CMSC 401
Algorithm Analysis with Advanced Data Structures
Syllabus

Catalog listing: CMSC 401
Course Level: Undergraduate
Prerequisites: CMSC 256 and CMSC 302
Instructor: Eyuphan Bulut
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Classroom: TR 11:00 AM – 12:15 PM (Engineering Building West 101)
Class website: CANVAS
Office Hours: TBD
TAs: TBD

1.0 – Overview (Catalog Course Description):

Semester course; 3 lecture hours. 3 credits. Prerequisites: CMSC 256 with a grade of C or better and CMSC 302 with a grade of C or better. Topics covered include foundations of algorithm and complexity analysis, advanced data structures including heaps, B-trees, hashing and graph representation; incorporating data structures into object-oriented design; analysis of various searching, sorting and shortest-path algorithms. Algorithm design topics include divide-and-conquer, dynamic programming and greedy methods.

2.0 – Course Structure:

Lecture hours/week – 3
Lab hours/week – 0

3.0 – Course Goals

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

- Apply mathematical knowledge to analyze algorithm's computational complexity
- Use knowledge of computing to prove correctness of algorithms

- Make correct design choices on the type of data structures and the type of the algorithms to use to solve given problems

4.0 – ABET Criteria Addressed:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
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.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

Other Criteria Addressed:

- Substantial coverage of algorithms and complexity, computer science theory, concepts of programming languages, and software development.

5.0 – Major Topics Covered:

- Foundations of algorithm and complexity analysis
- Solving recurrences
- Divide and conquer approach
- Advanced Data Structures
- Sorting and Order Statistics
- Advanced design and analysis techniques
- Graph algorithms (BFS, DFS, Dijkstra, MST, Max-Flow)
- Greedy Approach
- Dynamic programming

6.0 – Textbook(s):

Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms, Third Edition"

Book is available online at VCU library

- https://proxy.library.vcu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=343613

7.0 – Class Schedule:

- Lecture: T/R 11:00 AM – 12:15 PM (Engineering Building West 101)
- Lab: None

8.0 – Evaluation:

General Instructions:

Exams: There will be 3 tests. Tentative Exam Schedule:

- Test 1: Sept 28 (Tue class) Topics: Lectures 0-8
- Test 2: Oct 28 (Thu class) Topics: Lectures 9-16
- Test 3: Dec 9 (Thu class) Topics: Mostly Lectures 17-24 (may include content from Test 1-2 topics)

No make-ups for exams (unless special permission has been given prior to the date of the test.)

Course assignments:

- 4 programming assignments
- 2 theory assignments

Late submissions: 1 day: 20% penalty, 2 days 40% penalty, after 2 days not accepted (no excuses, plan accordingly).

Grading:

Category	**% weight**
Programming Assignments	**40% (10% each)**
Theory Assignments	**10% (5% each)**
Test 1	**15%**
Test 2	**15%**
Test 3	**20%**

Final grade:
A (85% - 100%),
B (70% - 84.99%),
C (60% - 69.99%),
D (50%-59.99%),
F (0% - 49.99%)

9.0– Resources needed:

Java compiler - required
Canvas - required
Piazza - recommended, for asynchronous Q&A outside of office hours
Standard computing resources (computer, operating system, editor, PDF viewer, email client, web browser etc.) - required

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Students should also visit **http://go.vcu.edu/syllabus** and review all syllabus statement information. The full university syllabus statement includes information on safety, registration, the VCU Honor Code, student conduct, withdrawal and more.