CptS 317: Automata and Formal Languages
Syllabus
Last updated: January 29, 2021

Course Information

Credit Hours: 3
Semester: Spring 2021
Meeting times and location: MWF, 10:10–11:00, via Zoom. Class meetings will happen synchronously.
Course website: Canvas will be used as the learning management system (LSM) for this course. This includes posting of lecture material, Zoom recordings of lectures, assignments, announcements, and messages; and handling of student submissions and instructor feedbacks.

Instructor Information

Instructor: Assefaw Gebremedhin
Email: assefaw DOT gebremedhin AT wsu DOT edu
Homepage: www.eecs.wsu.edu/~assefaw

Office hours (via Zoom): Wednesdays 11:30am–12:30pm, or by appointment.

Graduate Teaching Assistant: James Halvorsen
Email: james DOT Halvorsen AT wsu DOT edu
Office Hours (via Zoom): Mondays 3–4pm and Fridays 3–4pm

UG Teaching Assistant: Makiah Heinzmann
Email: makiah DOT Heinzmann AT wsu DOT edu
Office Hours (via Zoom): Wednesdays 3–4pm and Thursdays 1–2pm

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 using its 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

- 8 homeworks (58%) – best 7 out of 8 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 mid-term exams and the final exam will either be take-home or timed, on-line. This 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

Week	Topics	Assignments/comments
01 (Jan 18)	Intro to course	HW0 (survey) out; NO CLASS 1/18–MLK
02 (Jan 25)	Intro to automata theory	HW0 in, HW1 out
03 (Feb 01)	Finite Automata	HW1 in, HW2 out
04 (Feb 08)	Regular Expressions	HW2 in, HW3 out
05 (Feb 15)	Nonreguar Languages	HW3 in, HW4 out; NO CLASS 2/15
06 (Feb 22)	Context-free Grammars	HW4 in
07 (Mar 01)	Pushdown Automata	Mid-Term 1
08 (Mar 08)	Non-Context-Free Languages	HW5 out
09 (Mar 15)	Turing Machines	HW5 in, HW 6 out; NO CLASS 3/17
10 (Mar 22)	The Definition of Algorithm	HW 6 in
11 (Mar 29)	Decidable Languages	Mid-Term 2
12 (Apr 05)	Undecidability	HW7 out
13 (Apr 12)	Reducibility	HW7 in, HW8 out
14 (Apr 19)	Time Complexity	HW8 in
15 (Apr 26)	NP-Completness	
16 (May 03)	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.

Weekly Schedule

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

Policies

Conduct

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

- muting when not speaking
- using the chat feature only for purposes related to the class
- joining the meeting 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 or due to internet issues, 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.