CS 104-Introduction to Game Programming

Syllabus Fall-2021

Instructor: Prof. Christian Lopez, 569 Rockwell Integrated Science Center, lopezbec@lafayette.edu

Class: MW 10:00 AM- 11:50 AM, RISC 562

Office Hours: Tuesdays & Thursdays 2:00 PM -4:00 PM

Mentored Study Group: See Moodle

Moodle Website: https://moodle.lafayette.edu/course/view.php?id=20742

Prerequisite: **PHIL 200** or co-req. **MATH 141** or **MATH 161**

Course Description

This class is an introduction to computer science through game programming. Computer games are a growing part of the interactive entertainment industry, achieving billions in revenue each year. However, they are also becoming an increasingly prominent part of our everyday lives, from education to health and wellness. Most importantly, games are a fun way to learn to program a computer.

This course provides hands-on experience in programming and covers the basic techniques, including variables, loops, functions, conditionals, and Object-Oriented Programming. In this class, you will learn the concepts and skills of programming by designing and implementing computer games. Specifically, you will learn the basic tools and techniques for programming in Java using Processing and BlueJ. No prior knowledge of programming is required.

This course also introduces you to computer science, a discipline that impacts our daily lives through a variety of technologies. By programming games, you will begin your exploration of the power of algorithms for solving problems in computer science.

Student Learning Outcomes

Upon completion of this course, students will be able to:

- Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions (*ABET Outcome 1*).
    - Understand programming language constructs and be able to learn new languages.
    - Understand and apply the basic principles of object-oriented programming, including the definition and usage of classes and objects.

- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline *(ABET Outcome 2)*.
    - Read and understand computing requirements.
    - Design, implement, and debug Processing/Java programs to meet the requirements.
    - Reason logically about program execution (e.g., where might the program error be?)
    - Implement programs using the fundamental concepts in programming, such as conditionals and loops.

- Employ the fundamental elements of the scientific method in the physical and natural world by identifying and evaluating a testable scientific hypothesis *(Common Course of Study NS1)*.
    - Identify and/or formulate a testable scientific hypothesis.
    - Generate and evaluate evidence necessary to test and/or revise a hypothesis.
    - Understand the iterative process for refining tests to isolate errors.

- Create and evaluate descriptions and representations of scientific data via equations, graphs, tables, and/or models *(Common Course of Study NS2).*
    - Interpret the results from testing the hypotheses for a computer program.
    - Measure and evaluate a computer program.
    - Measure and evaluate the performance of users in games

Expectations

Every week, we will have a series of individual and group activities interwoven with small lectures. In some instances, we will adopt a flipped-classroom approach where prior to the class session, you will gain exposure to new concepts and material by watching lecture videos, doing guided readings, and/or completing the required activities; then you will do active work that calls for the analysis and/or the application of the concepts and material learned. Be advised, it is expected that students spend at least 2 hours of work outside of class for every hour of class (e.g., 3.6hrs. of class ~ 7.3 hrs. of work outside of class).

There will be discussions, dialogues, and exercises led by the faculty. You are expected to actively participate in these discussions during the class session, as well as the forums, and work on the particular exercises that allow you and your student colleagues to learn by doing, learn by observing the results of others, and to learn from one another while trying out new ideas. You will learn by doing computer programming, interacting with your professor and other students; and engaging with your professor's instruction as well as external media.

In addition, this class will have a Mentored Study Group. The Mentored Study Group meetings are a time when you can meet with your classmates and a senior student in Computer Science to discuss course materials, study, and complete your homework. There is ample evidence that changing up how you study Computer Science will help you to learn. Reading the books, doing assignments, participating during class sessions, online forums, office hours, and in your Mentored Study Group are some of the ways you can change up your approach. Your brain will learn better if you look at this subject from a variety of perspectives. All students are encouraged to actively participate in the Mentored Study Group.

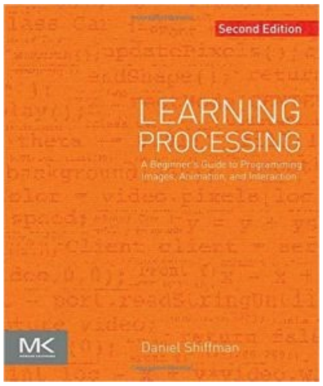
Finally, there will be a Q&A forum/web service named Piazza (which you will be able to gain access to via Moodle). In Piazza, you will post all the questions regarding assignments, the class, and or class activity. When using this system (and any other tool), you need to follow the Students Code of Conduct. Hence, you should not provide the solution nor ask for the solution of any assignment (or parts of it). I know this is a bit complicated with the type of assignments/class we have but try to ask questions about the underlying principles of the assignment so you can better understand its fundamentals (I will let you know asap if a question or answer is not appropriate). During the 1-1 meetings I can answers specifics questions you might have and/or work together in programming actives (e.g., homework, labs, etc.).

What you learn will depend directly on your willingness to participate, be involved, and complete assignments and exercises. Therefore, try different things even if you think they might "fail," ask questions—to faculty and to each other.

Textbook

In this course, we will focus on developing programs and computer games using Processing, a Java-based flexible software sketchbook, and language (processing.org). For this, we will be using the textbook:

◊ *Learning Processing: A Beginner's Guide to Programming Images, Animation, and Interaction*, 2nd Edition, by Daniel Shiffman. ISBN 9780123944436, Morgan Kaufmann


Second Edition
LEARNING PROCESSING
A Beginner's Guide to Programming Images, Animation, and Interaction
MK
Daniel Shiffman

This book has an electronic version that can be found at Lafayette's Library [https://libcat.lafayette.edu/search?/Xlearning+processing&SORT=D/Xlearning+processing&SORT=D&SUBKEY=learning+processing/1%2C408%2C408%2CB/frameset&FF=Xlearning+processing&SORT=D&1%2C1%2C]. Also, it is free online if you are a member of the Association for Computing Machinery (ACM). ACM is the professional association for computer science ACM membership costs students $19 per year and gives you access to many useful computer science books for free, and a variety of other benefits. Some chapters of the book will be made available for educational purposes via Moodle.

Grading Scheme

The grading breakdown of this class is shown below.

Attendance	3%
Participation	7%
Self-Assessments	10%
*Homework/Labs**	30%
Lab Exam	15%
Midterm Exam	10%
Final Exam	15%
Final Project	10%

**There will be approx. 5 Labs and 18 homeworkers, that will count towards 30% of the grade. Each Lab will be worth 3 homeworkers.*

Grading Scale

Typically, grades are assigned as follows from your final numerical grade:

A: 93-100	B+: 87-89	C+: 77-79	D+: 67-69	F: 0-59
A-: 90-92	B: 83-86	C: 73-76	D: 63-66	
	B-: 80-82	C-: 70-72	D-: 60-62	

Assignments Types

Attendance: The success of this course is highly dependent on your active participation. As such, only five unexcused absences will be allowed. If no advance notice is given (i.e., 24hrs), you will be considered absent if you arrive at class more than 10 minutes late or not at all. An unexcused absence will reduce your Attendance grade proportionally. Disciplinary action for students with greater than five absences will be handled on a case-by-case basis. If you have a dean's excuse or a coach's letter for a particular day, you will be excused from class (**open and honest communication will take you a long way in this**

class).

Participation: To get a perfect participation grade come to each class prepared and on time, contribute to discussions at least once a week or more (in class or via Piazza), allow other students to contribute, and maintain a high level of respect and professionalism with your peers. Participation includes asking or answering questions, expressing an opinion about a topic of discussion, and involvement in group projects or in-class group activities. All sincere efforts to participate are admired, so don't worry, just speak up. You are even welcome to express an opinion different than mine. All types of participation count except participation that shows you failed to prepare for class or are disrespectful to others. In addition, each day, a student will give a brief presentation (e.g., 1-2 mins) regarding a computer science-related news or important CS figure. Finally, in order to continuously improve the course and ensure students are making the most out of it, there will be anonymous feedback repositories where students are encouraged to provide constructive feedback regarding the things they liked or would like to improve from the class, activities, lectures, etc.

Self-Assessments**:** The material in this class is cumulative, so it is essential to stay current in the class (readings, activities, assignments, etc.). To help you stay current, there will be weekly short self-assessment quizzes posted on Moodle that we will complete in class (usually the first 10 min of class). Some of the quizzes will test your knowledge of the previous day or week. The intention here is to encourage you to actively review the material each day!

Homework**:** As in any other learning endeavor, practice is important while learning computer programming. The homework, as well as the labs and project, are meant to help you practice and gain proficiency. Homework includes completing the assigned problems. Late assignment will be accepted with a penalty of approx. 25% each day. After the 4th day, the answers will be provided and no additional submissions will be accepted. Homework will be distributed through Moodle. These will be small assignments to reinforce your learning and help you prepare for the labs and exams. You will receive the points for a problem that you complete in an acceptable way. There will be no partial credit. Notice that you will be able to determine the correctness of many of the homework problems on your own, by running your solution on the computer. However, it's best to simulate the exam environment by doing the questions first without a computer and then testing your results later. If you do obtain outside assistance in completing the problem, be sure that you **do NOT copy** the answer. Rather, learn from outside assistance, and then do the problem on your own. Directly copying an answer would constitute cheating.

Labs: Labs are the hands-on side of our class. In them, you will get to implement the techniques we discuss in class and see how they work. Some of our class time and videos posted on Moodle will be dedicated to working on these assignments. We will discuss common issues or interesting observations from work in the lab. Notice that Labs are more complex than homework, and class time will often not be enough to actually complete the lab. This means that you should plan on working on them outside of class. A good place to do this work is in your Mentored Study Group. Do not wait until the last day since they can take several days to complete.

Mentored Study Group Participation**:** All students are encouraged to attend the MSG as much as possible. Even if you feel 100% comfortable about a topic or assignment, it is still a good idea to attend the MSG and see how you might be able to help others and/or how your peers' points of view might give you a better perspective of a topic or assignment. However, remember to always do your own work and never plagiarize (i.e., copy, paste, and change a few numbers/lines of code). One of the best ways to ensure you master a topic is to explain it to someone else. To incentivize this, the MSG policy for this class is that you need to go to one or more of the sessions before some of the assignments' due dates (I will specify which assignments on the rubric of the assignment on Moodle) and show your program(s)/solution(s) to the MSG leader to get the full credit for it (i.e., show you are making progress and/or are invested in learning). You can rework the problems when you do not have the correct solution on your first try. But make sure that the results are entirely correct when you submit to Moodle to get full credit.

Exams: We will have one Midterm exam, one Lab exam, and one Final Exam. The midterm and the final exams will be closed book, close notes, close phone, and close Moodle material exams. The exam will consist of a series of short and code questions. The final exam will cover all the consent of the class. For Lab exam, you will be given a series of program requirements that you need to code and test, before submitting it via Moodle. All the exams will have a time limit proportional to their complexity. Some exams will have a self-assessment component to help you evaluate your own learning progress and encourage self-reflection of how to continuously improve.

Final Project: There is a final team project in this class to build a working game of your choice with specifics functionalities/characteristics that I will provide. Teams will be comprised of up to four students. This project will require your team to propose the game to be written, design the game, and then implement and test it. It will be similar to our labs but will involve extensive design, and demand to develop your own algorithms using the techniques taught during class. You will be required to submit one or more intermediate solutions as you develop your full game. 3% of the Final Project grade will be based on anonymous peer evaluation. That is, your team members will evaluate your performance and contributions to the project.

Late Submission of Course Work Policy

If a student submits an assignment after the due date without having made arrangements with the instructor at least 24 hrs. before the deadline (i.e., you did not reach out a day before the assignment was due), you will be penalized by approx. 25% of the assignment's grade for each day the that it is late (e.g., 0-24hrs late = -25%, 24hrs-48hrs late = -50%, see assignment's Rubric on Moodle). After the 4th day, the solution will be posted, and no additional submission or revisions will be allowed. Hence, try to work on all your assignment at least a day before the deadline, so if something happens, you can reach out, or if you know you won't be able to complete on time, just let me know 24hrs prior.

Assignment Grading

Your submitted programs (for labs, homework, project, and exams) would be graded based on:

- *Correctness*: Correctness is an objective criterion, which means that the program behaves according to the requirements explained in the assignment in all possible cases.
- *Good Style*: Good style refers to the way the program text looks. This includes commenting and correct indentation. We will discuss different aspects of a good programming style as we learn how to program.
- *Good Design*: Good design is a harder criterion to describe. It affects both the execution of the program and its readability. The characteristics of a good design will be illustrated throughout the course.

Class Participation Rubric

	Strong Work	Needs Development	Unsatisfactory
Listening	Actively and respectfully listens to peers and instructor	Sometimes displays lack of interest in comments of others	Projects lack of interest or disrespect for others
Preparation	Arrives fully prepared with all assignments completed, and notes on reading, observations, questions	Sometimes arrives unprepared or with only superficial preparation	Exhibits little evidence of having read or thought about the assigned material
Quality of Contributions	Comments are relevant and reflect an understanding of assigned text(s) or assignments; previous remarks of other students; and insights about assigned materials	Comments sometimes irrelevant, betray lack of preparation, or indicate lack of attention to previous remarks of other students	Comments reflect little understanding of either the assignment or previous remarks in a seminar
Impact on Class	Comments frequently help move the class conversation forward	Comments sometimes advance the conversation, but sometimes do little to move it forward	Comments do not advance the conversation or are actively harmful to it
Frequency of Participation	Actively participates at appropriate times	Sometimes participates but, at other times, is "tuned out."	Seldom participates and is generally not engaged

(Source: John Immerwahr, 8/15/2008, Copyright License: http://creativecommons.org/licenses/by-sa/3.0/us/)

Participation (in class or via Piazza) deserving 100% participation grade will be strong in most categories; participation that is strong in some categories but needs development in others will receive an 80%; a grade of 60% reflects a need for development in most categories; 40% of work is typically unsatisfactory in several categories, and 0% of work is unsatisfactory in nearly all categories.

Technology

In this class, students will be introduced to several programs and applications to help their learning journey (e.g., SoloLearn, Kahoot). Technology in the classroom should enhance the learning environment for all students. The use of technology for purposes defined by the College as academic dishonesty is prohibited. In the event that students receive permission in advance to digitally record a class (audio or video), the material should not be posted to the internet for public access, unless a prior agreement has been made with me. The use of technology in my classes should reflect two key values:

- **That we are here for a common purpose – education**. The use of technology in the classroom by the faculty member and the students should always support student learning. If you are using your phone, tablet, or computer in class, be prepared to show me how you are using the technology to support your learning.

- **That the classroom should be a place of mutual respect**. Students need to respect my efforts to create a classroom environment and to organize the course in ways that support the learning of all students. Students also need to respect their fellow classmates and their classmates' rights not to be distracted from participating fully in the classroom.

Diversity and Inclusiveness

Lafayette College is committed to creating a diverse community: one that is inclusive and responsive and is supportive of each and all of its faculty, students, and staff. The College seeks to promote diversity in its many manifestations. These include but are not limited to race, ethnicity, socioeconomic status, gender, gender identity, sexual orientation, religion, disability, and place of origin.

The College recognizes that we live in an increasingly interconnected, globalized world, and that students benefit from learning in educational and social contexts in which there are participants from all manner of backgrounds. The goal is to encourage students to consider diverse experiences and perspectives throughout their lives. All members of the College community share a responsibility for creating, maintaining, and developing a learning environment in which **difference is valued, equity is sought, and inclusiveness is practiced.**

It is the mission of the College to advance diversity as defined above. The College will continue to assess its progress in a timely manner in order to ensure that its diversity initiatives are effective.

Learning Needs and Accessibility:

Lafayette College is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any barriers to learning in this course, you are welcome to discuss your concerns with me. If you have a disability or think you may have a disability, please meet with the Office of Accessibility Services, to begin this conversation or request an official accommodation. If you have already been approved for accommodations through the Office of Accessibility Services, please meet with me so we can develop an implementation plan together.

Religious Observances:

If you plan to be absent from class due to the observance of a religious holiday, please communicate this to me before the end of the second week of class. You will need to get a Dean's Excuse for religious purposes. This dean's excuse needs to be approved before the "drop/add" deadline (see academic calendar).

Counseling Services

The Counseling Center is available to provide counseling and educational programs to help you achieve your academic, social, and personal development goals.

Communication

My preference is for you to address me as either Professor Lopez or Dr. Lopez. If you have a preference regarding how you would like to be addressed, please let me know.

If you need to schedule a meeting or have a request of me that will require time outside of class, please be sure to follow up any conversation we might have about the request immediately before, during, or after class with an e-mail to confirm that I have placed the request on my calendar. Because class time can be busy, by the time I return to my office, there is a chance I will have been distracted and forget our conversation.

Students often worry about how to e-mail a professor. I recommend reading some guidelines/advice at http://web.wellesley.edu/SocialComputing/Netiquette/netiquetteprofessor.html.

Tentative Schedule*

This is a tentative schedule, subject to change. Check Moodle for the most up to date information:

Week	Date		Class	Topics/Activities	Readings	Homework‡
1	M	30,Aug	1	> Syllabus > Introduction to CS		
	W	01,Sep	2	> Introduction to Games and Processing	Chapter 1	- Learning Plan (preliminary) - Sketch activity
2	M	06,Sep	3	> Processing and Interactions	Chapters 2-3	-Learning Plan (final)
	W	08,Sep	4	> Variables > Intro to BlueJ	Chapter 4	**-Lab 1**
3	M	13,Sep	5	>Conditionals and Booleans	Chapter 5	-GitHub Page -Exercises Chap. 1-3 -Programming activity
	W	15,Sep	6	>Loops	Chapter 6	**-Lab 2** -Exercises Chap. 4-5
4	M	20,Sep	7	>Functions	Chapter 7	-Exercises Chap. 5
	W	22,Sep	8	> Intro to Debugging & Hypothesis testing		-Exercises Chap. 6-7 -Code with Functions -Meta mindset Log
5	M	27,Sep	9	>Intro to Object Oriented Programming (OOP activity start)	Chapter 8	-Exercises Chap. 7
	W	29,Sep	10	> Class and Objects (OOP activity end)	Chapter 8	**-Lab 3**
6	M	04,Oct	11	> Arrays	Chapter 9	
	W	06,Oct	12	> Arrays cont.	Chapter 9	-Exercises Chap. 9
7	M	11,Oct	/	**FALL BREAK**		- Functions BlueJ
	W	13,Oct	13	> Practice Review		**-Lab 4 p1**
8	M	18,Oct	14	**Midterm Exam**	Chapter 15, 20	-Meta mindset Log
	W	20,Oct	15	>Images & Sounds	Chapter 15	-Virus

						Simulator
9	M	25,Oct	16	> Images (cont.)	Chapter 16	-Exercises Chap. 15-16
	W	27,Oct	17	>Video	Chapter 13 & 14	-Exercises Chap. 13 **-Lab 4 p2**
10	M	01,Nov	18	>Mathematics		-Programming activity
	W	03,Nov	19	**> Practice Review**		
11	M	08,Nov	20	**Lab Exam**	Chapter 22	
	W	10,Nov	21	> OOP (cont.)	Chapter 22	**-Lab 5 p1**
12	M	15,Nov	22	> Encap., Inh., and Polym. (cont.)	Chapter 22	- CodingBat problems
	W	17,Nov	23	>Text Data >Data Inputs/Outputs	Chapter 17-19	-Meta mindset Log
13	M	22,Nov	24	>Java I/O	Chapter 23	-Exercises Chap. 17
	W	24,Nov	/	**THANKSGIVING BREAK**	Chapter 23	**-Lab 5 p2**
14	M	29,Nov	25	>Java I/O (cont.)		
	W	01,Dec	26	> Java Recap		
15	M	06,Dec	27	> Practice Review		-Exercises Chap. 17
	W	08,Dec	28	**FINAL EXAM TBD**		-Lab 5 p2

[*] ***Check your E-Mail and Moodle Daily.*** *Information about the class, including assignment updates and schedule changes, will be posted to Moodle, and/or sent by e-mail. Not reading your e-mail or checking Moodle will not be accepted as a reason for me to accept a late assignment or your absence from a class activity.*

[†] ***See Moodle for updated information about deadlines and instructions about assignments***

Academic Integrity

All students are expected to abide by the Student Code of Conduct including policies around academic integrity whether we are in a face-to-face or remote classroom environment. Please be sure to review the Student Code of Conduct through this link HERE.

At Lafayette College, **all course materials are proprietary and for class purposes only**. This includes posted recordings of lectures, worksheets, discussion prompts, and other course items. Such materials should not be reposted. Online discussions should also remain private and not be shared outside of the course. You must request my permission before creating your own recordings of class materials, and any recordings are not to be shared or posted online even when permission is granted to record. If you have any questions about the proper usage of course materials feel free to ask me. Also, if you have any concerns with being recorded during the course please let me know.

COVID-19, Masks, and Final Notes

We all can agree that these are difficult and challenging times for everyone, and unfortunately, even more for some people than for others. What we need to remember is that we are all humans and we are all in this together. As such, we need to strive to practice compassion and empathy as much as we can with everybody! While this syllabus sets forward the rules and policies for this class, given the current circumstances, I am very flexible with everything, the rule of thumb is to: reach out to me beforehand so we can work something out. Remember, I am here to help you succeed!

Wearing a mask is known to reduce the transmission of SARS-CoV-2, the virus responsible for COVID-19. Regardless of your vaccination status, to protect the health of our class and until further notice, the College policy is that masks must be worn during all indoor class sessions. Masks should be worn properly over the nose and mouth and secured on the chin. Food and drink must also be eaten outside of the classroom. Students who show up to class without a mask will be asked to return to class wearing one in order to protect the health of our classroom community. In the event that you do not have access to a mask to wear during the class session, please let me know and we'll make sure that you will be able to obtain one.

As humans, we ALL have the extraordinary ability to learn, understand, and deal with new and difficult situations. This is the definition of intelligence, and everybody can adapt to new circumstances and develop new skills with time and effort. This means that you CAN learn new things, you CAN really change your “basic intelligence”, and your intelligence is something about you that you CAN change (remember the anonymous pre-class survey?). Having a “growth mindset” and acknowledging that you can become better at anything if you put time and effort, and that failure is just part of the learning process, is fundamental for your success. In this class, I will reward perseverance and effort, which you can show with your participation, 1-1 meetings, MSG, online forums, etc.