COMSCI 101

Introduction to Computer Science

Session 2 2025 Fall

Basic Course Information

Lectures:

Dates/Time: Monday, Tuesday, Wednesday, Thurday, 1:15 PM – 2:30 PM
Location: AB 1079

Labs:

Dates/Time: Wednesday 2:45PM - 4:00PM
Location: AB 3107

Dates/Time: Thursday 2:45PM - 4:00PM
Location: AB 3101

Lectures' office hour: Email for an 1-on-1 appointment

Instructor's Information

Name: Tongshu Zheng, PhD
Title: Assistant Professor of Environmental Science
Email: tongshu.zheng@dukekunshan.edu.cn
Bio: I obtained my bachelor's degree in Environmental and Sustainable Development from The Hong Kong Polytechnic University in 2016. I completed my Master's in Environmental Engineering at Duke University in 2018 and went on to earn my Ph.D. in the same discipline in 2021. I have applied advanced data science to air quality challenges across academia, government, and industry. I previously worked at the California Air Resources Board (CARB) and the environmental technology company Aclima, contributing to the modernization of air quality and greenhouse gas monitoring data infrastructures, mobile air quality sampling projects, and air quality predictive models development for government clients in California, New York, Washington, D.C., and Mexico. My current research focuses on: 1) using mobile monitoring platforms to construct ultra-high spatiotemporal-resolution urban air pollution exposure maps; 2) using low-cost air quality sensors to investigate how building types, HVAC systems, human activities, and outdoor environmental conditions influence indoor air pollution; and 3) developing ethane and methane retrieval methods from satellite imagery to estimate methane emissions and long-term trends in China's oil and gas sector.

TA's Information

Graduate TA

Name: Chengliang Jin
Email: chengliang.jin@duke.edu
Office hours and location: Thursday 7:30pm-8:30pm, WDR2003
Contact For: Questions regarding grading on quizzes, mini-projects, and exams

Undergraduate TAs:

Name: Hongliang Li
Email: hongliang.li@dukekunshan.edu.cn
Office hours and location: Sunday 6:30pm-7:30pm, WDR2003
Contact For: Questions related to homework grading, lectures, practice problems, and questions in lab, homework, quizzes, and exams.

Name: Minxian Yan
Email: minxian.yan@dukekunshan.edu.cn
Office hours and location: Thursday 6:30pm-7:30pm, WDR2003
Contact For: Questions related to lectures, practice problems, and questions in labs, homework, quizzes, and exams

IT support

Name: Sam Ma
Title: System Engineer IV
Email: sam.ma@dukekunshan.edu.cn
Work hours: Weekdays, 9:00 AM–5:00 PM
Contact For: Email if you are unable to log into the JP server, forgot your password, or do not have an account.

Prerequisite(s), if applicable

No specific prerequisites.

What is this course about?

Computer science (CS) is an exciting, growing and challenging field that impacts every part of our lives. As an introductory course for computer science, this course will not only provide fundamental knowledge of a variety of CS topics, but it will also provide essential computational problem-solving skills with hands on programming experience (with Python). This course is an elective course open to everyone, and no specific prerequisites are needed. Successfully completing this course will serve as a solid foundation for other courses in the computer science or data science majors and equip students with essential tools for a career in computer science, data science, and other disciplines. It can also bring new concepts and tools to other domains in the natural science, social sciences, arts, humanities and medical industry.

What will I learn in this course?

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

- Understand the basic organization of computers
- Grasp common computing and programming terminologies and concepts
- Think algorithmically, formulate problem computationally
- Employ common programming patterns and abstractions to solve problems in Python
- Use simple algorithms, data structures, and the notion of complexity
- Organize a program according to object-oriented programming (OOP) principle
- Debug a program

Recommended Text(s)/Resources/Equipments

Required Textbook: Introduction to Computation and Programming Using Python: With Application to Understanding Data, Third edition, by John V. Guttag

Required Free Software: IDLE Python, VS Code, Jupyter Notebook (TA will guide you to install them on your local computer in the 1st lab session).

Online Rescources

- Python for everybody, Exploring Data Using Python 3, Charles R. Severance: https://www.py4e.com/book.php
- A Byte of Python - free book on programming using the Python language: https://python.swaroopch.com/
- Python Tutorial - Python Full Course for Beginners: https://www.youtube.com/playlist?list=PLu0W_9lII9agwh1XjRt242xIpHhPT2llg
- MIT OCW: https://ocw.mit.edu/courses/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/

Other Resources

- Google and ChatGPT

What will I do in this course?

This course is intended for students with little or no programming experience. It aims to provide students with an understanding of the role computation can play in solving scientidic problems and to help students, regardless of their major, feel justifiably confident of their ability to write small programs. To achieve this, there will be lectures, Round-Robin Sharing, labs, quiz, homework, mid-term and final exam, as shown below.

- **Lectures:** There will be 4 lectures in each week. During the lectures, there will be Slides presentations, mainly on programming principles, basic data structure, and algorithms. To make the classroom more interactive, there will be programming activities and Q&A sessions. Hence, students need to bring their laptops to the lectures.
- **Labs**: There will be one lab session in each week with a lab instructor (TA). During the session, students will practice programming on the topics that are covered in the lectures. A short presentation or demonstration of coding will also be given by the instructor. Students can seek

assistance from the instructor when encountering difficulties. Some lab sessions may involve group discussions and collaboration on a task.

- **Homework/Quiz/Projects**: Homework will be assigned throughout the course. The homework normally has some programming tasks relevant to the contents covered in the lecture. Unannounced quizzes will take place during class and must be completed in person in class within the scheduled quiz window. You will also work on a few small (mini) projects through the session. More details about these assessments will be confirmed in due course. Note that though you can collaborate and help each other, all assignments (quizzes, mini-projects) will be individually graded, so do NOT simply copy and paste (or only with minor modifications) someone else's code. All work that you submit must be your own. Collaboration is encouraged but must be disclosed by all parties. Seeking advice and help from course peer-tutors are strongly encouraged.
- **Mid-term exam**: The in-class computer-based test will cover questions on what you have learned after 1/2 of the session. It will mainly be coding problems administered on JP server. You will be briefed with details about the content and format prior to the test.
- **Final exam**: Final exam will be paper-based test as well, which will be mainly covering the topics you have learnt through the session, but emphasizing more on the last 1/2 of the course. You will be briefed with details about the content and format prior to the test.

Grading Procedures

The final score of this course will include the followings:

- **Homework**: 18
- **Quiz (in class)**: 12
- **Mini-project**: 15
- **Midterm**: 25
- **Final**: 30

A+= 98% - 100%; A = 97% - 93%; A- = 90% - 92%; B+ = 87% - 89%; B = 83% - 86%; B- = 80% - 82%; C+ = 77% - 79%; C = 73% - 76%; C- = 70% - 72%; D+ = 67% - 69%; D = 63% - 66%; D- = 60% - 62%; F = 59% and below.

Course Policies and Guidelines

- **Discussion Guidelines**: Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to be expected. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor. Active interaction with peers and your instructor is essential to success in this course, paying particular attention to the following:
  - Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.
  - Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully, and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.
  - Read your online discussion posts carefully before submitting them.
- **Academic Integrity**: As a student, you should abide by the academic honesty standard of the Duke Kunshan University. Its Community Standard states: “Duke Kunshan University is a community comprised of individuals from diverse cultures and backgrounds. We are dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Members of this community commit to reflecting upon and upholding these principles in all academic and non-academic endeavors, and to protecting and promoting a culture of integrity and trust.” For all graded work, students should pledge that they have neither given nor received any unacknowledged aid.
- **More specifically, you should NOT do the following**:
  - Look at another student’s solutions.
  - Use solutions to same or similar problems found online or elsewhere.
  - Search for homework solutions online.
  - Turn in any part of someone else's work as your own.
  - Share your code or written solutions with another student or online.
  - Allow someone else to turn in your work as their own.
  - Write homework assignments together unless it is specified as a group assignment.
  - Collaborate with anyone outside your group for a group assignment.
- **Academic Policy & Procedures**: You are responsible for knowing and adhering to academic policy and procedures as published in University Bulletin and Student Handbook. Please note, an incident of behavioral infraction or academic dishonesty (cheating on a test, plagiarizing, etc.) will result in immediate action from me, in consultation with university administration (e.g., Dean of

Undergraduate Studies, Student Conduct, Academic Advising). Please visit the Undergraduate Studies website for additional guidance related to academic policy and procedures. Academic integrity is everyone's responsibility.

- **Academic Disruptive Behavior and Community Standard**: Please avoid all forms of disruptive behavior, including but not limited to: verbal or physical threats, repeated obscenities, unreasonable interference with class discussion, making/receiving personal phone calls, text messages or pages during class, excessive tardiness, leaving and entering class frequently without notice of illness or other extenuating circumstances, and persisting in disruptive personal conversations with other class members. Please turn off phones, pagers, etc. during class unless instructed otherwise. Laptop computers may be used for class activities allowed by the instructor during synchronous sessions. If you choose not to adhere to these standards, I will take action in consultation with university administration (e.g., Dean of Undergraduate Studies, Student Conduct, Academic Advising).
- **Academic Accommodations**: If you need to request accommodation for a disability, you need a signed accommodation plan from Campus Health Services, and you need to provide a copy of that plan to me. Visit the Office of Student Affairs website for additional information and instruction related to accommodations.
- Note that you are free to use any Gen-AI tools (e.g., ChatGPT) to help learn offline, but keep in mind that you are NOT allowed to use it for all quizzes/midterm/final.
- Note that you are encouraged to collaborate with your classmates, such as discussion of course content at high level, talking about hints or debugging, problem-solving strategies. However, you must do all coding and write-ups on your own.

Course Outline

Week 1

- Course introduction
- CS backgrounds and the basic organization of computers

Week 2

- Python Programming Basics – part I (expressions, operators, string, looping and branching, etc)

Week 3

- Python Programming Basics – part II (function, tuple, list, etc.)

Week 4

- Python Programming Basics – part III (handling files, dictionary, debug and testing)

Week 5

- Recursion, Computational Complexity

Week 6

- Object-oriented programming

Week 7

- Searching, Sorting, and Tree

Course Schedule

	Content
Week 1	Introduction
	Binary System
	Data Representation
	Software & Hardware
Week 2	Python Basic
	Condition
	Loop
	String
Week 3	Function 1
	Function 2
	Tuple and List 1
	Tuple and List 2
Week 4	Files
	Midterm
	Dictionary
	Debug and Testing
Week 5	Recursion 1
	Recursion 2
	Computation Complexity 1
	Computation Complexity 2
Week 6	Class 1
	Class 2
	Class 3
	Class 4
Week 7	Search
	Sorting
	Tree

	Review
Week 8	Final