

**CMPS 200 DISCRETE STRUCTURES  
FALL 2023**

**2017 - 2020 Catalog Data: CMPS 200 DISCRETE STRUCTURES**

(Credit, 3 hour) (Lecture, 3 hours). Mathematical foundations of Computer Science, including fundamentals of logic, set theory, Boolean algebra, graph theory and finite state machines. Topics to be covered in this course include concept of logic and proofs, sets, functions, relations, sequences and sums, algorithms and computational complexities, matrices, induction and recursion, trees and graphs, Boolean algebra, grammars, languages, and finite state machines.

**Prerequisite:** Sophomore standing in Computer Science, MATH 135.

**Credit Hours:** 3  
**Instructor:** Dr. Davoud Arasteh, Professor  
**Office Location:** Room 416, Pinchback Hall  
**Office Phone:** (225) 771-3727  
**Office Hours:** MWF 9 -11, TR 8-9:30

**E-mail:** davoud\_arasteh@subr.edu  
**Textbook:** Kenneth H. Rosen, *Discrete Mathematics and its Application*, 7<sup>th</sup> edition, ISBN 978-0-07-338309-5, McGraw-Hill Companies, Inc., ISBN-13: 978-1-4292-1510-7

**Reference:** Judith L. Gersting, *Mathematical Structures for Computer Science*, *Discrete Mathematics and Its Applications*, 7<sup>th</sup> edition, W. H. Freeman and Company, A Macmillan Higher Education Company

**This course addresses:** Program Educational Objectives - PEO 1, PEO 2

Program ABET Outcomes - Outcome 6

**Target:** 70% will perform at the level of performance in achieving ABET Outcomes 6.

**Program Educational Objectives:** The Educational Objectives of the computer Science Program are to produce graduates who:

**PEO 1:** Successfully enter the competitive job market or pursue advanced study;

**PEO 2:** Are proficient in identifying, formulating, and solving a wide range of computing problems;

**PEO 3:** Are capable of working collaboratively, and communicating effectively with team members, constituents, and the public;

**PEO 4:** Uphold professional and ethical responsibilities, and contribute to society through active engagement.

**Program ABET Outcomes: Graduates of the program will have an ability to:**

**Outcome 1:** Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions; [PEO 1, PEO 2]

**Outcome 2:** Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline; [PEO 1, PEO 3]

**Outcome 3:** Communicate effectively in a variety of professional contexts; [PEO 1, PEO 3]

**Outcome 4:** Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles; [PEO 1, PEO 4]

**Outcome 5:** Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline; [PEO 1, PEO 3]

**Outcome 6:** Apply computer science theory and software development fundamentals to produce computing-based solutions; [PEO 1, PEO 2]

**Course Objectives:**

**Course Objective 1.** Students learn the major mathematical concepts that form the basis of computer science.

**Course Objective 2.** Students develop a sound understanding of logic systems, including propositional and predicate calculus, and be able to apply proof techniques.

**Course Objective 3.** Students learn the main structures (sets, relations, functions, matrix, graphs, trees), and be adept at solving problems and proving theorems related to them.

**Course Objective 4.** Students learn about the complexity of various computational problems and be able to classify and quantify them.

**Course Learning Outcomes [CLO]:** Upon successful completion of the course, students will demonstrate the ability to:

**CLO 1.** Represent logical statements in propositional and predicate calculus, and use truth tables and formal proofs to determine their truth values. [ABET 1] [Course Objective 1]

**CLO 2.** Create a truth table for a logical expression. Derive a logical expression from a given truth table. Design a circuit to perform a simple task. Construct a circuit from a logical expression using AND, OR, and NOT gates. Simplify logical expressions. Derive a logical expression from a given circuit. [ABET 1] [Course Objective 1]

**CLO 3.** Describe set notations using predicate calculus. Determine the power of a set. Use predicate calculus to prove set theoretic propositions. [ABET 1] [Course Objective 2]

**CLO 4.** Define binary relations and their properties using predicate calculus. Represent binary relations as ordered pairs, matrices, or graphs. Combine binary relations by union, intersection, and composition using matrix operations. [ABET 1] [Course Objective 3]

**CLO 5.** Describe the asymptotic growth of functions, and compare functions using big-o notation. Compare asymptotic growth and prove inequalities by induction. Determine and solve recurrences arising from algorithms. [ABET 1] [Course Objective 4]

**CLO 6.** Describe and use proof by induction. Derive closed-form representations for recursively defined sequences; prove their correctness by induction. Derive recursive sequences from closed-form functions and prove their equivalence by induction. [ABET 1] [Course Objective 2]

**CLO 7.** Describe and determine the existence of Euler circuits and paths and Hamilton circuits and paths in graphs. Determine the minimum spanning tree of a graph. [ABET 1] [Course Objective 4]

**Course Educational Strategies:**

1. Provide clear lectures, class discussions, and problem analysis of discrete structures concepts.
2. Provide students with the opportunity to learn course material through reading and working on homework assignments.
3. Allow students to demonstrate mastery of the course concepts through quizzes, tests, and exams.
4. Provide students with the opportunity to learn more about pseudo programming algorithms through their applications to real world problems.

**Course Topics:**

This course will cover the elementary discrete mathematics for computer science and engineering. It emphasizes mathematical definitions and proofs as well as applicable methods.

Topics include the mathematical concepts and structures such as sets, relations, functions, graphs, trees and logic systems that form the basis of computer science.

Chapter 1 The Foundations: Logic and Proofs

Chapter 2 Basic Structures: Sets, Functions, Sequences, Sums, and Matrices

Chapter 3 Algorithms

Chapter 4 Number Theory and Cryptography

Chapter 5 Induction and Recursion

Chapter 6 Counting

Chapter 8 Advanced Counting Techniques

Chapter 9 Relations

Chapter 10 Graphs

Chapter 11 Trees

Chapter 12 Boolean algebra

**COURSE RULES AND PROCEDURES**

**Exam policy:** Exams will emphasize concepts developed in the course. Exams will be closed book and notes unless stated otherwise. Students will not be able to pause the exams. There must be no sharing of any materials during exams. Communicating to one another is not permitted while taking an exam. If there are questions, they should be directed to the instructor.

**Attendance policy and class participation:** Students are expected to be present and on time and participate in class (whether virtual or in-person attendance) from the beginning throughout the end of the class period. Though attendance is strongly encouraged, merely attending classes does not guarantee a passing grade. It is every student responsibility to make sure that he/she signs the roll during class.

**Makeup test or exam:** No makeup test or exam will be given except in the case of emergency such as the student being sick, or he/she is unable to come to class due to some unforeseen event. An official proof MUST be presented to the instructor and student is required to take the makeup test/exam as soon he/she returns to class in the following class session. Failure to comply will result in the grade of zero (0) for the test/exam.

**Use of electronic devices while in class:** Students are not allowed to use the computers for other purpose unrelated to the course content during the lectures unless authorized by the instructor of this course for the purpose of the course. Please turn off (or place on silence) your cellular phones before the lecture starts. The Hybrid classes will be through Microsoft Teams. Make sure to mute your microphone during the remote delivery of the lectures.

**Academic honesty and plagiarism:** Please review the Southern University – Baton Rouge Student Handbook for information regarding the university's academic conduct policy and what constitutes plagiarism. Academic dishonesty and plagiarism will NOT be tolerated. The remote attendees must specially stick to these guidelines.

**Assignment policy:** Students are NOT allowed to share their assignments or to communicate during the tests or exam. No late assignment will be accepted and no make up for assignments and quizzes.

**Grading Distribution:**

A student's grade at the end of the semester will be determined by the following percentages.

Quizzes (25%)

Tests (25%)

Midterm Exam (25%)

Final Exam (25%)

**Grading Scale:** A=90 - 100, B=80 - 89, C=70 - 79, D=60 - 69, F= Below 60

**MOODLE ACCESS** – Southern University and A&M College at Baton Rouge will use Moodle extensively in this course. Moodle is a learning management system designed to help teachers and students communicate effectively online. The course syllabus, class materials (e.g., handouts, PowerPoint slides, journal articles, assignments, readings, etc.) will be placed on Moodle. The student should check Moodle DAILY for all assignments submitted via Moodle. If the student has problems with his Moodle account, he/she should contact Ms. Chrisena Williams-Brown in the Division of Information Technology via email at [chrisena\\_williams@subr.edu](mailto:chrisena_williams@subr.edu) or via phone at (225) 771-5017.

### INSTITUTIONAL POLICIES

**ACADEMIC DISHONESTY** – Southern University and A&M College's *Student Code of Conduct* (Code 1.1) identifies academic dishonesty as any deliberate attempt to gain an unfair advantage in academic work. Examples of academic dishonesty include cheating, falsification of information, fraud, plagiarism, and unauthorized access to academic records, providing information, material, or other assistance with knowledge that such assistance could be used in violation of the *Student Code of Conduct* or other University policies, or providing false information in connection with any inquiry regarding academic dishonesty.

[Academic Dishonesty Policy](#) - link to PDF [Report Academic Dishonesty](#) - link to PDF

**ACADEMIC GRIEVANCES** – Southern University and A&M College students may seek redress in academic decisions when they believe the decision is unfair or ungrounded. The academic grievance procedure provides prompt and equitable resolutions to student academic grievances. Classroom related matters should be subjected to these procedures only when the grievance cannot be settled in the ordinary course of immediate post-class discussion. Academic grievances are not handled by the Office of the Dean of Students.

[Student Academic Grievance Procedures](#) - link to PDF

**ADA COMPLIANCE** – Southern University Baton Rouge is committed to providing reasonable accommodations for students with documented disabilities in compliance with the American with Disabilities Act (ADA). Students may request accommodations by registering with the Coordinator for Disability Services. It is important to do this early each semester because ADA accommodations are not retroactive. Upon completion of the application, the Coordinator will be responsible for forwarding the letter of accommodations to the students' professors. Accommodations will begin upon acknowledgement that the professor has received the letter of accommodations. All discussions with the faculty/student/Coordinator will remain confidential.

Contact Information

The Office of Disability Services is in Office # 246, A. C. Blanks Hall, in the center of the campus.

**Southern University Office of Disability Services**

**Jada J. Netters, Coordinator** P.O. Box 11298 Baton Rouge, LA 70813 Phone: (225) 771-3546 (V/TTDD)  
Email: [ods@subr.edu](mailto:ods@subr.edu) Website: [www.subr.edu/ods](http://www.subr.edu/ods)

The Office of Disability Services (ODS), under the auspices of the University Counseling Center, assists students in meeting their unique academic/educational, personal, vocational and social needs that would otherwise prove to be an obstacle to educational pursuits. The Office of Disability Services (ODS) provides

confidential services to those students who, in this post-secondary setting, **must request and provide the necessary documentation to verify a special needs request.** Diagnostic educational evaluations/examinations are not conducted through ODS. Academic accommodations are made based on a student's documented disabilities.

**Disruption of the Academic Process**—The University's Student Code of Conduct (Codes 1.6 and 2.2) broadly defines disruption/obstruction as any major/minor action which obstructs, or attempts to obstruct, an official University function, such as teaching, research, administration, or other campus activity.

[Disruption Policy](#) - link to PDF [Report Classroom Disruption](#) - link to PDF

**Southern University Statement of Non-Discrimination**—In compliance with Title IX of the Education Amendments of 1972, Title VI and VII of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, and other federal, state, and local laws, Southern University and A&M College forbids discriminating or harassing conduct that is based on an individual's race, color, religion, sex, ethnicity, national origin or ancestry, age, physical or mental disability, sexual orientation, gender identity, gender expression, genetic information, veteran or military status, membership in Uniformed Services, and all other categories protected by applicable state and federal laws. This commitment applies, but is not limited to decisions made with respect to hiring and promotion, the administration of educational programs and policies, scholarship and loan programs, and athletic or other College administered programs. Discriminatory acts of any kind are strictly forbidden.

Any member of the Southern University and A&M College community has the right to raise concerns or make a complaint regarding discrimination without fear of retaliation. All inquiries regarding the application of this statement and related policies may be referred to:

Cedric Upshaw, Title IX Coordinator, at (225) 771-5565.

Complaints may also be made via email at [titleix@subr.edu](mailto:titleix@subr.edu) or by visiting [www.subr.edu/titleix](http://www.subr.edu/titleix).

**Standards for Satisfactory Academic Progress**—The Higher Education Act of 1965 as amended and final regulations set by the United States Department of Education (34CFR668.16) require that institutions of higher education establish reasonable standards of Satisfactory Academic Progress (SAP) as a condition of continuing eligibility for federal aid programs. Financial aid recipients are expected to make reasonable progress as a condition of receiving and continuing to receive student financial aid. Student progress is assessed according to both qualitative and quantitative measures. The University has developed this policy to provide a framework for monitoring and determining a student's Satisfactory Academic Progress in accordance with Federal and Institutional requirements. This policy applies to all new, transfer, re-entry, re-admit with transfer work, and continuing students at Southern University.

For additional information, please visit [www.subr.edu/cusa](http://www.subr.edu/cusa)

**Student Email Policy**—Email is a universal service that has greatly enhanced communication both internally within the Southern University and A&M College community and externally to users, including prospective students, alumni, and the public at large. The purpose of the University's general email policy is to describe the appropriate use of University email facilities, associated responsibilities, and rights of all users of University email facilities and official Southern University and A&M College email accounts. This student email policy is a supplement to the University's general email policy.

[Student Email Policy](#) - link to PDF

**Tobacco Free Campus Policy**—The Southern University System (SUS) maintains a 100% Tobacco-Free Policy. Smoking and tobacco use of any kind will be prohibited on all SUS campuses and/or other properties owned and/or leased locations/premises; all internal and external areas, parking garages, and parking lots; all entrances and exits; and in all SUS owned and/or leased vehicles. Students may not smoke in their own or others' vehicles when the vehicles are parked on SUS properties. This policy will be in place at all

Southern University and A&M College sponsored events-both on our premises and at external locations hosting such events, including non-University hours and will further apply to all faculty, staff, students and visitors.

[SUBR Tobacco Free Policy](#) - link to PDF