ASHESI

CS 212: Computer Programming for Computer Science, Aug-Dec 2023, Fall Semester

Section C Instructor: Dr. Justice Appati *Email*: jappati@ashesi.edu.gh *Office hours:* Mondays and Wednesdays, 15:00 - 16:00, or by appointment in the Adjunct Faculty Office, Douglas & Belinda Jackson Hall 202	**Section C Faculty Intern:** Eric Gadzi *Email*: eric.gadzi@ashesi.edu.gh *Office hours:* Mondays, 9:40 - 11:00 Wednesdays, 13:00 - 16:30 Fridays, 8-30 - 10:00 (opposite the Support Centre)
Section A&B Instructor: Kwabena A. Bamfo *Email*: kwabena.bamfo@ashesi.edu.gh *Office hours:* Mondays and Wednesdays, 15:00 - 16:00, or by appointment in the Adjunct Faculty Office, Douglas and Belinda Jackson Hall 202	**Section A&B Faculty Intern:** Eugene Daniels Email: eugene.daniels@ashesi.edu.gh *Office hours:* Mondays, 9:40 - 11:00 Wednesdays, 13:00 - 16:30 Fridays, 8-30 - 10:00 (opposite the Support Centre)

Meeting Times:

Section A:	Lecture – Mondays & Wednesdays 11:30 am – 01:00 pm	[Location: Nana Apt Hall 217]
	Lab – Fridays 10:20 am – 11:50 am	[Location: Nana Apt Hall 217]
Section B:	Lecture – Mondays & Wednesdays 9:45 am – 11:1 5am	[Location: Nana Apt Hall 217]
	Lab – Fridays 12:10 pm - 01:40 pm	[Location: Nana Apt Hall 217]
Section C:	Lecture – Mondays & Wednesdays 8:00 am - 9:30 am	[Location: Nana Apt Hall 217]
	Lab – Fridays 1:50 pm - 3:20 pm	[Location: Nana Apt Hall 217]

Course Overview: Welcome to CS 212 at Ashesi University! This course gives students an intensive introduction to programming as a means of problem-solving. It also introduces them to the broader fields of computer science and information systems and shows a connection between computer programming and other disciplines. Concepts will be illustrated in the Python programming language. This course will introduce the concept of an object, and begin to introduce learners to object-oriented programming. Basic software engineering concepts including testing, debugging, and documentation will also be introduced and used to solve problems through approximation, simulations, recursive formulas and data processing.

Learning Outcomes

At the end of the course, students will be able to:

1. Describe the process of team development and the roles and practices of effective teams
2. Demonstrate leadership practices that support equatable collaboration and team effectiveness.
3. Analyse given problems, break these problems down into smaller more manageable components, solve each smaller component, and combine these component solutions into an overall solution to the original problem.
4. Create algorithms for solving simple problems relevant to a variety of domains and application areas.
5. Use the Python programming language to implement, test, and debug algorithms for solving Problems.
6. Implement, analyse, and explain the behaviour of simple programs involving the fundamental programming constructs variables, expressions, assignments, I/O, control constructs, functions, parameter passing, and recursion.
7. Apply object-oriented design and programming to problem-solving.
8. Design software to process data and design simple simulations

You may notice that not all of the above learning goals are technical. Employers responding to the USA's National Association of Colleges and Employers (NACE) Association's Job Outlook survey rated the following as the top skills employers look for in new hires:

Problem-solving skills	91.2% of respondents
Ability to work in a team	86.3% of respondents
Strong work ethic	80.4% of respondents
Analytical/quantitative skills	79.4% of respondents
Communication skills - written	77.5% of respondents
Leadership	72.5% of respondents
Communication skills - verbal	69.6% of respondents
Initiative	69.6% of respondents

Ashesi Learning Goals Addressed in this Course:

1. **Ethics and Civic Engagement:** *An Ashesi student is an ethical, responsible and engaged member of his/her community*. You are expected to maintain a very high academic and ethical standard, as described in the "Expectations" section below.
2. **Critical Thinking and Quantitative Reasoning**: *An Ashesi student is able to apply critical thinking and quantitative reasoning to approach complex problems.* This course involves problem-solving with computers. You will develop the ability to analyse simple but relevant problems, design simple algorithms to solve them, and implement these algorithms (using the Python Programming Language).
3. **Communication**: *An Ashesi student is an excellent communicator in a variety of forms*. This course requires writing about and/or presenting project work.
4. **Leadership and Teamwork**: *An Ashesi student is adept at leading and functioning in teams.* This course requires you to work in a team in class and for the final project.
5. **Curious and Skilled**: *An Ashesi student is inquisitive and confident, has breadth of knowledge, and has attained a high level of mastery in their chosen field.* This course aims to build your knowledge with respect to the role of computers and information systems in our complex world, as well as develop skills in foundational programming concepts.
6. **Technology Competence**: *An Ashesi student is an effective and flexible user of technology*. You will become familiar with business information systems and programming basics, which is an aspect of technological competence.

Textbook & Reference Material:

Learning Management: *Course content available on Canvas https://ashesi.infrastructure.com/login/canvas*

Primary Textbook: **Think Python** by Allen B. Downey. Available in PDF form in Canvas. For other freely available formats, visit https://greenteapress.com/wp/think-python-2e/

Additional Reference: **Python Programming: An Introduction to Computer Science** by John Zelle. Available in hardcopy at the Library

Additional Reference: **Python: Programming in Context** by John Zelle. Available in hardcopy at the Library

Primary Online References: **Khanacademy - Python**: https://tinyurl.com/khanacademypython

PyCharm IDE by JetBrains: https://www.jetbrains.com/pycharm/

Additional Online References:
Tutorialspoint: https://www.tutorialspoint.com/python/index.htm
W3Schools: https://www.w3schools.com/python/
DataCamp: https://www.datacamp.com/courses/intro-to-python-for-data-science

Learning activities:

In this course, learning takes place through a variety of activities, including lectures, reading, labs and assignments. Each of these is carefully designed to help you develop expertise in problem-solving and programming, and none should be neglected. Historically, students who have paid careful attention to each of these aspects have been very successful while those who have neglected one or more of them have struggled.

- *Reading*: The assigned reading introduces new concepts and serves as a preparation for class as well as a foundation for the concepts explored, discussed, clarified, and practised in class. It includes additional details that we will not have time to dwell on in class, so you must do the reading in order not to miss this information. The reading assignments will be for the next class session and you will frequently be quizzed on these readings.

- *Lectures, Class activities, and Labs*: Essential concepts will be presented and will include activities to help you grasp essential principles and concepts. The best way to get the most of the class sessions is to be an active participant: come to class well prepared, do the practical class activities, ask and answer questions in class, and participate in all discussions and teamwork.

- *Assignments and Projects*: Assignments and projects are primarily designed to give you practice and help you learn concepts that you cannot learn just by reading or listening to a lecture. It is an opportunity to apply concepts in a context that allows you to seek clarification and guidance from the instructor and teaching assistants. Historically, students who ensure that they complete and understand all the assignments typically go on to do well in the tests and exams, whereas those who fail to complete assignments typically go on to do very poorly in the exams.

Formative Learning Assessments:

- *Attendance & Participation*: You are required to prepare for each class. You are required to come to class, and to arrive on time. A record of poor or chronically late attendance will result in a penalty against your course grade. Your active participation enriches the course experience for everyone. Be engaged in the class and prepared for hands-on exercises in lab or in class whenever assigned

- *Quizzes*: There will be regular quizzes on the assigned readings. At the most basic level of Bloom's taxonomy of learning is remembering, the ability to remember or recall information. Quizzes will include questions relating to the reading assignment for that day's lesson. Learning quizzes will also be organised frequently to assess how much learning is happening as we teach.

- *Teamwork*: At the next two levels of Bloom's taxonomy are understanding, the ability to grasp the meaning of the material, followed by application, the ability to use the material in a new situation. In teamwork, you will take your learning from the reading and apply it to a simple, atomic problem. Teamwork is, obviously, completed in teams of two to four people, depending on the work. Teamwork is always an in-class activity, although some teams may need to complete the work outside of class.. We will use Google Drive extensively in teamwork assignments, so make sure you always have your laptop with you.

- *Labs and Homework Assignments:* You are required to attend all lab sessions.. There will be regular programming assignments throughout the semester. Labs and homework move us to the next two levels of Bloom's taxonomy, analysis, the ability to break an idea down and analyse constituent parts, followed by evaluate, to make a well-considered choice. In labs and homeworks, We are expecting you to explore the idea from the teamwork assignment on a new, harder, more open-ended problem, and use the learning from other parts of the class to assemble your solution to the problem. You will need to be able to think independently on labs and homework assignments; they are never collaborative. You are always encouraged to seek out help from others on labs and homework, particularly from the evening tutoring sessions, but also your classmates, the instructor, and outside resources that are NOT a solution to the problem. **However, you are also expected to give them credit for their assistance (through citations and acknowledgement in supporting materials and in your code).** Again, if you are unsure if you should attribute credit, do it! **If it was not your idea, cite it!**

Summative Learning Assessments:

- *Examinations:* There will be a mid-semester assessment during the class, as well as a final assessment at the end of the class – consisting of a project and an exam. The mid-semester assessment will be summative of the content covered up until the midpoint of the course while the final assessment is summative of all of the course content. Both of these assessments will assess at all levels of Bloom's Taxonomy of Learning, including the highest level of evaluation, which is the ability to create and judge the value of an idea for a given purpose.

Expectations:
The instructor and faculty interns are committed to helping you to be successful in this course. In return, there are some fundamental expectations of you.

Participation
You must prepare for each class.Your active participation enriches the course experience for everyone. Do not be afraid to ask questions! Your questions will probably help others in the class as well.

Professionalism
You are expected to interact with your course colleagues, as well as the instructor and teaching assistant in a professional, respectful, and polite manner at all times.

Academic honesty
You are expected to keep in mind at all times that *"An Ashesi student is an ethical, responsible and engaged member of his/her community"*. The work in this course is designed to help you develop skills essential to your future career success. You can only develop these skills if you do the homework **yourself**.

All the homework that you turn in **must** be your own. If it is not, then you have not done the expected learning. For programming assignments, you are allowed and encouraged to brainstorm about the problems with your peers. You can talk in English about algorithms and approaches. However, unless you are explicitly asked to work in a team, you must sit down behind the computer and write the Python program you turn in yourself. You may not copy code from the internet or from your peers – this is plagiarism, and furthermore, will not help you learn. If you have a good reason to copy code from a given source, you **must** cite the source in a comment above the block of code copied.

It is in your interest to make sure that you do the programming yourself, but to reinforce this, the instructor may call on you at any time to explain and defend the code you have written.

Reading email
We will send you important information by email from time to time. We expect you to check email frequently. Not reading your email will not be accepted as an excuse for missing important information.

Evaluation Criteria
Your grade in the course will be determined according to the following criteria:

Attendance & Participation	5%
Quizzes	10%
Labs and Homework Assignments:	25%
Mid-semester assessment:	20%
Final assessment:	40% (sit-down exam)

Like all classes at Ashesi, this class gives a lot of weight to continuous assessment. However, note that a failing grade in the exams (mid-semester exams and final exam) may result in an automatic failing grade in the course, regardless of your overall weighted grade. For example, if you do excellently on the assignments, but fail the exams, your overall grade will be a failing grade. Thus, you must pay attention to both assignments and exams.

Late Policy
All assignments are due when stated because the class because the learning is designed to build upon the given work. For homework assignments and labs, you will lose 25% of your grade for each day your assignment is handed in late. You may also begin to get lost, so try to plan ahead! After two days past the due date, the assignment or lab will not be accepted since you would have already lost 50% of the grade by then and the

course will have moved on, possibly leaving you behind. Unless otherwise stated, late submissions will not be accepted for any other work assigned.

Prerequisites
The prerequisites for this class are Introduction to Computing and Information Systems, or Pre-Calculus 1 or Calculus 1

Schedule
Below is a tentative schedule. The schedule is subject to adjustment at the instructors' discretion, and will be updated on Canvas. Updated reading assignments will also be posted on Canvas.

NB:
* Reading Quizzes are also sometimes referred to as Readiness Assessment Tests
* Learning Quizzes are on everything covered since the last Learning Quiz

Week	Topics	Reading(s)	Assignments & Assessments
Week 1 Aug 21 – Aug 25	**M:** Introduction to CS 212 & The Basics of a Program **W:** Variables, Expressions, and Statements **F:** Variables, Expressions, and Statements	**W:** Read Chapter 1 & 2 in *Think Python*	**W:** Reading Quiz RQ01 on Chapter 1 & 2 in *Think Python* **F:** Learning Quiz LQ01 on everything covered Assignment A01
Week 2 Aug 28 – Sep 1	**M:** Functions **W:** Functions **F:** Case Study: Interface Design	**M:** Read Chapter 3.1 - 3.6 in *Think Python* **W:** Read Chapter 3.7 - 3.12 in *Think Python*	**M:** Reading Quiz RQ02 on Chapter 3.1 - 3.6 in *Think Python* Assignment A01 due **W**: Reading Quiz RQ03 on Chapter 3.7 - 3.12 in *Think Python* Assignment A02

Week	Topics	Reading(s)	Assignments & Assessments
Week 3 Sep 4 – Sep 8	**M:** Conditionals and Recursion	**M:** Read Chapter 5.1 - 5.6 in *Think Python*	**M**: Reading Quiz RQ04 on Chapter 5.1 - 5.6 in *Think Python* Learning Quiz LQ02 on everything covered Assignment A02 due
	W: Conditionals and Recursion	**W:** Read Chapter 5.7 - 5.12 in *Think Python*	**W:** Reading Quiz RQ05 on Chapter 5.7 - 5.12 in *Think Python*
	F: Conditionals and Recursion		
Week 4 Sep 11 – Sep 15	**M:** More about Functions	**M:** Read Chapter 6.1 - 6.4 in *Think Python*	**M:** Reading Quiz RQ06 on Chapter 6.1 - 6.4 in *Think Python*
	W: More about Functions	**W:** Read Chapter 6.5 - 6.9 in *Think Python*	**W:** Reading Quiz RQ07 on Chapter 6.5 - 6.9 in *Think Python*
	F: More about Functions		**F:** Learning Quiz LQ03 on everything covered
Week 5 Sep 18 – Sep 22	**M:** Iteration	**M:** Read Chapter 7.1 - 7.3 in *Think Python*	**M:** Reading Quiz RQ08 on Chapter 7.1 - 7.3 in *Think Python*
	W: Iteration	**W:** Read Chapter 7.4 - 7.7 in *Think Python*	**W:** Reading Quiz RQ09 on Chapter 7.4 - 7.7 in *Think Python* Assignment 03
	F: Iteration		

Week	Topics	Reading(s)	Assignments & Assessments
Week 6 Sep 25 – Sep 29	**M:** Strings **W:** Strings **F:** Strings	**M:** Read Chapter 8.1 - 8.5 in *Think Python* **W:** Read Chapter 8.6 - 8.11 in *Think Python*	**M:** Reading Quiz RQ10 on Chapter 8.1 - 8.5 in *Think Python* Assignment 03 due **W:** Reading Quiz RQ11 on Chapter 8.6 - 8.11 in *Think Python* **F:** Learning Quiz LQ04 on everything covered
Week 7 Oct 2 – Oct 6	**M:** Review **W:** Review **F:** Mid-Semester Assessment		**F:** Mid-Semester Assessment
Week 8 Oct 9 – Oct 13	MID-SEMESTER BREAK		
Week 9 Oct 16 – Oct 20	**M:** Lists **W:** Lists **F:** Lists	**M:** Read Chapter 10.1 - 10.7 in *Think Python* **W:** Read Chapter 10.8 - 10.14 in *Think Python*	**M:** Reading Quiz RQ12 on Chapter 10.1 - 10.7 in *Think Python* **W:** Reading Quiz RQ13 on Chapter 10.8 - 10.14 in *Think Python* **F:** Learning Quiz LQ05 on everything covered

Week	Topics	Reading(s)	Assignments & Assessments
Week 10 Oct 23 – Oct 27	**M:** Dictionaries **W:** Dictionaries **F:** Dictionaries	**M:** Read Chapter 11.1 - 11.4 in *Think Python* **W:** Read Chapter 11.5 - 11.8 in *Think Python*	**M:** Reading Quiz RQ14 on Chapter 11.1 - 11.4 in *Think Python* **W:** Reading Quiz RQ15 on Chapter 11.5 - 11.8 in *Think Python*
Week 11 Oct 30 – Nov 3	**M:** Tuples **W:** Tuples **F:** Case Study: Data Structure Selection	**M:** Read Chapter 12.1 - 12.4 in *Think Python* **W:** Read Chapter 12.5 - 12.8 in *Think Python*	**M:** Reading Quiz RQ16 on Chapter 12.1 - 12.4 in *Think Python* Learning Quiz LQ06 on everything covered **W:** Reading Quiz RQ17 on Chapter 12.5 - 12.8 in *Think Python*
Week 12 Nov 6 – Nov 10	**M:** Files and I/O **W**: Files and I/O **F:** Files and I/O	**M:** Read Chapter 14.1 - 14.5 in *Think Python* **W:** Read Chapter 14.6 - 14.10 in *Think Python*	**M:** Reading Quiz RQ18 on Chapter 14.1 - 14.5 in *Think Python* Assignment 04 **W:** Reading Quiz RQ19 on Chapter 14.6 - 14.10 in *Think Python* **F:** Learning Quiz LQ07 on everything covered

Week	Topics	Reading(s)	Assignments & Assessments
Week 13 Nov 13 – Nov 17	**M:** Objects and Classes **W:** Objects and Classes **F:** Objects and Classes	**M:** TBD **W:** TBD	**M:** Reading Quiz RQ20 on TBD Assignment 04 due **W:** Reading Quiz RQ21 on TBD
Week 14 Nov 20 – Nov 24	**M:** Objects and Classes **W:** Objects and Classes **F:** Objects and Classes	**M:** TBD **W:** TBD	**M:** Reading Quiz RQ22 on TBD Assignment 05 **W:** Reading Quiz RQ23 on TBD
Week 15 Nov 27 – Dec 1	**M:** Inheritance **W:** Inheritance **F:** Inheritance	**M:** TBD **W:** TBD	**M:** Reading Quiz RQ24 on TBD **W:** Reading Quiz RQ25 on TBD
Week 16 Dec 4 – Dec 8	**M:** Revision Period **W:** End of Semester Examinations Begin		
FINAL EXAMS Dec 11 – Dec 15	END OF SEMESTER EXAMINATIONS CONTINUE		