

CSC 406 Systems I  
Fall 2017-2018  
Thurs 5:45PM – 9:00PM  
Lewis 1507  
<http://d2l.depaul.edu/>

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Office Hours: Tues 4:00PM-5:30PM

## **Course Summary**

This course covers the concepts underlying all computer systems and how they affect the correctness, performance, and utility of application programming. We will cover, in particular, information representations, program representations and program execution.

## **Learning Objectives**

Upon successful completion of this course, students should be able to:

- Use C's bit operators to manipulate data
- Explain how specific kinds of data (numbers, text, instructions) are stored in a memory
- Simulate the execution of various x86 assembly instructions
- Explain how a buffer overflow attack works as well as carry one out
- Reverse engineer parts of a compiled program to understand what it is doing
- Understand programs that use arrays, structs, and pointers in the C language

## **Prerequisites**

The only formal prerequisite for this course is introduction to programming (CSC401). The assumption is that you are already familiar with structural programming concepts like branching, loops, and functions, as well as structured data like lists and objects. If your scheduling of classes allows it, I strongly recommend you finish CSC402 as well before taking CSC406.

## **The C programming language and the UNIX environment**

We will be using C and UNIX extensively in this course. It is used throughout the book and in the lectures as well as on practice problems, the take home labs, and the exams. However, both the book and the lectures will spend minimal time teaching you these tools. You will need to become very comfortable with both by spending time interacting with the server for the class as well as consulting references. The assumption is that at this point in your studies, you can mostly teach yourself how to use these tools and class time is better spent on more advanced topics. I will provide a very brief introduction just to get you started, and I will answer any questions students have about C and Linux in class, but students are expected to pick up C and UNIX on their own. This will require a great amount of time reading the C text for the course, interacting with the Linux server, writing and debugging

programs, and looking things up in UNIX and C manuals. Do not underestimate the amount of extra time this will take.

## Grading Policy

Your overall grade for the course will be computed as follows:

Labs (takehome)	30%
Online quizzes	10%
Practice Problems	10%
Midterm exam	25%
Final exam	25%

Letter grades will be assigned according to the table below; however, the instructor reserves the right to adjust the scale in the student's favor. In other words, the table indicates the minimum letter grade you will receive for the given overall percentage. You may receive a slightly higher grade if the instructor feels an adjustment is necessary.

93-100	A
90-92.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
60-66.9	D
0-59.9	F

## Textbooks and Printed Resources

*Computer Systems: A Programmer's Perspective, 3rd Edition.* Bryant & O'Hallaron, Prentice Hall/Pearson, 2016. **ISBN: 978-0134092669**

*Programming in C, 4th edition.* Kochan, Prentice Hall/Pearson, 2015. **ISBN: 978-0-321-77641-9**

Important: Make sure you have access to the correct version of the text books. Verify the ISBN! There are other versions of CS:APP out there (still 3<sup>rd</sup> edition, but a different ISBN) that have different problems. Students are responsible for answering the questions as they appear in the required book with the ISBN number above. Answers to different problems will not earn any points.

Below is a tentative schedule of topics including a list of readings from the text. The schedule also includes a list of practice problems that you should be able to answer. A subset of these will be assigned as practice problems, but you should be able to answer all of them.

## Tentative Schedule

Note: In the schedule below, I have highlighted chapters 9 and 10 in the *Programming in C* book, because there are the places where C is most significantly different from Java.

Week Date	CS:APP	Practice Problems	Programming in C
Week 1	Section 2.1	2.1-2.5, 2.7-2.16	Chapters 2, 3, 8, <b>9</b>
Week 2	Sections 2.2, 2.3	2.17-2.34, 2.38, 2.40, 2.42-2.44	Chapters <b>10</b> , 11, 17
Week 3	Sections 3.1-3.4	3.1-3.5	Chapter 12, 13
Week 4	Sections 3.5	3.6-3.11	Chapters 4, 5
Week 5	Sections 3.6	3.13, 3.16-3.18, 3.20, 3.21, 3.23-3.27, 3.29-3.31	Chapter 6, 7
Week 6	Midterm		
Week 7	Sections 3.7 - 3.8	3.32, 3.33, 3.35-3.40	
Week 8	Section 3.9	3.41-3.45, 3.48	
Week 9	Section 3.10	3.46, 3.48	
Week 10	Section 2.4	2.45, 2.47, 2.48, 2.49	

## Lab Projects

The heart of this course are the labs that students will be doing. Each of these labs requires a significant amount of time and work to complete. They really are projects and not simple homeworks. Students are urged to start early. Each lab has multiple pieces and is automatically graded so you can check your progress as you go. Late submissions will not be accepted. So submit early and often. Partial credit is better than no credit.

All labs are individual work. Students are expected to solve the problems on their own. Searching for answers to the problems online is considered cheating and will result in an F for the course. You are certainly welcome and encouraged to seek help with how to use the various tools. If you are ever unsure about whether some reference/resource is allowed, please just ask.

## Quizzes

Quizzes will be handled online on the D2L site for the course. Quizzes must be completed by 11:59PM on the day they are due (typically, the evening before a class meeting. Late quizzes will not be accepted and will receive a grade of 0, so make sure to finish them early and to save your work as you finish each problem. **Note:** Saving the problems is not the same thing as submitting. Make sure to submit when finished. Also, you may retake the quiz as often as you like to try to improve your score.

Students should expect about one quiz per week. Also, students are allowed to work together in trying to answer/understand the online quiz questions. What is not allowed is simply getting the answer from another student.

## Homework

I will periodically post problems sets from the practice problems in the CS:APP text or a short coding assignment in a dropbox on D2L. Students are required to complete these assignments; however the grading will be less formal. (A large component of the grade comes from completing the assignment, rather than from correctness.) The problems are meant to serve as practice and to generate discussion so students may work in groups on these homework problems; however, each student must make their own submission. Pay close attention to the submission requirements for each homework assignment as provided in the D2L dropbox for the assignment.

## Exams

The midterm exam is in class on Tuesday, October 17. The final exam is on Tuesday, November 21, at 5:45PM – 7:45PM in the usual classroom. Students must take the exam at the scheduled time on the scheduled date so clear your schedule now. Students may bring a single 8.5" by 11" sheet of notes (both sides) to the exams, but no other resources will be allowed. The sheet of notes must be turned in with the exam and will not be returned. Please make a copy for yourself before bringing it to the exam.

Online Students: You must register through D2L to take the exam. Note that you will have a 2 day window to take the exams (10/17-10/18 for the midterm and 11/20-11/21 for the final). Even if you are not ready to register now, check that this option is available to you on D2L. If it is not, you are registered for the live section and must take the exam in the classroom with the live class.

Exams are individual work.

## Course Server and Required Software

All lab work must be done on the UNIX server for the course. This will require you to have some kind of terminal/telnet application that uses SSH. You can find a link to PuTTY in the Content section of D2L.

Accounts will be generated from the class roster on September 12. If you cannot login on September 13, contact the instructor immediately. Note that if you registered late for the course, your name may not have been on my roster when I generated accounts, so let me know as soon as possible.

The hostname for the server is marrero373.cstcis.cti.depaul.edu. Your username is the first letter of your first name followed by at most the first 7 characters of your last name. (This includes hyphens if your name is hyphenated.) Your password is your DePaul student ID including leading zeroes if there are any. Please change your password as soon as you login by typing in "passwd" (without the quotes) and then following the instructions.

You will also need to become familiar with the text/terminal based tools, including the editor (either emacs or vi), the compiler (gcc), and the debugger (gdb). See the Reference Documents module under Content on D2L if you are unfamiliar with these tools or with the UNIX command line interface.

Please be aware that I may look at the files under your account on the server. Please do not place anything on the server that is not related to the course or that you do not want me to see.

## **Email and Discussion Forum**

Email and the discussion forum on D2L is the primary way I communicate with students outside of class. To make communication as smooth as possible, please make sure to do the following:

- Make sure the email address listed under "demographic information" at <http://campusconnect.depaul.edu> is correct. All my emails to you will go to that address.
- All students must subscribe to the discussion forum on D2L. Students should use it to post questions about the course, including questions about lectures and assignments, but please do not post any code from the labs on the forum nor should you discuss solutions to the labs on the forum. Posting your question on the forum allows other students to answer the question and so you could get your answer faster. Also, any questions I receive by email that are not of a personal nature will be posted to the forum together with my answer.
- Send me email from an address that identifies who you are. You have the best chance of getting through the email spam filter if you use your DePaul email address. You have the greatest chance of the email being filtered or of me ignoring it if you send it from an address that I cannot recognize immediately as a student in my class. (I once had a student send me email from way2sexy@hotmail.com and complain 2 weeks later that I wasn't answering his email.) Also include the course number (CSC406) in the subject of all emails. This will make it easier for me to spot your email and will eliminate the possibility that my first response would be "What class are you in?"
- If your question was answered in the lecture or in another email/post, I will simply refer to the lecture or post. So if you did not understand something I said in class or in an email, be specific. Point out exactly what you didn't understand in my prior communication so that you don't get just a pointer to the lecture recording, email, or forum post.

## **Changes to Syllabus**

This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L and sent via email.

## **Online Course Evaluations**

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. They are a requirement of the course and are key to continue to provide you with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is

completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Students complete the evaluation online in CampusConnect.

### **Academic Integrity and Plagiarism**

This course will be subject to the university's academic integrity policy. More information can be found at <http://academicintegrity.depaul.edu/>. If you have any questions be sure to consult with your professor.

### **Academic Policies**

All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the University Academic Calendar. Information on enrollment, withdrawal, grading and incompletes can be found at:

<http://www.cdm.depaul.edu/Current%20Students/Pages/PoliciesandProcedures.aspx>

### **Students with Disabilities**

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential. To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at: [csd@depaul.edu](mailto:csd@depaul.edu).

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