GMU Fall 2019
INFS 519 - Program Design and Data Structures

Instructor: Hal Greenwald (hgreenwa@gmu.edu)
Office Hours: Wednesday 4:30 – 6:30
Lecture: Wednesday, 7:20 – 10:00pm   Sandbridge Hall 107

Course Description
Study of the fundamentals of data structures and algorithms applied in programming solutions to application problems. The course stresses programming in a modern high-level language.

Prerequisites
The prerequisite for this course is SWE-510 or its equivalent. You should have a semester's worth of basic programming in Java, including program design, coding, and debugging techniques.

Textbooks
Mark Allen Weiss, Data Structures & Problem Solving Using Java, Addison-Wesley (4th ed. is latest).

Topics to be covered and schedule
The following topics will be covered in approximately the order listed below. Lecture notes will be posted under Blackboard Announcements prior to each class.

Topic	Textbook Chapter(s)
Java – review of selected topics	1 - 4
Algorithm Analysis	5
Recursion, Sorting Algorithms	7, 8
Array, ArrayList, Stacks, Queues	15,16
Linked Lists	17
Trees	18
Binary Search Trees, B-Trees	19
Hash Tables	20
Graphs	14
Huffman Encoding	12.1
Special Topics	TBD

Syllabus: may be subject to modification.

Date:	Topics include:
8/28	Introduction, binary and hexadecimal integers, ASCII and Unicode, Java data types, Strings, Arrays, Multidimensional Arrays, ArrayList, Iterator and ListIterator
9/4	Overriding and Overloading methods, Inheritance, Static vs Dynamic polymorphism, Truth tables, Java bitwise and bit shift operators, Introduction to Algorithmic Complexity
9/11	Abstract Data Types, Sorting and Searching, Singly Linked List, Doubly Linked List, code examples and analysis
9/18	Circular Linked List, Code examples and analysis continued, Generics, **Homework # 1 assigned**.
9/25	Collections framework and Collection interfaces, Legacy classes and synchronization, Stack implementations: Array-based vs Linked list
10/2	The Stack continued, Recursion, Recursion vs Iteration, The Queue interface
10/9	Priority Queues, Algorithm efficiency, Time/Space Complexity, **Homework # 1 due**, Homework # 2 assigned.
10/16	Big O Notation, Priority Queues continued, Binary Trees: Size, Depth, and <u>Balance</u>, **Midterm Exam**
10/23	Binary Trees continued, Binary Search Trees, BST applications
10/30	**Homework # 2 due**, Time Complexity continued, Logarithms, Binary tree traversals continued, Recursive $O(\log(n))$ search, Homework # 3 assigned.
11/6	AVL Trees, Balance factor, Rotations
11/13	Graphs: Directed vs Undirected, Weighted vs Unweighted, Adjacency Matrix, Depth/Breadth-first search, Hash Tables, **Homework # 3 due**, Homework # 4 assigned
11/20	Priority Queues revisited, Heap (Min/Max), Heap Sort
12/4	Huffman Encoding, special topics, **Homework # 4 due**.
12/11	**Final Exam** (Cumulative)

GRADING POLICY

Your course grade will be an aggregate of the following items:

- Homework (40 points): 4 Java programming assignments
- Midterm Exam: (30 points)
- Final Exam – cumulative: (30 points)

Grading:

- A+ is at least 98 points
- A: is at least 90 points
- B+: is at least 88 points
- B: is at least 80 points
- C: is at least 70 points
- D: is at least 60 points

Honor Code
The class enforces the **GMU Honor Code**. Violations of academic honesty will NOT be tolerated.
Both the University and the Computer Science Department have honor codes you are expected to adhere to: https://oai.gmu.edu/mason-honor-code/ and http://cs.gmu.edu/resources/honor-code/. You are bound by these honor codes.
Disability Statement
If a disability or other condition affects your academic performance, please document it with the Office of Disability Services.
Campus Resources
Computer Labs – there are several freely available computer labs on campus, for hours and locations please see: http://doit.gmu.edu/students/computer-labs/computer-lab-locations/
Office of Disability Services - http://ds.gmu.edu

Counseling and Support Services - http://caps.gmu.edu

English as a Second Language (ESL) Writing Support - http://writingcenter.gmu.edu/tutoring/esl-writing-support

Working together vs. individually
For this class homework and exams require individual work. Study groups are *encouraged*, but homework solutions and write-ups MUST be the result of individual effort. Similarly, study groups for examinations are encouraged. However, exams are individual effort and closed book.

Class Policies
Blackboard is used for class announcements, assignments, and other related information.
Please show up on time – late arrivals can be disruptive.
Mute cell phones. If you must take a phone call during class please take it outside the room.
No web surfing or texting during class – it can be disruptive to those around you.
No make-up exams and, in general, no late assignments will be accepted unless otherwise announced.