

Units: 2

Instructor: Mohammad Reza Rajati, PhD

PHE 412

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Course Producers: TBD

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Lecture: Section 30201D: MW, 10:00 –10:50 am in ZHS 159

Section 29908D: MW, 11:00 –11:50 am in ZHS 159

Webpages: [Piazza Class Page](#) for discussion and supplementary material

and [USC Blackboard Class Page](#) for grades

and [ZyBooks](#) for lectures, code submission, and grades

Prerequisite: None.

Recommended Preparation: Proficiency in high school math

(including trigonometry, algebra, and basic probability).

Hardware/Software Required: A laptop and Internet connection

will generally suffice to complete homework.

Tentative Grading: Programming Assignments 30%

Labs 5%

Midterm Exam 32%

Final Exam 33%

Class Participation Activities* 5%

Participation on Piazza* 2%

Letter Grade Distribution:

≥ 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	≤ 59.99	F

Disclaimer: Although the instructor does not expect this syllabus to drastically change, he reserves every right to change this syllabus any time in the semester.

Note on e-mail vs. Piazza: If you have a question about the material or logistics of the class and wish to ask it electronically, please post it on the piazza page (not e-mail). Often times, if one student has a question/comment, other also have a similar question/comment. Use private Piazza posts with the professor, TA, graders only for issues that are specific to your individually (e.g., a scheduling issue or grade issue). Try minimizing the use of email to the course staff.

Catalogue Description: Fundamental concepts of algorithmic thinking as a primer to programming. Introduction to C++.

Course Description: This course introduces students to the fundamental concepts of algorithmic thinking as a primer to programming. It is intended for students who have little to no prior programming experience with the goal of providing a strong foundation for CS 103 Introduction to Programming. The course introduces the mathematics and basic language constructs needed for programming as well as the problem-solving techniques required to analyze a problem and produce an algorithm. These techniques are put into practice over the course of the semester with an introduction to programming using C++. Weekly lab and programming assignments will provide hands-on experience and active learning techniques.

Concepts include data representation, basic discrete math, control structures (conditional and iterative structures), functions, and arrays. Weekly small-group discussions will provide the opportunity for students to practice the concepts learned in class, review and ask questions. Weekly assignments will provide opportunity to practice, apply, and deepen the knowledge gained from lectures. By the end of this course, students should feel comfortable to take information-based problem descriptions and write a software program in C++ to perform the required task.

Course Objectives: Upon successful completion of this course a student will

- Choose appropriate data and variable types to store specific kinds and ranges of information.
- Write, compile, and run a computer program.
- Use basic discrete mathematics to understand, describe, and solve computation problems.
- Understand the way computers represent and operate on data.
- Trace provided C and C++ code line-by-line to analyze what operations are being performed and describe what the program will output.
- Employ programming concepts: variables, control structures, loops, and arrays to develop programs that solve information problems.

- Interpret written program requirements and develop a programmatic solution to meet those requirements.

Exam Dates:

- **Midterm Exam:** Wednesday March 9, 7-8:50 PM.
- **Final Exam:**, Monday, May 9, 4:30 PM- 6:30 PM as **set by the university**.

Textbooks:

- **Required Textbook:**

1. Frank Vahid and Roman Lysecky, *Programming in C++ with ZyLabs*. (Zy)

- **Recommended Textbook:**

1. Cay Horstmann, *C++ for Everyone*, 2nd Edition, Wiley; 2012. (Hort)

Grading Policies:

- The letter grade distribution table guarantees the *minimum* grade each student will receive based on their final score. When appropriate, relative performance measures will be used to assign the final grade, at the discretion of the instructor.
 - Final grades are non-negotiable and are assigned at the discretion of the instructor. If you cannot accept this condition, you should not enroll in this course.
- Your three lowest grades in the Labs and two lowest scores in programming assignments will be dropped from the final grade. This policy gives a break to students who miss the deadline of a homework unintentionally or register late in the course or miss a homework because of poor time management. Missing any of the homework assignments is not a good idea if you want to learn the concepts.
- *Class Participation Activities have up to 5% extra credit.
- *Participation on Piazza has up to 2% extra credit, which is granted on a competitive basis *at the discretion of the instructor*.
- **Homework Policy**
 - Class Participation Activities will be assigned before each class and should be completed before class or shortly after class, depending on the due date. Because of the nature of Participation Activities and because they are for extra credit, there will be no grace period for them and NO EXTENSION to their due dates under any circumstances.
 - Homework is assigned on an approximately weekly basis. Two one-day grace periods can be used for each homework with 10% penalty per day. *Absolutely no late homework will be accepted after the grace period. A late assignment results in a zero grade.*
 - In case of *documented illness* or *grave family* situations, exceptions can be made to the late submission policy, mostly in the form of waiving the late penalty.

- Poor internet connection, failing to upload properly, or similar issues are **NOT** acceptable reasons for late submissions. If you want to make sure that you do not have such problems, submit homework *eight* hours earlier than the deadline. Please do not ask the instructor to make individual exceptions.
- Students are encouraged to discuss homework problems with one another, but each student must do their own work and submit individual solutions written/ coded in their own hand. Copying the solutions or submitting identical homework sets is written evidence of cheating. The penalty ranges from F on the homework or exam, to an F in the course, to recommended expulsion.
- Posting the homework assignments and their solutions to online forums or sharing them with other students is strictly prohibited and infringes the copyright of the instructor. Instances will be reported to USC officials as academic dishonesty for disciplinary action.

- **Exam Policy**

- **Make-up Exams:** No make-up exams will be given. If you cannot make the above dates due to a class schedule conflict or personal matter, you must drop the class. In the case of a required business trip or a medical or family emergency, a signed letter from your manager or counselor or physician has to be submitted. This letter must include the contact of your physician or counselor or manager.
- Midterm and final exams will be closed book and notes.
- All exams are cumulative, with considerable emphasis on material presented since the last exam.

- **Attendance:**

- Students are required to attend all the lectures and discussion sessions and actively participate in class discussions. Use of cellphones and laptops for anything unrelated to programming in C++ is prohibited in the classroom.

Important Notes:

- Textbooks are secondary to the lecture notes and homework assignments.
- Please use your USC email to register on Piazza and to contact the instructor and TAs.

Tentative Course Outline

MONDAY		WEDNESDAY	
Jan 10th	1	12th	2
Introduction (Zy 1.1-1.3) Programming (general introduction) Programming basics Comments and whitespace		Introduction (Zy 1.4-1.7) Errors and warnings Computers and programs (general) Computer tour Language history	
17th		19th	3
Martin Luther King Day		Introduction (Zy 1.8-1.10) Problem solving Why programming? Why whitespace matters?	
24th	4	26th	5
Variables and Assignments (Zy 2.1-2.5) Variables and assignments (general) Variables (int) Identifiers Arithmetic expressions (general) Arithmetic expressions (int)		Variables and Assignments (Zy 2.7-2.11) Floating-point numbers (double) Scientific notation for floating-point literals Constant variables Using math functions Integer division and modulo	
31st	6	Feb 2nd	7
Variables and Assignments (Zy 2.12-2.15) Type conversions Binary Characters Strings		Variables and Assignments (Zy 2.16-2.18) Integer overflow Numeric data types Unsigned	
7th	8	9th	9
Variables and Assignments (Zy 2.19-2.22) Random numbers Debugging Auto Style guidelines		Conditional Statements (Zy 3.1-3.4) If-else branches (general) Detecting equal values with branches Detecting ranges with ibranches (general) Detecting ranges with branches	
14th	10	16th	11
Conditional Statements (Zy 3.5-3.8) Detecting ranges with Logical operators Detecting ranges with gaps Detecting multiple features with branches Common branching errors		Conditional Statements (Zy 3.10-3.12) Order of evaluation Switch statements Boolean data type	

MONDAY		WEDNESDAY	
21st President's Day		23rd Conditional Statements (Zy 3.13-3.16) String comparisons String access operations Character operations More string operations	12
28th Conditional Statements (Zy 3.17-3.19) Conditional expressions Floating-point comparison Short circuit evaluation	13	Mar 2nd Loops (Zy 4.1-4.3) Loops (general) While loops More while examples	14
7th Loops (Zy 4.4-4.6) For loops More for loop examples Loops and strings	15	9th Midterm	16
14th Spring Recess		16th Spring Recess	
21st Loops (Zy 4.7-4.9) Nested loops Developing programs incrementally Break and continue	17	23rd Loops (Zy 4.10-4.11) Variable name scope Enumerations	18
28th Arrays & Vectors (Zy 5.1-5.5) Array/vector concept (general) Vectors Array/vector iteration drill Iterating through vectors Multiple vectors	19	30th Arrays & Vectors (Zy 5.6-5.9) Vector resize Vector push-back Loop-modifying or copying/comparing vectors Swapping two variables (General)	20
Apr 4th Arrays & Vectors (5.11-5.15) Arrays vs. vectors Two-dimensional arrays Char arrays / C strings String library functions Char library functions: ctype	21	6th User-Defined Functions (Zy 6.1-6.6) User-defined function basics Print functions Reasons for defining functions Writing mathematical functions Functions with conditional statements/loops	22
11th User Defined Functions (Zy 6.7-6.10) Unit testing (functions) How functions work Functions: Common errors Pass by reference	23	13th User-Defined Functions (Zy 6.11-6.14) Functions with string/vector parameters Functions with C string parameters Scope of variable/function definitions Default parameter values	24

MONDAY		WEDNESDAY	
18th	25	20th	26
User-Defined Functions (Zy 6.15-6.18) Function name overloading Parameter error checking Preprocessor and include Separate files		Searching & Sorting Algorithms* (Zy 15.1-15.4) Binary Search The Big O Notation Time Complexity	
25th	27	27th	28
Searching & Sorting Algorithms* (Zy 15.5-15.9) Sorting Bubble Sort Selection Sort Quick Sort		Interpreted Languages* Python	

Notes:

- Items marked by * will be covered only if time permits.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086

eotix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776

osas.usc.edu

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost’s Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

ombuds.usc.edu

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-3340 or otfp@med.usc.edu

chan.usc.edu/otfp

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.