# University of Michigan-Dearborn Syllabus – Winter 2021

**CIS 306 Discrete Structures II (4 Credit Hours)**

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Office Hours: 24/7 e-mail, off and on, and web conferencing when possible and beneficial.
Dearborn Discovery Core Categor(y/ies): Intersections
Course Meeting Times and Format(s): **Online, Asynchronous (recorded lectures)**

**Course Description:**

This course introduces students to further topics in discrete mathematics, including theory of computation, more complexity theory, coding theory, and game theory. The course also explores the nature of computation and how computation affects society.

**Prerequisites:** CIS 275 or equivalent.

**Program Goals:**

https://umdearborn.edu/cecs/departments/computer-and-information-science/undergraduate-programs/bs-computer-and-information-science/student-outcomes

**Dearborn Discovery Core Goals:**

1. Students are able to describe how ways of knowing and creating knowledge differ across disciplines and cultures.
2. Students are able to demonstrate knowledge, skills, and attributes needed to understand diverse local or global contexts.
3. Students are able to critically evaluate the narratives, values, artifacts, processes, technologies or structures that may create a just and sustainable society.
4. Students are able to creatively integrate theory and practice from across disciplines or from experiences outside of the classroom to address complex questions.

**Course Objectives/Outcomes:**

1. The student will be able to answer questions about P and NP
2. The student will be able to compute Nash equilibrium
3. The student will be able to design a context-free grammar to generate a context free language
4. The student will be able to design a finite-state machine to recognize a regular language

5. The student will be able to design a Turing machine to recognize a language
6. The student will be able to represent context free language using push down automata
7. The student will be able to use RSA for encoding and decoding
8. Students are able to describe how ways of knowing and creating knowledge differ across disciplines
9. Students will learn how computation affects society

**Reference Materials and/or Technology:**

- Discrete Mathematics II, course pack (online) by B.S. Elenbogen and J.P. Baugh
- Models of Computation by J. Erickson

**Assignment and Grading Distribution:**

| | | |
|---|---|---|
| Tests | 150 points each | 45% |
| Quizzes | 20 points each | 10% |
| Essays | 20 points each | 10% |
| Final Exam | 200 points | 30% |
| Misc. | | 5% |
| Pretest | | 1% |

**Grading Scale:**

| | |
|---|---|
| **95 – 100%** | **A** |
| **90 – 94%** | **A-** |
| **86 – 89%** | **B+** |
| **83 – 85%** | **B** |

| | |
|---|---|
| **80 – 82%** | **B-** |
| **76 – 79%** | **C+** |
| **73 – 75%** | **C** |
| **70 – 72%** | **C-** |

| | |
|---|---|
| **66 – 69%** | **D+** |
| **63 – 65%** | **D** |
| **60 – 63%** | **D-** |
| **Below 60%** | **F** |

## Tentative Course Outline:

| Week | Date | Topic | Reading | Assignments |
|---|---|---|---|---|
| 1 | 1/13/2021 | Introduction to the course; pretest; background information | | |
| 2 | 1/20/2021 | Automata and Regular Languages | 3.1 – 3.5 | Essay 1 assigned |
| 3 | 1/27/2021 | Non-regular languages and Kleene's Theorem | 3.6 – 3.8 | |
| 4 | 2/3/2021 | Grammars and Context Free Languages | 4 | |
| 5 | 2/10/2021 | Turing Machines and the Halting Problem | 5 | |
| 6 | 2/17/2021 | Complexity Theory, P, and NP | 6.1 – 6.4 | |
| 7 | 2/24/2021 | *Special Topics, Review* | | |
| 8 | 3/3/2021 | *Special Topics*<br>Review and Test 1 this week | | Essay 2 assigned |
| 9 | 3/10/2021 | *Special Topics, Review* | | |
| 10 | 3/17/2021 | Cryptography and RSA | 1 | |
| 11 | 3/24/2021 | Game Theory and Nash Equilibrium | 2 | |
| 12 | 3/31/2021 | Computational Geometry | 7 | |
| 13 | 4/7/2021 | *Special Topics*<br>Review and Test II this week | | |
| 14 | 4/14/2021 | **Review for Final** | | |
| 15 | 4/21/2020 | **Final Exam (Asynchronous delivery, multiple times)** | | |

### Course Policies

**Due Dates:** All assignments are due at 11:59 pm on the date specified. Projects may be turned in up to one week late, at a penalty of 5% per day. Exceptions to these rules will be made only under *exceptional* circumstances, and then only with an appropriate written excuse.

**Grade disputes and corrections:** If you are dissatisfied with a grade you receive, you need to contact me **within one week** of the date that I first attempted to return the exam or

assignment results to you.

**Plagiarism:** Although students are encouraged to help their classmates, students sharing code are guilty of plagiarism. If programs are considered too similar, the students will be asked to explain. In all cases of cheating, students who supply code or take it will both be penalized. **The minimum penalty for all students involved in cheating is failure on the assignment**. The assignments in this class are for student use only. You are not allowed to post any assignments on the Internet or share them with other students. Students who turn in questionable programs and homework assignments are subject to defend them orally to the professor without warning.

**Exams:** The exams will be closed books and closed notes; however, you may bring a piece of information sheet (letter size, both sides). **Unless prior arrangements are made, a grade of zero will be recorded for missed exams.**

**University Attendance Policy:**

A student is expected to attend every class and laboratory for which he or she has registered. Each instructor may make known to the student his or her policy with respect to absences in the course. It is the student's responsibility to be aware of this policy. The instructor makes the final decision to excuse or not to excuse an absence. An instructor is entitled to give a failing grade (E) for excessive absences or an Unofficial Drop (UE) for a student who stops attending class at some point during the semester.

**Academic Integrity Policy:**

The University of Michigan-Dearborn values academic honesty and integrity. Each student has a responsibility to understand, accept, and comply with the University's standards of academic conduct as set forth by the Code of Academic Conduct (http://umdearborn.edu/697817/), as well as policies established by each college. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offenses and violations can result in penalties up to and including expulsion from the University.

**Disability Statement:**

The University will make reasonable accommodations for persons with documented disabilities. Students need to register with Disability Resource Services (DRS) every semester they are enrolled. DRS is located in Counseling & Support Services, 2157 UC (http://www.umd.umich.edu/cs_disability/). To be assured of having services when they are needed, students should register no later than the end of the add/drop deadline of each term. If you have a disability that necessitates an accommodation or adjustment to the academic

requirements stated in this syllabus, you must register with DRS as described above and notify your professor.

**Safety:**

All students are strongly encouraged to register in the campus Emergency Alert System, for communications during an emergency. The following link includes information on registering as well as safety and emergency procedures information:
http://umemergencyalert.umd.umich.edu/

Finally, all students are also encouraged to program 911 and UM-Dearborn's Public Safety phone number (313) 593-5333 into personal cell phones. In case of emergency, first dial 911 and then if the situation allows call UM-Dearborn Public Safety.