

Intensive Foundations of Computer Science (CS 5001 / CS 5003)

Align Course, Khoury College of Computer Sciences

Northeastern University, Vancouver Campus

Spring 2025 Semester

We acknowledge that the land on which we gather is the unceded territory of the Coast Salish Peoples, including the territories of the xʷməθkʷəṽəm (Musqueam), Skwxwú7mesh (Squamish), and səlílwatał (Tsleil-Waututh) Nations.

Spring 2025 CS 5001 section 6 (CRN 40683) / Spring 2025 CS 5003 section 8 (CRN 40690)

Class Hours: Monday 10:45 am - 12:45 pm / Wednesday 10:45 am - 12:45 pm (Pacific Time)

Class Location: West Georgia 1524

Instructor: Dr. Lino Coria

Email: l.coria@northeastern.edu

Office Hours

Lino Coria: Wednesday 9:30 am – 10:30 am (Pacific Time)

Teaching Assistants: TBD

Office Hours will be held online. Because of this, please use [Microsoft Bookings](#) to book an appointment. If requested, we can meet in person on campus.

Students can also e-mail to schedule office hours outside of the scheduled time if necessary. Also note that remote connectivity problems may cause quality of service that are beyond our control. If those issues arise, we reserve the right to end/suspend the online hours at our discretion.

Course Description

This course introduces students to the **principles of systematic problem solving through programming**. Topics include analysis of problems, modelling a solution, data types, and control structures. Additionally, it will introduce various ways to organize data including a discussion of their advantages and disadvantages.

Course Prerequisites

The course is suitable for students in the ALIGN MS in CS program. It assumes no previous programming experience. We're happy you're here!

Course Objectives

1. Develop a basic understanding of how to analyze and break down large problems to implement efficient solutions using the Python programming language.
2. Determine functionality of code written by oneself and others through reading and tracing short segments of code.
3. Write correct and clearly documented small-to-medium sized programs that others can read, understand, and modify.
4. Use generalization for data and functions to limit code duplication.
5. Develop tests to exercise implemented code to ensure quality testing in the software development process.
6. Select appropriate data types to represent information including using common library classes.
7. Assess the impact of data structure and algorithm choice on the run time and storage space needed to execute a program.

Course Structure

Classwork

Monday classes are not lectures; they are **workshops**.

During Monday workshops and in Wednesday recitations, students will often be working in groups. We strongly invite you to get to know your group members and work closely together, supporting each other learning and understanding to the best you can.

Classwork has both graded and ungraded activities.

Labs and homework assignments

Homework assignments (HW) are both automatically and manually graded. **HW MUST be done and submitted INDIVIDUALLY.**

Note: In rare cases, HW due dates may change due to events both within or outside our control! in which cases students would be notified in advance and would be given enough time to submit their HW accordingly.

Lab assignments can and should be done working with your assigned lab groups.

The weekly schedule, including topics and deadlines, are subject to change based on events both within our control and outside of it. But this is a guideline for the semester schedule.

Week	Week of...	Topics	Labs	Assignments	Must read <u>before</u> next week
				(<u>release dates</u> , unless noted otherwise)	
	06-Jan	Introduction and Getting Started			
1	13-Jan	Flowcharts, Conditionals & Boolean Expressions	Lab 1	HW 1	Module 1 + Think Python Ch 2 & 5 (except recursion)
2	20-Jan	Functions and Testing	Lab 2	HW 2, Reflection 1	Module 2 + Think Python Ch 3 & 6 (except recursion)
3	27-Jan	while Loops	Lab 3	HW 3, Quiz 1	Module 3 + Think Python Ch 7
4	03-Feb	Strings, Lists, and for Loops	Lab 4	HW 4, code walk 1	Module 4 + Think Python Ch 8, 9 & 10
5	10-Feb	Recursion	Lab 5	In-class Demos*	Module 5 + Think Python Ch 5 & 6 +
				In-class Demos* (group work)	In-class Demos Description and Communication Plan
				Quiz 2	
6	17-Feb	Dictionaries and Sets	Lab 6	HW 5	Module 6 + Think Python Ch 11
7	24-Feb	Files & Error Handling	Lab 7	HW 6	Module 7 + Think Python Ch 14
	03-Mar	Spring Break			
8	10-Mar	Classes & Objects (Part 1)	Lab 8	HW 7, Quiz 3	Module 8 + Think Python Ch 15 & 17 (except

					Polymorphism and Interface)
9	17-Mar	Classes & Objects (Part 2)	Lab 9	HW 7, code walk 2	
10	24-Mar	In-Class Demos		Final project* (individual work)	Module 10
11	31-Mar	Efficiency: Searching & Sorting	Lab 10	Reflection 2	Module 11
12	07-Apr	Data Structures: Stacks and Queues		Quiz 4 (end of class Monday),	
				Final project Milestone 1 turn-in*	
13	14-Apr	Final Exam Review & Project Codewalks		Final exam review	
14	21-Apr	Continue Final Project Codewalks (as needed)		Final project codewalks. Final date for assignments: April 22nd	Final Exam: Monday April 21st, 10:45am

- The **Assignments** column shows the corresponding activity for that week. Some activities will span over a few weeks. Please follow closely the "**due**" and "**available until**" dates on each released assignment. All assignments can be accessed from the "Assignments" page from the menu on the left-hand side.
- In-class demos release date is the week of February 10th
- Final Project release date is the week of March 24th
- Final Project Milestone 1 turn-in date is the week of April 7th
- Final Exam: Monday, April 21st, at 10:45am
- Final Project turn-in (the complete final version of the project) is finals week, the week of April 21st. No material for this class will be due after **April 22nd**. Please be available for course activities until this day.

Student Expectations

Prior to the lecture/workshop, students must watch and complete the required video and readings for the course. This course and the lecture/workshop will *assume* students have watched the required materials, which are meant to take 1-2 hours to complete.

In general, not including time spent in class, you should be prepared to spend 3-4 hours per credit hour for this course. This means that **you should plan on spending a *minimum* of 12-16 hours per week on this course**. 16 hours is a rough average of **2.2 hours per day, every day of the week**. Many students find this course takes about 20 hours/week to successfully complete. 20 hours a week is a rough average of **3 hours per day, every day of the week**. Some students may spend more time than that on certain weeks.

Please plan carefully! It can be hard to estimate when you might get stuck, so make sure to have extra slack time in your schedule to accommodate tricky problems or new concepts that are harder than you expect. Sometimes a problem comes along that you really need to sleep on. Finish your work as early as you can, so that when problems come up that require extra time, you have that time to spend.

Communication: Please post questions to Piazza. If it is related to a concept write a public post. Post a private question if it's related to grades or code.

Any questions about grades or requests to change points earned on an assignment must be asked within 7 days of the assignment's return.

Only email your instructors directly if you must provide sensitive personal information. Emails will take the instructor between 24-72 hours to respond to. If you haven't heard from your instructor in 72 hours, please email them again with a follow-up.

Course Assessment

Grade structure

Final grades will reflect students' effort and performance. The course grade will be based on the following:

Assessment	Weight	Collaboration
Learning activities, in-class and on Canvas	5%	Individual or group work, as assigned
Quizzes (in-class)	8%	Individual work, ~4 quizzes

Lab assignments	5%	Group work, as assigned
Code walks	5%	Individual, in-person code walks
Homework (on Gradescope)	25%	Individual work
Final exam (paper-based)	15%	Individual work
Final project (on Gradescope)	25%	Individual work (implementation) + feedback from the Support Circle (4 students + TA + Instructor)
In-Class Demos	10%	Groups
Reflections (on Canvas)	2%	Individual work
Total	100%	

Learning activities (Canvas and in-class)

These quizzes and activities will be turned in on Canvas or in class.

Quizzes (in-class)

These quizzes will be facilitated in the classroom by your instructor, and their dates are listed on the syllabus schedule above; any change to the quiz dates will be announced well in advance (and we'll try to avoid it). The quizzes will be closed book. To accommodate absences or unforeseen difficulties, the lowest quiz grade will be dropped.

Code walks (in-person)

We will schedule two 20 minutes, in-person code walks during the semester, where you will explain one of the assignments you have submitted out of a set of possible assignments and answer questions about them.

Homework assignments (individual, take-home, submitted to Gradescope)

There will be approximately eight homework assignments over the course of the semester. In most homework problems, students will be asked to solve a problem that requires the application of topics they learned about in the lessons. Unlike in-class activities, HW assignments tend to be a bit larger and will require a student to combine the concepts and use them outside of artificially created environments.

Due to the size of these assignments, you will be provided with time to solve them depending on the complexity of the problem. In addition to programming, you will be expected to use **good coding style, include proper documentation, design test cases for the problem, and**

implement all coding best practices you learn about in workshops and recitations. In most assignments, you will be asked to answer questions about your solution.

HW assignments are all submitted on Gradescope. Please note that Gradescope is set for the Eastern time zone (Boston). Please be aware of submission deadlines. **Homework assignments may not be submitted late.**

Final exam (paper-based)

There will be a final exam that covers all material presented during the semester.

The exam will take place on **Monday, April 21st**, at **10:45 AM**. Please plan to arrive 10-15 minutes early to get settled. It will be a **2-hour, closed-book, paper-based exam** held in a designated classroom (specific assignments will be provided before the exam date).

Please note that completing the exam at a different time is not an option, so ensure your schedule is clear for this date and time.

The exam will be designed to be completed in x time, and $1.5x$ time will be given to complete it, where x will be determined closer to the end of the semester but will not exceed 1.25 hours.

Final project (on Gradescope)

There is one project towards the end of the semester. It will be more challenging and involve more code than the homework sets, but you will have a longer time to complete it. **The project may not be submitted late, and it will not be dropped.**

In-Class Demos

We will use one class period for presentations. **Students will present, in groups**, about one additional Python feature or computer science concept that your group will research and learn (a sample list will be provided, but additional student-generated options may be approved). Students will choose how to organize their groups and divide the work to present a presentation to the class.

Submissions of the In-class Demos materials must be done on Canvas. Additionally, as part of this assignment all students, within their teams, would be required to submit an **individually written peer review**, in their own words.

Reflections (on Canvas)

There will be ~3 written reflections over the course of the semester. You'll reflect on what you've learned, your progress in teams and individual learning and collaboration environments, and your target technical and interpersonal and workplace skills to acquire. These reflections will be evaluated based on your coverage of each topic in your reflection; grammar & composition skills are not graded. Please use your own writing and not ChatGPT or other tools for this: we're interested in where you are at and your own reflections, and we're not going to mark off for phrasing, style, grammar, etc.

Late Policy

Timely submission of assignments is crucial for your success in this course. All assignments must be submitted by the stated deadline, without exception. Similarly, there will be no alternative dates for in-person exams or code walks. This policy is in place to ensure that everyone benefits; staying on schedule allows you to begin the next assignment on time, prevents unnecessary delays in the course progression, and ensures that teaching assistants can grade assignments promptly and provide timely feedback. By adhering to these deadlines, you'll have the best opportunity to stay engaged with the course material and maintain steady progress throughout the semester.

Grade Calculations

Grades will be calculated on an absolute basis: there will be no overall curving. The mapping of raw percentage point totals to letter grades is given below. I do not round grades.

Grades at NU are in the American style; the final letter grade, not the percentage grade, is the only grade that will appear on your transcript once you have completed the class. In other words, there is no ultimate difference between a 93% A and a 99.75% A: both award 4.0 points on the 4.0 grading scale, and both will appear as an A on your transcripts. This course uses the default Northeastern grading scale for graduate courses:

93.00 – 100.00	A
90.00 – 92.99	A-
86.00 – 89.99	B+
82.00 – 85.99	B
77.00 – 81.99	B-
73.00 – 76.99	C+
69.00 – 72.99	C
65.00 – 68.99	C-
0.00 – 64.99	F

To progress, students are required to meet the grade point average (GPA) requirements for the MS Computer Science – Align as determined by Khoury College of Computer Sciences ([see Khoury's website for more information](#)). If you are unfamiliar with the 4.0 grading system, [see this explanation](#).

Course Materials

Canvas

There is an associated Canvas page for this course. The instructors will use it to post weekly reading assignments, lecture materials, labs, feedback, and grades.

Textbook

There is a required textbooks for this class, listed below; the other books are recommended and are a good resource for students who are looking for additional explanations beyond what's provided in course videos. All the following textbooks are available for free online to NU students, see directions below.

Required:

- ***Think Python: How to Think Like a Computer Scientist***, by Allen B. Downey
[Available here.](#)

Additional Resources:

- **Python Crash Course, 3rd Edition**, by Eric Matthes. [Available here.](#)
- **Practical Programming, 3rd Edition: An Introduction to Computer Science using Python 3.6**, by Paul Gries, Jennifer Campbell, and Jason Montojo. [Available here.](#)
- **Python in a Nutshell, 4th Edition**, by Alex Martelli, Anna Martelli Ravenscroft, Steve Holden, Paul McGuire. [Available here.](#)
- **Introducing Python, 2nd Edition**, by Bill Lubanovic. [Available here.](#)

As students at NU, you have access to a very awesome resource: O'Reilly Online.

To access it, and all the above textbooks for free:

1. Go to NU's library page for computer science [here](#).
2. In the lower left-hand corner, click on "Connect to O'Reilly", which will take you [here](#).
3. Select "Not listed."
4. Put in your northeastern.edu email and follow SSO.

Piazza

Piazza will be used for class discussion and course announcements. It also provides students with a platform for getting you help fast and efficiently from classmates, the TAs, and the instructors. Rather than emailing questions to the teaching staff, we encourage you to post your questions on Piazza.

Use the link on the left of the Canvas page to sign up on Piazza for this course.

If you have trouble with Piazza, you can get help from team@piazza.com.

Python

This class will be using the Python 3 programming language. You can download this for free from python.org. By default, Python installs the *Integrated Development and Learning Environment* (IDLE), which can be used to do the early development in this course. Later in the course, we will provide instruction and help to move towards using a more complex IDE, [Visual Studio Code](#), which has some useful features that we will rely on for our more complicated projects.

Gradescope

Gradescope is used in this course to manage assignments and give students feedback. Each assignment will have a dedicated slot on Gradescope to accept submissions from students and to provide manual feedback after grading.

Please note that Gradescope is set for the Eastern time zone (Boston). Please be aware of submission deadlines.

General Policies

Attendance Policy

It is expected that you attend every class and participate. We begin each class on time. If you must miss a class for any reason (e.g. illness, family emergency, religious observance), contact me via Teams. Regardless of the reason, it is your responsibility to catch up on the material you have missed and obtain the notes from a classmate (not from me).

Students who are absent repeatedly from class will be evaluated by faculty responsible for the course to ascertain their ability to achieve the course objectives and to continue in the course.

Academic Integrity

You are expected to read, understand, and follow the [University's policy on Academic Integrity](#). Each student is expected to do his or her own work. Violations of academic integrity will result in a zero on the corresponding assignment along with harsher penalties for more widespread problems. An Academic Integrity Report will be submitted by the instructor to the Office of Student Conduct and Conflict Resolution (OSCCR).

Here are a few examples of academic dishonesty:

- Working with one or more partners on an assignment where not allowed.
- Submitting a copy of work done by another student, with or without their knowledge.
- Submitting work that was primarily found on the web or provided by someone else outside of this class.
- Submitting work by anybody who took this course in the past whether the course was here at Northeastern or at another campus or institution.
- Providing or receiving significant help to another student on an assignment.

General discussions with other students are okay but should be done away from the computer, leaving only memories.

If you are unsure about the plagiarism policy, **please ask me!**

AI Tools

In this course, we recognize the growing role of AI tools in programming and problem-solving. However, our primary focus is on helping you develop a strong foundation in systematic problem-solving and programming concepts. To achieve this, you are expected to refrain from using AI tools at the start of the course. This will allow you to independently build your understanding and skills without relying on external assistance.

As the course progresses, we will gradually introduce AI tools in a structured manner during classroom discussions and activities. This approach ensures that you understand both the core principles of programming and the appropriate, responsible use of AI tools to enhance your work. Until these tools are introduced, it is important to tackle assignments and exercises on your own to fully engage with the material. By following this policy, you will gain confidence in your abilities and be better prepared to use AI effectively when the time comes.

Accommodations

The goal is that every student should be able to participate in this course. If you require any special accommodations, let me know immediately so that we can work out appropriate arrangements.

Students who have disabilities who wish to receive academic services and/or accommodations should visit the Disability Access Services

(<https://disabilityaccessservices.sites.northeastern.edu/>) or call (844) 688-6287.

If you have already done so, please provide your letter from the DAS to the instructor early in the semester to arrange those accommodations.

Feedback

Your opinions are very important to me. All students are strongly encouraged to use the Teacher Rating and Course Evaluation (TRACE) system, at <https://www.northeastern.edu/trace/>, to complete your course evaluations. A reminder about TRACE should arrive via email about two weeks before the end of the course.

In addition, I will be asking for your feedback at least once, about halfway through the semester. However, if you have concerns about the course, do not wait until you are asked. Please schedule a meeting with me, and we will discuss your concerns then.

Title IX Policy

Northeastern University and its faculty are committed to creating a safe and open learning environment for all students. If you or someone you know has experienced discrimination, harassment, or sexual violence (including sexual harassment, sexual assault, dating/domestic violence, or stalking), please know that help and support are available. Northeastern strongly encourages all members of the community to take action, seek support, and report incidents of discrimination, harassment, and sexual violence to the Office for University Equity and

Compliance (OUEC) through the Online Discrimination Complaint Form found at <https://www.northeastern.edu/ouec/file-a-complaint/>.

Please be aware that faculty members are Mandatory University Reporters who are required to disclose information about alleged discrimination, harassment, and sexual violence (including sexual harassment, sexual assault, dating/domestic violence, or stalking) to the OUEC. If the OUEC receives a report, a member of their office will reach out to offer information about available rights, support resources and pathways towards a resolution as a member of the campus community. Community members are not required to respond to this outreach.

If you, or another community member you know wishes to speak to a confidential resource who does not have this reporting responsibility, please contact any of the following confidential resources. These confidential resources are not required to report allegations of discrimination to the University without your signed release.

- [Find@Northeastern](#): Offers 24/7 mental health support via phone at 877.233.9477 (in the U.S.) or +1.781.457.7777 (outside the U.S.).
- [Sexual Violence Resource Center](#): The SVRC provides confidential, trauma-informed support services to Northeastern students who have experienced any form of sexual violence (i.e., sexual assault, sexual harassment, sexual exploitation, domestic/dating violence, and/or stalking). Request services online at bit.ly/svrequestform.
- Confidential Resource Advisor: The CRA provides confidential, restorative informed support services to Northeastern students who have been accused of sexual or identity-based harm. Request services online at <https://bit.ly/svrequestform>.
- Please visit <https://www.northeastern.edu/ouec> for a complete list of reporting options and support resources both on- and off-campus and contact the OUEC (ouec@northeastern.edu) at any time.

Classroom Conduct

The classroom principles that we will follow in the classroom are transparency, equity and inclusion, participation, active dialog, and constructive critique. Students are expected to support each other, learn from each other, and help each other grow. Students have the responsibility to conduct themselves in ways that will help them learn, yet that will not disrupt other students' learning. While each student will be working closely with their team members, you are also expected to engage with your classmates in a respectful, kind, and helpful manner.

In the class, we encourage asking questions, sharing ideas, and engaging in discussions related to the class topics. Sometimes discussions may steer away from the course content, and the course instructor will reserve the right to re-direct it back on track.

Giving and receiving feedback is one of the core activities in this class. When giving and receiving feedback, it is important to keep in mind that we give feedback because we want all

projects to succeed. Our feedback will highlight parts that work well but also point out aspects that can be improved. The feedback should not be taken personally or seen as an attack on students' knowledge or capabilities. Thus, we will learn a craft of constructive feedback and practice it in the class regularly.

Expectations

1. Respect should be shown in all communications and interactions with faculty, staff, industry, peers, and all others on campus. This includes respecting the preferred methods and response times of faculty and staff.
2. Students come to class prepared and having engaged with the online course materials.
3. Students are to actively participate in course activities and discussion.
4. Any issues that arise should be communicated to the appropriate faculty or staff member proactively.
5. All course interaction including instruction, teamwork, TA advising, and course activities are to be done in English.
6. Students should come into the classroom with the goal of learning and have a “growth mindset.”

Meetings

At any time during the course, if you have any concerns, speak to me at the end of class, or contact me by e-mail, and we will set up a one-on-one meeting at a mutually convenient time, either on campus or via Teams.

Wellness Resources

Wellness and Mental Health Support

As a graduate student, you may experience a range of challenges including significant stress, difficult life events, mood changes, excessive worry, or problems with eating and/or sleeping. If you or anyone you know is struggling, we strongly encourage you to seek support.

Northeastern University provides several services and resources to support the overall wellness of students.

To access support, you can [book a Wellness Consultation](#) with the Vancouver Wellness Program Specialist. During this session, you can discuss your concerns and receive guidance on the next steps, along with access to resources that promote mental health and overall well-being. For same day appointments or more information, please email v.williams@northeastern.edu. Students in need of immediate support can access [Find@Northeastern](#) for free 24/7 mental health support at 855.229.8797 (Canada) and +1.781.457.7777 (International) or [Here2Talk](#), a free 24/7 counselling service for all post-secondary students in BC at: 604-642-5212 or toll free at 1-877-857-3397

Wellness Consultation Referral

Learning is most easily accomplished when you are physically and emotionally at your best. If you run into difficulties and need assistance, I encourage you to contact me during my office hours, reach out before or after class, or send me an email. I will do my best to support your success during the term. This includes identifying concerns I may have about your academic progress or wellbeing through a Wellness Consultation Referral. Through this process, I can connect you with the campus Wellness Program Specialist who offers support and assistance getting back on track to success. Only the Wellness Program Specialist can access any concerns I may identify, and a referral does not affect your academic record.

For more information about the Wellness Consultation Referral process or to book a consultation directly, email Victoria Williams, the Vancouver Wellness Program Specialist - v.williams@northeastern.edu.