Discrete structures syllabus (Fall 2020 – 15 week – online only)

Course instructor

Dr. Jonathan A. Saddler
Teaching Assistant Professor of Computer Science
East Carolina University

Office hours and course communications

Office: Science and Technology Building Room C117
Office Hours:
Tuesdays and Thursdays 5:00 – 6:00 PM (during catalog lecture hours)
Mondays and Fridays 3:00 – 4:00 PM
Email: jsaddlerecu@gmail.com AND SADDLERJ20@ecu.edu

Credit hours – ~~3.0~~ 4.0

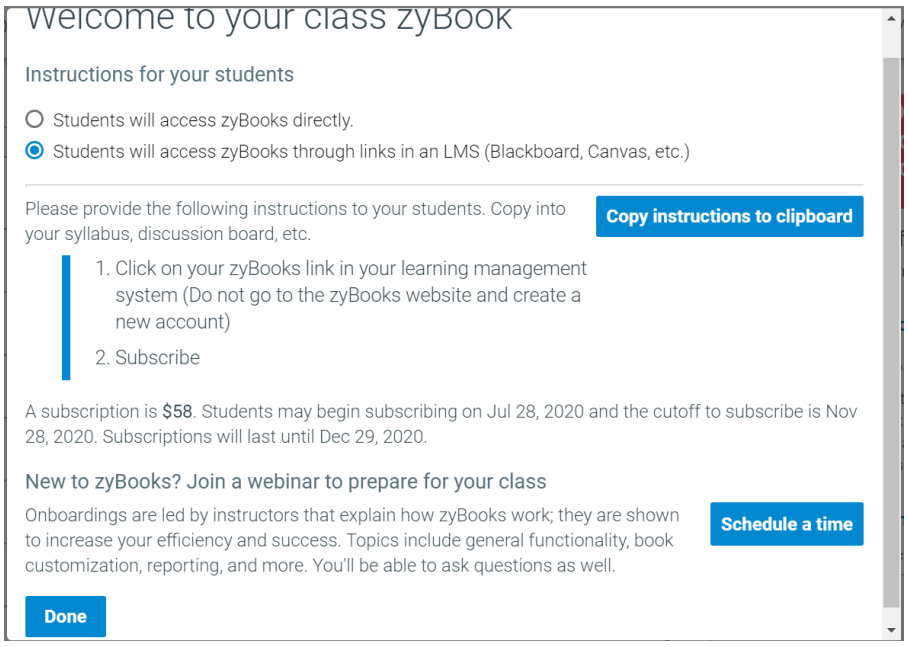
Course description

This course provides an accelerated introduction to the essentials of discrete structures, combinatorics, graph theory, automata, and algorithms.

Course teaching assistant

There may be one teaching assistant assigned to this course. To be determined.

Required Textbooks



Reference books – (all are optional for this course)

1. Rosen, K. H. (2018). Discrete Mathematics and its Applications (8th ed.). McGraw-Hill.
2. Epp, S.S. (2019). *Discrete Mathematics with Applications* (5th ed.). Cengage Learning.
3. Graham, R. L., Knuth, D. E., & and Oren Patashnik. (1994). *Concrete Mathematics: A Foundation for Computer Science* (2nd ed.). Addison- Wesley Professional.
4. Lewis, H., & Zax, R. (2019). *Essential Discrete Mathematics for Computer Science.* Princeton University Press.
5. Lehman, E., Leighton, F. T., &Meyer, A. R. (2018). *Discrete Mathematics for Computer Science.* Creative Commons Attribution- ShareAlike 3.0 license. https://courses.csail.mit.edu/6.042/spring18/mcs.pdf
6. Liben-Nowell, D. (2017). Discrete Mathematics for Computer Science.Wiley .

Student learning outcomes

After successful completion of the course, you will be able to do the following:

- Model computational problems and solve them using sets, relations, and functions
- Solve counting problems using combinatorial techniques
- Apply concepts of graph theory to model and solve graph-theoretic problems
- Solve different types of recurrence relations using both exact and asymptotic notation
- Prove lemmas and theorems using mathematical induction
- Algebraically manipulate asymptotic expressions
- Solve a class of computational problems using finite-state automata
- Critique capabilities and limitations of finite-state automata

Major course topics

- Logic and proof techniques
- Essential discrete structures: sets, functions, sequences , sums, matrices, and relations
- Algorithms and asymptotic notations - Big-0, Big-Omega and Big-Theta
- Induction and recursion
- Counting principles, permutations and combinations, and binomial coefficients, and Discrete probability
- Techniques for solving recurrence relations
- Graph terminology and concepts, basic graph theory and algorithms, modeling real life problems using graphs + Trees and tree traversals
- Analysis, design, capabilities, limitations of finite state automata

Course assessment and grading scale

Undergraduate Students (does not apply)

Graduate Students:

- Assignments (60%)
    - Made up of: Zyante
    - + Video Assignments
    - + Turned in Assignments
    - Watch my videos and respond via (Canvas?, Teams? Email? I'll direct you)
- Midterm exam (15%)
- Final exam (20%)
- Innovative contribution to online course content (5%)
- Extra credit (up to 5%)
  Those who wish to seek extra credit, check with the course instructor.

Score Range	Letter Grade
90 – 100	A
80 – 89.9	B
70 – 79.9	C
60 – 69.9	D
$\leq$ 59.9	F