any student who violates the University's standard of conduct relating to academic integrity will receive an F as a final grade in this course, will not have the option to withdraw from the course and will be reported to the Office of Student Standards and Accountability.

Cheating includes, but is not limited to, plagiarism and unauthorized collaboration as defined in the Standards for Student Conduct WAC 504-26-010 (3). You can learn more about Academic Integrity on the WSU campus at http://conduct.wsu.edu. If you have any questions about what is and is not allowed in this course, you should ask the course instructor before proceeding.

Students with Disabilities

Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations must be approved through the Access Center. For more information, consult the webpage http://accesscenter.wsu.edu or email at Access.Center@wsu.edu.

COVID-19 Policy

Students are expected to abide by all current COVID-19 related university policies and public health directives, which could include wearing a cloth face covering, physically distancing, self-attestations, and sanitizing common use spaces. All current COVID-19 related university policies and public health directives are located at https://wsu.edu/covid-19/.

Accommodation for Religious Observances or Activities

Washington State University reasonably accommodates absences allowing for students to take holidays for reasons of faith or conscience or organized activities conducted under the auspices of a religious denomination, church, or religious organization. Reasonable accommodation requires the student to coordinate with the instructor on scheduling examinations or other activities necessary for course completion. Students requesting accommodation must provide written notification within the first two weeks of the beginning of the course and include specific dates for absences. Approved accommodations for absences will not adversely impact student grades. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence. Students who feel they have been treated unfairly in terms of this accommodation may refer to Academic Regulation 104 – Academic Complaint Procedures.

Important Dates and Deadlines

Students are encouraged to refer to the academic calendar often to be aware of critical deadlines throughout the semester. The academic calendar can be found at
http://registrar.wsu.edu/academic-calendar.

Changes

This syllabus is subject to change. Updates will be posted on the course website.