



Applied Information Technology Department

Course Syllabus

IT306 Program Design and Data Structures

Revised 05.01.2013

Catalog Description

1. Fundamentals of data structures and analysis of algorithms.
2. Large programs written in a modern, high-level programming language.
3. Stresses abstraction, modular design, code reuse, and correctness.

Prerequisites

1. The prerequisites for this course are IT 206 and Math 112 (or approved equivalent courses).
2. A grade of "C" or better must be achieved in the prerequisite courses before a student is qualified to take this course.
3. The prerequisite courses must be completed prior to, not concurrently with, this course. This requirement will be strictly enforced.
4. Any student who does not meet the prerequisite requirement may be dropped from the course by the Instructor at the start of the semester and the student will be responsible for any consequences of being dropped.

Rationale

1. Programming is an essential skill for IT students and IT professionals.
2. Understanding how a computer is instructed to accomplish tasks leads to an appreciation of the underlying concepts of the Information Technology discipline.
3. Learning how to solve a problem using an object-oriented programming language provides a strong foundation that will be used in Database, Security, Web Development and Networking courses.

Educational Objectives

1. Programming is a foundational skill for all computing disciplines.
2. This knowledge area develops skills and concepts that are essential to good programming practice and problem solving.
3. It covers fundamental programming concepts, event-driven programming, object-oriented programming, basic data structures, and algorithmic processes.

Course Outcomes


1. Utilize primitive data types and built-in data structures.
2. Describe common applications for each data structure in the topic list.
3. Write programs that use each of the following data structures: arrays, records, strings, linked lists, stacks, queues and binary trees.
4. Choose the appropriate data structure for modeling a given problem.
5. Describe a simple hash function.
6. Work as part of a Software Development Team.

Major Topics

1. Primitive types
2. Arrays
3. Records
4. Strings and string processing
5. Data representation in memory
6. Pointers and references
7. Linked structures
8. Knowledge of hashing function
9. Use of stacks, queues
10. Use of graphs and trees
11. Use of binary trees
12. Collections and Generics
13. Strategies for choosing the right data structure

Required Textbook

There is one required textbook for this course:

	<p>** REQUIRED **</p> <p><u>Big Java Late Objects</u> By: Cay S. Horstmann</p> <p>Publisher: John Wiley & Sons, Inc. Publication Date: February 1, 2012 ISBN: 978-1-118-08788-6</p>
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Recommended Textbooks and Resources:

1. Data Structures and Algorithms Made Easy in Java: Data Structure and Algorithmic Puzzles, Second Edition, by Narasimha Karumanchi.
2. Data Structures and Algorithms in Java, by Michael T. Goodrich and Roberto Tamassia.
3. Data Structures and Algorithm Analysis in Java, 3rd Edition, by Mark Allen Weiss.
4. Safari Tech Books Online:

<https://login.mutex.gmu.edu/login?url=http%3a%2f%2fproquest.safaribooksonline.com%2f%3fuicode%3dviva>

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Grading

Grades will be awarded in accordance with the GMU Grading System for undergraduate students. See <http://www.gmu.edu/catalog/apolicies/> under [Grading System](#) for more information.

The grading scale for this course is:

○ 99 – 100%	A+	Passing
○ 92 – 98%	A	Passing
○ 90 – 91%	A-	Passing
○ 88 – 89%	B+	Passing
○ 82 – 87%	B	Passing
○ 80 – 81%	B-	Passing
○ 78 – 79%	C+	Passing
○ 72 – 77%	C	Passing
○ 70 – 71%	C-	<i>Passing*</i>
○ 60 – 69%	D	<i>Passing*</i>
○ 0 – 59%	F	Failing

- Grades of "C-" and "D" are considered passing grades for undergraduate courses. However, a minimum grade of "C" is required in the BSIT program for any course that is a prerequisite for one or more other courses. This course is a prerequisite for several courses in BSIT Concentrations – see http://catalog.gmu.edu/preview_program.php?catoid=19&poid=17882 for more information on those courses.

Raw scores may be adjusted by the Instructor to calculate final grades.

Final grades will be determined based on the following components:

Activity	Distribution
Take-Home Assignment	15%
Group Project	20%
Midterm Exam	25%
Final Exam	40%

These components are outlined in the following sections. Note that not all assignments are given an equal weight.

Programming Assignments and Project

Each student individually will prepare and submit a solution to each programming assignment and phases of the project in accordance with requirements to be discussed in class and published on <http://mymasonportal.gmu.edu/>. Late submissions will not be accepted under any circumstances. Students may submit incomplete assignments for partial credit. The student must complete these assignments. Assistance may be requested from the instructor or GTA. Other assistance may be considered an Honor Code violation.

Mid-term exam

The mid-term exam will be conducted during the scheduled class session in Week 7 and will be based on topics addressed during the first seven weeks of the course. The mid-term exam will be “closed book” – no reference materials other than those provided with the exam paper will be permitted. Mid-term exams may be retained by the instructor.

Final exam

The final exam will be held during the scheduled final exam session (see <http://registrar.gmu.edu/>) and will be based on topics addressed throughout the entire course. The final exam will be “closed book” – no reference materials other than those provided with the exam paper will be permitted. Final exams will be retained by the [Department of Applied Information Technology](#) and will not be returned to students.

Final grades will be posted to [PatriotWeb](#), which is the only vehicle for students to obtain those grades. A student with a "hold" on his/her PatriotWeb account will be unable to access final grades until the hold has been removed by the Registrar.

Module	Class Content
1	Course introduction Review of Object-Oriented Concepts
2	Review of Inheritance and Polymorphism Concepts
3	Review of Exception Handling and Files
4	The Unified Modeling Language
5	Recursion
6	Searching, Sorting and Big-O
	Class does not meet - Columbus Day Holiday
	Midterm Exam and Group Meetings
7	Linked Lists
8	Stacks and Queues
9	Binary Trees
10	More on Trees
11	Collections and Generics
12	Hashing
13	Course Wrap-Up and Review
	Final Exam

The textbook chapter(s) corresponding to the material covered in each lecture should be completed **prior to** that lecture.

This schedule is subject to revision before and throughout the course. Registered students should see <https://mymasonportal.gmu.edu/webapps/portal/frameset.jsp> for the latest class schedule.

Important Dates

Dates for adding, dropping the course, etc. are available via: registrar.gmu.edu

Religious Holidays

A list of religious holidays is available on the [University Life Calendar page](#). Any student whose religious observance conflicts with a scheduled course activity must contact the Instructor **at least 2 weeks in advance** of the conflict date in order to make alternative arrangements.

Attendance Policy

Students are expected to attend each class, to complete any required preparatory work, including assigned reading – see the **separated schedule**, and to participate actively in lectures, discussions and exercises. As members of the academic community, all students are expected to contribute regardless of their proficiency with the subject matter.

Students are expected to make prior arrangements with Instructor if they know in advance that they will miss any class and to consult with the Instructor as soon as possible if they miss any class without prior notice. Any student who expects to miss more than one class session is strongly advised to drop the course and take it in a later semester when he/she can attend every class.

Departmental policy requires students to take exams at the scheduled time and place, unless there are truly compelling circumstances supported by appropriate documentation. Except in such circumstances, failure to arrive to the exam site on time for a scheduled exam will result in a score of zero (0) for that exam, in accordance with [Mason policy on final exams](#). Students should not make travel plans or other discretionary arrangements that conflict with scheduled classes and/or exams. If the University is closed due to weather or other unforeseen conditions, final exams may be rescheduled – students are strongly advised not to make plans that would prevent them from attending exams that may be rescheduled during the entire [exam period](#).

Classroom Conduct

Students are expected to conduct themselves in a manner that is conducive to learning, as directed by the Instructor. Any student who negatively impacts the opportunity for other students to learn will be warned – if disruptive behavior continues, the student will be asked to leave the classroom.

Electronic devices are potential distractions in the classroom environment. Cell phones, pagers and other handheld devices must be turned off or set to "silent" mode and not used while class is in session. Laptop computers and similar devices may be used only if such use is directly related to the classroom activity in progress – for some activities the Instructor may require that such devices not be used in order to maximize student engagement.

Communications

Registered students will be given access to a section of myMason Portal for this course. MyMason Portal will be used as the primary mechanism (outside of lectures) to disseminate course information, including announcements, lecture slides, homework and other assignments, and scores for homework and exams.

Communication with the Instructor on issues relating to the individual student should be conducted using MyMason Portal Mail, GMU email, via telephone, or in person - **not** in the public forums on MyMason Portal. MyMason Portal Mail is the preferred method – for urgent messages, you should also attempt to contact the Instructor via telephone. Federal privacy law and GMU policy require that any communication with a student related in any way to a student's status be conducted using secure GMU systems – if you use email to communicate with the Instructor you **MUST** send messages from your GMU email account.

Lecture slides are complements to the lecture process, not substitutes for it - access to lecture slides will be provided in MyMason Portal as a courtesy to students provided acceptable attendance is maintained.

All course materials (lecture slides, assignment specifications, *etc*) are published on MyMason Portal in Adobe® Portable Document Format (PDF) or in a format for which a free *reader* is available (such as Microsoft PowerPoint). This allows users of most computing platforms to view and print these files. Microsoft® Word (or a compatible word processing application) is required for preparing assignments – it is available on computers in the Mason open labs.

Privacy

Instructors respect and protect the privacy of information related to individual students.

As described above, issues relating to an individual student will be discussed via email, telephone or in person. Instructors will not discuss issues relating to an individual student with other students (or anyone without a need to know) without prior permission of the student.

Assessable work other than exams will be returned to individual students directly by the Instructor (or by a faculty or staff member or a Teaching Assistant designated by the Instructor, or via another secure method). Under no circumstances will a student's graded work be returned to another student. Faculty and staff will take care to protect the privacy of each student's scores and grades.

Disability Accommodations

[The Office of Disability Services \(ODS\)](#) works with disabled students to arrange for appropriate accommodations to ensure equal access to university services. Any student with a disability of any kind is strongly encouraged to register with ODS as soon as possible and take advantage of the services offered.

Accommodations for disabled students **must** be made in advance – ODS cannot assist students retroactively, and at least one week's notice is required for special accommodations related to exams. Any student who needs accommodation should contact the Instructor during the first week of the semester so the sufficient time is allowed to make arrangements.

Honor Code

All members of the Mason community are expected to uphold the principles of scholarly ethics. Similarly, graduating students are bound by the ethical requirements of the professional communities they join. The ethics requirements for some of the communities relevant to Applied IT graduates are available via the following links:

- [ACM Code of Ethics and Professional Conduct](#)
- [IEEE Code of Ethics](#)
- [EC-Council Code of Ethics](#)

On admission to Mason, students agree to comply with the requirements of the [GMU Honor System and Code](#)¹. The Honor Code will be strictly enforced in this course. Honor Code cases are heard by a panel consisting of students – students who meet the requirements are encouraged to nominate themselves to serve on the Honor Committee.

Any use of the words or ideas of another person(s), without explicit attribution that clearly identifies the material used and its source in an appropriate manner, is **plagiarism** and will not be tolerated. Dean Griffiths has mandated a "zero tolerance" policy for plagiarism within [The Volgenau School](#). The Instructor reserves the right to use manual and/or automated means (including such services as Safe Assign and MOSS – Measure of Software Similarity) to detect plagiarism in any work submitted by students for this course, and to direct Teaching Assistants and/or other faculty and/or staff members to do likewise in support of this course.

For this course, the following requirements are specified:

- All assessable work is to be prepared by the individual student, unless the Instructor explicitly directs otherwise.
- All work must be newly created by the individual student for this course for this semester.
- Any usage of work developed for another course, or for this course in a prior semester, is strictly prohibited without prior approval from the instructor.
- Students may seek assistance with assigned work, (and are encouraged to do so) **provided**:
 1. The directions for the assigned work do not prohibit such assistance.
 2. Such assistance is acknowledged in the submitted work, clearly identifying the person(s) giving assistance and the nature of the assistance given.
 3. Any work to be submitted is prepared entirely and exclusively by the student submitting it. Students are expressly prohibited from sharing any assessable work for this course in any manner with other students (except students assigned as Teaching Assistants to this course and the student's section), unless all students involved have had their work graded and returned by the Instructor, or the Instructor has explicitly approved such sharing.

¹ Available at www.gmu.edu/catalog/apolicies and related GMU Web pages.