

University of Louisville, CSE Department

AUTOMATA THEORY - CSE 504-02

COURSE SYLLABUS – Fall 2024

Instructor: Dr. Mehmed Kantardzic

Phone: (502) 852-3703

E-mail: mmkant01@louisville.edu

Office Hours: TTh 2:30 pm – 4:00 pm DC 210
or other times by appointment

Lectures: TTh 1:00 pm - 2:15 pm DC 117

Laboratory: None

Course Prerequisite: CECS 310

Course Description:

This course is an introduction to formal specification of different types of automata and languages, and their applications to engineering problems including modeling the behavior of discrete systems. Topics include theory of computing, formal languages theory, and applications of cellular automata.

The course contains heavy coverage of the following ABET goals: the ability to apply knowledge of mathematics, and the ability to formulate and solve problems.

Course Objectives:

At the conclusion of this course, the successful (passing) student will be able to:

- a. Understand the basic principles of formal languages and abstract models of computation.
- b. Demonstrate the ability to specify and design finite automata, pushdown automata, and Turing machines.
- c. Demonstrate the ability to analyze and design regular, context-free, recursive, and context sensitive languages.
- d. Demonstrate a working knowledge on computational complexity and limits of algorithmic computation.
- e. Formalize problems in computer science with greater mathematical maturity.

Text:

P. Linz, *An Introduction to Formal Languages and Automata*, 6th Edition, Jones and Bartlett Publishers, Inc., 2017.

Assignments:

Homework assignments serve as an aid to the class lecture topics. They will be given in class and are expected to be completed before the next class. Unannounced quizzes may be given on homework assignments.

Grading Policy:

There will be two TESTS and a COMPREHENSIVE FINAL EXAM. Arrangements must be made IN ADVANCE if for some valid reason you cannot take an exam at the scheduled time.

In addition to achieving a passing cumulative score (typically 60%), a minimum performance of 50% should also be achieved in each of the next three areas (given with weights):

10 Quizzes	20%
Two Tests	40%
Final Exam	40%

Total	100%

Grading Scale

(90% & up) **A** (80%-89.99%) **B** (70%-79.99%) **C** (60%-69.99%) **D** (below 60%) **F**

Academic Dishonesty:

Academic dishonesty is prohibited at the University of Louisville. It is a serious offense because it diminishes the quality of scholarship, makes accurate evaluation of student progress impossible, and defrauds those in society who must ultimately depend upon the knowledge and integrity of the institution and its students and faculty. For more information, visit the [Code of Student Rights and Responsibilities](#) (Sections 5. and 6.).

Students with Disabilities:

The University of Louisville is committed to providing access to programs and services for qualified students with disabilities. If you are a student with a disability and require accommodation to participate and complete requirements for this class, notify me immediately and contact the Disability Resource Center (Stevenson Hall, 502.852.6938) for verification of eligibility and determination of specific accommodations. For more information, visit the [Disability Resource Center](#).

The University COVID items:

As a Community of Care, all Cardinals are expected to abide by public health guidelines and regulations as published by the University. While masks are currently not mandated, they are ***strongly encouraged*** when indoors (including classrooms, shared office spaces, etc), while Jefferson County is in “red level” (high risk) status based on CDC criteria.

Please note, in the event that the public health status changes, the University may reinstitute required masking, or otherwise alter their COVID policies. Students, Faculty, and Staff are expected to abide by any such requirements in the event they are implemented. As a Community of Care, please be courteous to others, whether or not they decide to wear a mask.

Faculty have the responsibility to help students meet these recommendations by allowing students absent for reason of illness and/or quarantine to make up missed work and not penalize students for these absences. Faculty may require documentation.

In the event the instructor becomes ill, he/she will send a notification via Blackboard prior to the subsequent class meeting to provide further instructions. Depending on the type of illness, class may be moved to a remote format (temporarily), may be run by a Graduate Teaching Assistant, or may be canceled. Please be sure to check your University email account regularly in case issues such as this arise.

UofL will post updates to policies, FAQs, and other COVID information [here](#).

Updated COVID-19 Status for the Jefferson County area can be found [here](#).

Computer Issues and IT Support:

Speed IT staff are available by appointment from 9 am to 4 pm to assist you with your technology needs. You may schedule an appointment by sending a detailed email including any relevant error codes and screen snips at SPDHelp@Louisville.edu (preferred) or 502-852-7620.

Tentative Schedule:

The following is the tentative schedule of topics, and associated textbook chapters, which will be covered:

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|----|---|--------------------|
| 1. | Introduction to the Theory of Computation | (Chapter 1) |
| 2. | Finite Automata | (Chapter 2) |
| 3. | Regular Languages and Regular Grammars | (Chapters 3 and 4) |

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|----|--|-----------------------|
| 4. | Context-Free Languages | (Chapters 5, 6 and 8) |
| 5. | Pushdown Automata | (Chapter 7) |
| 6. | Turing Machines | (Chapters 9 and 10) |
| 7. | A Hierarchy of Formal Languages and Automata | (Chapter 11) |

Computer projects: None

Oral and written communication requirements:

There will be no oral or written communication requirements beyond normal homework assignments, quizzes and exams.

Title IX/Clery Act Notification

Sexual misconduct (including sexual harassment, sexual assault, and any other nonconsensual behavior of a sexual nature) and sex discrimination violate University policies. Students experiencing such behavior may obtain confidential support from the PEACC Program (852-2663), Counseling Center (852-6585), and Campus Health Services (852-6479). To report sexual misconduct or sex discrimination, contact the Dean of Students (852-5787) or University of Louisville Police (852-6111).

Disclosure to University faculty or instructors of sexual misconduct, domestic violence, dating violence, or sex discrimination occurring on campus, in a University-sponsored program, or involving a campus visitor or University student or employee (whether current or former) is not confidential under Title IX. Faculty and instructors must forward such reports, including names and circumstances, to the University's Title IX officer.

For more information, see the Sexual Misconduct Resource Guide.

<http://louisville.edu/hr/employeerelations/sexual-misconduct-brochure>

Religious Holy Days and Observances:

Federal law and university policy prohibit discrimination on the basis of religious belief. It is the policy of the University of Louisville to accommodate students, faculty, and staff who observe religious work-restricted holy days. Students who observe work-restricted religious holy days must be allowed to do so without jeopardizing their academic standing in any course. Faculty are obliged to accommodate students' request(s) for adjustments in course work on the grounds of religious observance, provided that the student(s) make such request(s) in writing during the first two (2) weeks of term. Deans and department chairs must investigate and resolve student complaints arising from alleged faculty failure to make reasonable accommodations under these guidelines.

For more information, view the [Calendar and Policy on Religious Holy Days and Observances](#).

Statement on Diversity:

The University of Louisville strives to foster and sustain an environment of inclusiveness that empowers us all to achieve our highest potential without fear of prejudice or bias. We commit ourselves to building an exemplary educational community that offers a nurturing and challenging intellectual climate, a respect for the spectrum of human diversity, and a genuine understanding of the many differences-including race, ethnicity, gender, gender identity/expression, sexual orientation, age, socioeconomic status, disability, religion, national origin or military status-that enrich a vibrant metropolitan research university.

We expect every member of our academic family to embrace the underlying values of this vision and to demonstrate a strong commitment to attracting, retaining and supporting students, faculty and staff who reflect the diversity of our larger society.

For more information, visit the [Office of Diversity](#).

Incomplete Grade

As described in the [Academic Catalog](#), students may request an incomplete under the following conditions:

- More than 50% of the semester's course work, as computed by percent of final grade excluding the final exam has been completed;
- Performance on the completed course work is considered passing;

- The inability to complete the final portion of the course work is due to reasons beyond the student's control, such as, but not limited to: prolonged illness, death in the immediate family, catastrophic events such as a car wreck, and travel restrictions.

Before a grade of incomplete is assigned, the student must provide documentation of the extenuating circumstances. The faculty member must develop and provide the student with a written statement outlining the schedule to complete the coursework. This must include dates and times when all remaining assignments are to be completed; on what date any missing exams will be taken, as well as the times and locations where exams will be proctored. Exams taken as part of removing the incomplete can be different from the exams given during the semester. Both the student and the instructor must agree in writing on the schedule. If the student does not meet the deadlines in the fulfillment of the agreed upon schedule, a grade of F will be assigned, and no additional extensions will be given.