

CSCI 6010 Introduction to Computer Science Fundamentals Spring 2017

1 Course Description

Review of programming in a high-level language using Java or C++ Introduction to objects and object-oriented programming: static and dynamic objects, inheritance, dynamic method invocation. Data structures: 2D-arrays, linked-lists, stacks, queues, trees, hashing. Discrete structures: sets, graphs, permutations and combinations.

2 Prerequisite

one year of course work in programming in C, C++ or Java.

3 Instructor

Dr. Juman Byun

Email: juman@gwu.edu

Office hours: by appointment

4 Required Text

No textbook is required.

5 What you will be able to do at the end of this course

If you are taking this course, you are likely to become (if not already are) the bridge person between business and technology. This course aims to strengthen your technology side.

As a result of completing this course, students will be able to:

1. Analyze and identify the true nature of a problem
2. Synthesize an algorithm to solve the problem
3. Transform the algorithm into software

6 Workload

In addition to the class time, about 7.5 hours of independent learning per week is expected to complete assignments.

7 Class Sessions and Sample Assignments

Meeting time: Mondays at 6:10-8:40pm (2.5 hours)

Location: [MON](#) 115

All assignments are due 11:59pm a day before the next class.

Different assignments may be given as long as they help the students understand the class materials better. Sample assignments below are shown as examples.

Fall 2017 begins Tuesday, January 17

Session	Date	Topics
Week 1	2017-01-23	Programming review: Compilation cycle lexical elements, data-types, variables, operators, statements, control-flow, I/O. Sample assignment: 3-4 simple programs, 20-30 lines each, to exercise control-flow, methods, data-types and operators, e.g., read two files and for every word in the first file, find whether anagrams of it exist in the other file.
Week 2	2017-01-30	Programming review: Recursion, 1D and 2D arrays. Sample assignment: 8-queens-type problem that reads initial locations from a file.
Week 3	2017-02-06	Objects: Static objects (Java classes with only static members), encapsulation, inheritance, method overriding. Dynamic objects, instances, mutators/accessors, object variables, arrays of objects, objects as data types. Sample assignment: Vector-like class that defines a bunch of methods for manipulating vectors.
Week 4	2017-02-13	Objects: inheritance, dynamic method invocation, "this" pointers, constructors/destructors, constructor-chaining, casting, cloning. Sample assignment: Implement 2D vectors using earlier vector implementation. Test usage of constructors, cloning.
Week 5	2017-02-20	President's Day (no classes)
Week 6	2017-02-27	Data structures: Linked-lists: ADT-operations, implementation via objects, generic linked lists that store objects. Comparison with arrays. Explanation of pointers, comparison with C-based implementation. Operations: insertion, search, deletion, sorted lists. Stacks and queues: ADT's, operations, implementation via arrays, lists. Sample assignment: Implement a circular doubly-linked list with deletions. Implement two types of simple priority queues and compare their use in a simulation.
Week 7	2017-03-06	Data structures: Trees: post-, in- and pre-order traversals. Tree ADT and implementation. Binary trees. Breadth-first and depth-first searches using stacks and queues. Sample assignment: Implementation of trees and traversals to solve expressions.
Week 8	2017-03-13	Spring Break (no classes), March 13 - Saturday, March 18
Week 9	2017-03-20	Data structures: Simple hashing, Java's implementation, applications. HashSets, HashMaps. Introduction to tries. Sample assignment: hashtables that use int-keys.

Week 10	2017-03-27	Discrete structures: sets, relations, graphs, depth-first and breadth-first search. Sample assignments: typical graph homework.
Week 11	2017-04-03	Discrete structures: Permutations and combinations. Sample assignments: some homework questions, some programming problems that use recursion.
Week 12	2017-04-10	Threads: Description of operating systems, processes, memory, multiprocessing, scheduling, threads. Threads, synchronization, mutual-exclusion, monitors, deadlock. Sample assignment: programming problem with threads and synchronization
Week 13	2017-04-17	Networking: Broad overview of internet, TCP/IP, connections, webservers etc. Introduction to sockets, simple socket programming. Sample assignment: Build a chat program.
Week 14	2017-04-24	GUIs, database connectivity: Event-based programming and GUIs, database connections. Sample assignment: Build a GUI that connects to a MySQL database and displays rows from selected tables
Week 15	2017-05-01	Last day of class

Final Examinations Monday, May 8 - Tuesday May 16

Due to the nature of the course, a take-home exam is the most likely form of the final exam. But this may change depending on the cohort of students.

NOTE: In accordance with university policy, the final exam will be given during the final exam period and not the last week of the semester. For details and complete policy, see: provost.gwu.edu/administration-final-examinations-during-examination-period

8 Grading

Assignment: 50%

Class Participation/Attendance: 30%

Final Exam/Project: 20%

Extra credit: 10% towards the assignment if an assignment plan is submitted by Wednesday

Late fee: 10% of the assignment per day

9 University policies:

9.1 University policy on observance of religious holidays

In accordance with University policy, students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. For details and policy, see: students.gwu.edu/accommodations-religious-holidays.

9.2 Academic integrity code

Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information. For details and complete code, see: studentconduct.gwu.edu/code-academic-integrity

9.3 Safety and security

In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.

10 Support for students outside the classroom

10.1 Disability Support Services (DSS)

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Rome Hall, Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information see: disabilitysupport.gwu.edu/

10.2 Mental Health Services 202-994-5300

The University's Mental Health Services offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations confidential assessment, counseling services (individual and small group), and referrals. For additional information see: counselingcenter.gwu.edu/