# CSci 435. Formal Languages and Automata

**Term:**           Fall 2020.
**Class Hours:**    12:30 – 1:45 PM, TR
**Room:**           Upson II 261

**Instructor:**     Dr. M. Eunjin Kim
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**Phone:**          (701)777-3338
**(Virtual) Office Hours:** 3:30 – 4:45 PM, MW
                    via zoom (https://und.zoom.us/j/8719470008)
            .

**TA & Office Hours:**   TBA

**Prerequisites:**       Csci 242. Algorithms and Data Structures with a grade C or higher.

**Required Textbook:**   *An Introduction to Formal Languages and Automata (6th ed.)*
                         Peter Linz
                         Jones & Bartlett Learning, 2017.

**Reference Books:**     *Automata Theory, Languages, and Computation (3rd ed. )*
                         John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman.
                         Pearson, 2006.

                         *Elements of the Theory of Computation (2nd ed.)*
                         Harry R. Lewis and Christos H. Papadimitriou
                         Prentice Hall, 1997 (2007).

                         *Introducing the Theory of Computation*
                         Wayne Goddard
                         Jones & Bartlett, 2008.
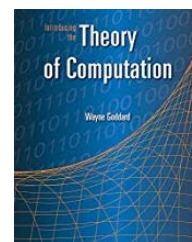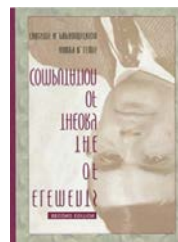


**Grade Policy**:

| | | |
|---|---|---|
| Midterm | Chap. 1 – 6 | : 25 % |
| Final Exam | Chap. 7 – 14 | : 30 % |
| Assignments | | : 45 % |
| ~~Attendance~~ | | : ~~5 %~~ |

**Final Grade Policy:**

Midterm = $y_1$;  Your Midterm Score = $x_1$;
Final Exam = $y_2$;  Your Final Exam Score = $x_2$;
HW Total = $y_3$:  Your Total HW Score = $x_3$:
~~Attendance = $y_4$:~~  ~~Your Total physical Attendance = $x_4$:~~

Your Total $= \frac{x_1}{y_1} \cdot 250 \ + \frac{x_2}{y_2} \cdot 300 \ + \frac{x_3}{y_3} \cdot 450$ ~~$+ \frac{x_4}{y_4} \cdot 50$ (or 0: online)~~

A ∈ [ 900, 1000 ]
B ∈[ 800, 900 )
C ∈ [ 700, 800 )
D ∈ [ 600, 700 )
F ∈ [ 0, 600)

**FINAL EXAM:**  1:000 – 3:00 PM, December 17th (Thr.) 2020.

**COURSE DESCRIPTION**:

This course introduces the fundamental theory and the computing models of computer science for the computability theory, formal languages, grammars, and computing machines. Topics include automata theory, Turing machines, regular languages, context-free languages, grammar, and their relationships and hierarchy.

**ABET Outcome:**

*a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.*
*b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution*
*c) A n ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.*
*f) An ability to communicate effectively with a range of audiences.*
*i) An ability to use current techniques, skills, and tools necessary for computing practice.*
*j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.*

**Program Outcome:**

*1) Knowledge of programming language principles*
*5) The ability to communicate effectively, both orally and in writing*
*7) The ability to conduct sound scientific investigation and analysis*

**GENERAL POLICY**

**Reading:**

Reading of Textbook is required.

**Late Submission:**

Exams and due dates of assignments/projects will be scheduled in advance. A grade of zero will be recorded for missed exams and late assignments unless prior arrangements are made with a valid written excuse. Assignments turned in after the due date, but by the beginning of the next scheduled class will be penalized 30%.  After one class, it will not be accepted.

**Academic Dishonesty**:
All work, in class or out of class, must be done *__independently__*. In any/all cases of plagiarism, your work will be graded as *ZERO*. The students might discuss the ideas for assignment or/and project, however, please *do not copy* the solution or the program codes of your classmate or any online source in the internet.
http://und.edu/student-affairs/code-of-student-life/_files/codepdfs/appendix/iiia/iiia-3.pdf

**Netiquette:**

Your email with the instructor is not a chatting but a (semi) formal communication in regard to the course.  Proper etiquette with mutual respect is expected. The following format is recommended.
**Please include the course number in the subject.**

| | |
|---|---|
| **Subject:** | e.g.) **CSci 435(Online):** Question 1 in HW 2 |
| **Salutation:** | e.g.) Hello Dr. Kim, |
| **Main Body:** | e.g.) Question 1 in HW 2 states …….. |
| **Closing:** | e.g.) Thank you. |
| **Your Full Name:** | e.g.) Paul Smith |

So, you do not have to introduce yourself in the email as you include the course number and your full name.  Any email neither with the above format nor with an etiquette shall not be replied.

Use your UND email (your_name@und.edu) ONLY. No email from your personal account will be replied:  e.g.) gmail, yahoo, etc.

Any trivial email shall NOT be replied due to the heavy volume of emails from many classes:  e.g.) Which slide file does contain the topic related to the question of HW?  Is my approach to the question correct?, etc. etc.

**Classroom Etiquette:**

To maintain a proper atmosphere for learning, the following standards of classroom behavior will be observed.
- Students will be **on time** for class.
- Please read COVID19 instruction in the blackboard and abide by it.
- When a student attends a class, he/she should not disrupt class by coming in and out of the class or by leaving before the end of the class hour.  If there is a situation that you have to leave class early, please inform the instructor before the class.
- Students will show courtesy and respect to others in the classroom by not talking and by **not coming in and out of the classroom**.
- All cellular phones and tablets are to be turned off in the classroom.

**Dropping a Course**:

Dropping a course is a responsibility of a student. Non-attendance of the class, without the formal dropping of the course, may result in an 'F' on the student's final grade. Drops should be completed by the student on Campus Connection.

**Disclaimer**:

This syllabus is **not absolute**. It will be announced in class if *any change* occurs.

**Disability Statement:**

If you need accommodations in this course because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible.
If you plan to request disability accommodations, you are expected to register with the Disability Services for Students (DSS) office (Room 190 McCannel Hall, 777-3425).

**COVID-19 Policy:** https://und.edu/academics/provost/_files/docs/syllabus_statement_7_29_20.pdf

Please read the document in the link or the announcement in the blackboard.

**SELECTED TOPICS:**

1. Introduction to the Theory of Computation
2. (Non)Deterministic Finite Automata
3. Regular Languages and Regular Grammars
4. Properties of Regular Languages
5. Context-Free Languages and Context-Free Grammars
6. Simplification of Context-Free Grammars and Normal Forms
7. PushDown Automata
8. Properties of Context-Free Languages
9. Turing Machines
10. Other Models of Turing Machines
11. A Hierarchy of Formal Languages and Automata
12. Limits of Algorithmic Computation
13. Other Models of Computation
14. An Overview of Computational Complexity                    As the time permits…