

## **CMPS 201 Data Structures Spring 2020**

### **Course Information:**

|                |                 |
|----------------|-----------------|
| CRN:           | 20153           |
| Course Number: | CMPS 201        |
| Section:       | 1               |
| Course Title:  | Data Structures |
| Credit Hours:  | 3               |
| Prerequisite:  | CMPS191         |

### **Lectures:**

|                 |                          |
|-----------------|--------------------------|
| Day and Time:   | TR 11:00-12:20           |
| Class Location: | N205, Henry Thurman Hall |

### **Instructor:**

|                  |                        |
|------------------|------------------------|
| Name:            | Shuju Bai, Ph.D. E111, |
| Office Location: | Thurman Hall 225       |
| Office Phone:    | 771-3021               |
| Office Hours:    | MTWR: 12:30-2:00pm     |
| Email:           | shuju_bai@subr.edu     |

### **Catalog Description:**

CMPS 201 DATA STRUCTURES (Credit, 3 hours). This course presents the data structures which may be used in computer storage to represent the information involved in solving problems. Analysis of algorithmic complexity and techniques for estimation and measurement are introduced. It Covers standard structures for representing data in abstract (described by a model) form and concrete (described by an implementation) form. Prerequisite: Completion of COMPS 191 with a "C" or better.

### **Audience:**

This course is designed for students in the under-graduate program in computer science.

### **Textbook and Materials:**

Required: C++ Plus Data Structures by Nell Dale, 6th edition, ISBN: 978-1-284-08918-9

### **Course Objectives:**

The students learn in this course the concepts of data structures. A successful student will have the knowledge of various ADTs such as lists, stack, queue, and tree structures. Students will also have thorough understanding of graph concepts and some sorting and searching algorithms. In addition, students will be able to implement various ADTs using C++.

This course addresses ABET Program Educational Objectives 1, 2, and 3.

The Educational Objectives of CMPS201 of the Computer Science Program are to produce graduates who

- successfully enter the competitive job market or pursue advanced study. [PEO1]
- are proficient in identifying, formulating, and solving a wide range of computing problems. [PEO2]
- are capable of working collaboratively, and communicating effectively with team members, constituents, and the public. [PEO3]

### **Course Student Outcomes:**

This course addresses ABET Program Student Outcomes 1 and 6. Each student will demonstrate

- an ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions. [SO1]
- an ability to apply computer science theory and software development fundamentals to produce computing-based solutions. [SO6]

**Course Educational Strategies:**

- Provide clear lectures and discussions of major concepts of data structures.
- Assign homework and programming projects to students to help them master the course materials delivered.
- Provide programming labs to enhance students' software implementation skill.
- Conduct quizzes and exams to urge students to review learned materials and check the level of mastery of the knowledge for each student.
- Collect comments and feedback from students.
- Welcome students to discuss any course-related issues.

**Topic Outline:**

1. Review of Programming Concept
2. Software Engineering Principles
3. Data Abstraction
  - A. Abstract Data Type
  - B. Language Features to Support Data Abstraction
  - C. Comparison of Algorithms (Big - O Notation)
4. Unsorted and Sorted Lists.
  - A. List building
  - B. Sorting
  - C. Searching
5. Linked Lists.
  - A. Single
  - B. Double
  - C. Circular
6. Stacks
7. Queues
8. Recursion
9. Trees
  - A. Tree Concepts
  - B. Binary Search Trees
  - C. Traversals of Trees
  - D. Heaps
  - E. Advance Tree Concepts
10. Graphs
  - A. Depth First and Breath First Algorithms
  - B. Graph Algorithms – Prims, Dijkstra, Floyds
11. Advanced Sorting and Searching Techniques
  - A. Hashing
  - B. Quicksort
12. Additional Topics  
May include Graphs, AVL Trees, 2-3 Trees and other advanced topics.

**Grading Distribution:**

| <i>Course Work</i>                         | <i>Approx. weight in grade</i> |
|--------------------------------------------|--------------------------------|
| Attendance                                 | 5                              |
| Homework, quizzes, programming assignments | 35                             |
| Midterm                                    | 30                             |
| Final                                      | 30                             |

**Grading Scale:**

- |            |     |
|------------|-----|
| 90% – 100% | - A |
| 80% – 89%  | - B |
| 70% – 79%  | - C |
| 60% – 69%  | - D |
| Below 60%  | - F |

Grades may be curved at the end of session at the instructor's discretion.

## **Course Requirements:**

### **Programs and Programming Projects**

Programming assignments are a mandatory part of the course. Homework programs will concentrate on implementing fundamental programming concepts and techniques. Projects will be large scale programs implementing the Abstract Data Types discussed in class. Programming Projects will be worth significantly more points than homework programs. There will be at least 3 large programming projects during the semester.

### **Examinations**

Several written examinations will be given and a comprehensive final exam will be given. Examination dates will be announced at least 1 week in advance.

Several programming exams will also be given. A programming exam consists of a student being required to complete several programming assignments during the class period with no assistance.

### **Quizzes and Homework**

Quizzes are generally unannounced and may be given at any time and may cover any class material or any assigned material. Programming quizzes may also be given where the student is required to complete programming assign during the class period with no assistance.

Grading will consist of several exams, both written and programming, homework programs and programming projects, quizzes and homework. The final point total may be adjusted to reflect the actual number of assignments given.

## **Course Rules and Procedures:**

**Exam policy:** Exams will emphasize concepts developed in the course. Exams will be closed book and notes unless stated otherwise (if formulas, tables, etc. are needed, the instructor will supply them). Students will not be able to leave the classroom while they are taking an exam. There will be no sharing of any materials (including calculators) during exams. Communicating to one another is not permitted while taking an exam. If there are questions, they should be directed to the instructor. Students who communicate to one another will receive a zero for that exam.

**Attendance policy and class participation:** Students are expected to be present and on time and participate in class 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 in class when one is provided, or he/she pays attention during the roll call.

**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 classroom computers or laptop 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.

**Missing or late assignments/quizzes/exams:** At the instructor's discretion, students may be given opportunity for late submission of an assignment or retake of a quiz or exam upon presentation of a valid excuse.

**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.

**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.

**Concern policy:** Any questions/concerns/issues related to grading should be address in 5 business days after the grade is issued, other issues (absence, performance, and all) should be addressed as soon as possible.

**Change to syllabus:** Any aspects of this syllabus may be subject to change. However, any substantive changes affecting distribution of grades for various components of the course will be accompanied with prior notice given to students via class announcement and Blackboard announcement or email.

**Livertext Access:** Each student is required to have access to LiveText. Southern University and A&M College-Baton Rouge has entered into partnership with LiveText, Inc. to provide online academic resources for student collaboration and learning outcomes assessment. Therefore, all students enrolled in this course are required to purchase a subscription from LiveText, Inc. through the Southern University Bookstore. LiveText, Inc. provides students with the electronic tools and services needed to serve them in their courses and in their career or academic pursuits beyond graduation.

**Moodle Access:** Southern University and A&M College at Baton Rouge will used 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. All course communications will be primarily via SUBR email or Moodle. Students are responsible for regularly checking their emails and 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.

**Academic Dishonesty:** The University defines academic dishonesty as premeditated and un-premeditated fraudulent behavior. Premeditated fraud is defined as conscious, pre-planned, deliberate cheating with materials prepared in advance. Unpremeditated fraud is defined as cheating without the benefit of materials prepared in advance. See the Southern University and A & M College Catalog for a more detailed definition of academic dishonesty. In addition, administrative regulations governing the conduct of students enrolled at the University are contained in the Code of Student Conduct. A copy of the Code of Student Conduct may be obtained from the Office for Student Affairs.

**ADA Compliance:** Students with documented disabilities who believe that they may need accommodations in this class are encouraged to contact the Disability Services Coordinator in the Office of Disability services, 234 A.C. Blanks Hall, 225-771-3950 (Voice/TTD), 225-771-5652 (Fax), as soon as possible to ensure that such accommodations are implemented in a timely fashion. Students who need accommodations must be registered with the Office of Disability Services. Students are responsible for informing the instructor of any instructional accommodations and/or special learning needs at the beginning of the semester. All discussions will remain confidential.