

University of Arkansas – Fort Smith
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General Syllabus

CS 4153 Advanced Algorithms

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisite: CS 3103 Algorithm Design

Effective Catalog: 2018-2019

I. Course Information

A. Catalog Description

Explores the topics of advanced algorithm design with a special focus on efficiency, analysis, and implementation.

B. Additional Course Information

This course is used to satisfy the requirements for the Programming and Data Analytics concentrations in the Information Technology degree. It may also be used as an upper level elective in all other concentrations of the IT degree.

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Analyze and develop operational knowledge of advanced algorithm design
2. Explain, design and apply advanced data structures
3. Develop operational knowledge of geometric algorithms
4. Evaluate and rank the complexity of parallel algorithms
5. Evaluate and assess current trends in algorithm design and research

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Communication Skills (written and oral)

Students will apply programming documentation, demonstrations and technical explanations to concepts and code execution.

Analytical Skills

Critical Thinking Skills: Students will design algorithm requirements and properties to implement the appropriate programming code solution or application implementation to solve the given problem. Students will measure effective solutions and accurate output in both programming and written solutions.

III. Major Course Topics

- A. Algorithm Efficiency
- B. Advanced Data Structures
- C. Dynamic Programming
- D. Greedy Algorithms
- E. Network flows
- F. Computational Geometry
- G. Parallel Algorithm Design
- H. Computability
- I. Applications of advanced algorithms
- J. Large data sets and compression
- K. Streams
- L. Disk-oriented data structures