

SOUTHEAST COMMUNITY COLLEGE
DIVISION OF ARTS AND SCIENCES
Computer Science
Revision Date: 07-01-24

I. CATALOG DESCRIPTION

Course Number: CSCI2311
Course Title: Data Structures and Algorithms for Informatics
Prerequisite(s): A grade of "C" or higher in MATH2170 or BSAD2170 or appropriate score on math placement test.
Catalog Description: This is an introductory course to algorithms and data structures for students with diverse non-computer science background but interested in informatics. Foundational coverage of algorithms includes both problems (such as indexing, searching, sorting, and pattern matching) and methods (such as divide-and-conquer, dynamic programming, greedy, network flow and graph theory). Foundational coverage of data structures includes lists, tables, trees, graphs, and multidimensional arrays. Advanced topics will be studied in the context of informatics applications. Specifically, students will learn the fundamental ideas for how to efficiently analyze structured data, and how to solve challenging problems in general informatics.
Credit Hours: 3.0
Class Hours: 45
Lab Hours: 0
Total Contact Hours: 45

II. COURSE OBJECTIVES: *Course will*

- A. Mastery: general algorithmic approaches including recursion, greedy methods and divide-and-conquer, including fluency with common algorithms for searching, sorting, hashing, and pattern matching, and fluency with informatics data structures including lists, stacks, queues, linked lists, trees, and graphs.
- B. Familiarity: algorithm correctness and with complexity analysis; informatics problems.
- C. Exposure: dynamic programming, NP Completeness, decidability.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Think logically/critically
 - 2. Become familiar with well-known algorithms and data structures
 - 3. Develop problem-solving strategies using Python and common Computer Science techniques
 - 4. Understand applications of abstract structures and concepts.
- B. General Education Learning Outcomes
 - 1. GELO #5: Analytical, Quantitative, and Scientific Reasoning
Outcome: Apply mathematical and scientific methods to solve problems from an array of contexts and everyday situations.
Outcome: Effectively develop strategies, algorithms, or experiments (or performing experiments) to better describe the systems or to solve the problems.

IV. CONTENT/TOPICAL OUTLINE (*course outline may provide more detailed information*)

- A. Python review
- B. Algorithm Analysis
- C. Data Structures

- D. Recursion
- E. Searching and Sorting
- F. Trees and Tree Algorithms
- G. Graphs and Graph Algorithms
- H. Python Packages and Machine Learning for Informatics

V. INSTRUCTIONAL MATERIALS

- A. Required program(s):
 1. Problem Solving with Algorithms and Data Structures using Python, Third Edition by Brad Miller and David Ranum, Franklin and Beedle Publishers, 2014.
(Online:
<https://runestone.academy/ns/books/published/pythonds3/index.html?mode=browsing#>)

VI. METHOD OF PRESENTATION/INSTRUCTION

- A. Methods of presentation typically include a combination of the following:
 1. Class lecture
 2. Projects using data sets.
 3. Problem sets
 4. Individual student assistance as needed.
 5. Group activities and email.

VII. METHODS OF EVALUATION

- A. Methods of evaluation typically include a combination of the following:
 1. Projects
 2. Investigations/Activities/Reports (varies with instructor)
 3. Comprehensive final project (required—counts 10-25% of grade)
- B. SCC GRADING SCALE

A+	95-100	C+	75-79	F	59 or less
A	90-94	C	70-74		
B+	85-89	D+	65-69		
B	80-84	D	60-64		

VIII. SPECIFIC COURSE REQUIREMENTS

- A. None.