

INQ 241: How to Think Like a Computer

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Office Hours: MWF 11:30 - 1:30, or by appointment

Class Hours: TTh Group 1:10-2:40

Office: Trexler 365B

Class Room: Trexler 363

Course Objectives

We all use computers in many aspects of our lives, but what does it mean to compute? How does a computer compute? In this course we will attempt to answer these questions at a high level i.e., we will not go into the advanced mathematical details needed to formally define computation, instead we will use only high school level mathematics and focus on the big picture. We will examine how logic is the foundation of computation. We will use the Turtle graphics library in the Python programming language to visually examine the basics of computation. Finally, we will examine solutions to simple yet fundamental computational problems.

The course is designed to . . .

1. enable student's to understand what computation is at a high level,
2. enable student's to understand how logic is used do computation,
3. introduce student's to programming in Python.
4. increase the student's quantitative and computational reasoning skills,
5. increase the student's ability to communicate, in written form, both technical information and well-reasoned arguments.

Intended Learning Outcomes

At the end of the course the successful student will be able to:

1. describe and apply methodologies of mathematics or computer science appropriate for the course's discipline and topic.
2. write about course topics clearly and effectively.
3. interpret quantitative information related to the course topic.

Course Content

Text: Is Math Mathematics Invented or Discovered? (a series of articles on the topic) (download from Inquire),
Think Python: How to Think Like a Computer Scientist, 2nd Edition (available for free online) EasyWriter, Eighth Edition, Andrea A. Lunsford.

Homework:

On all assignments, your name must be written clearly **as it appears on Inquire**. Your homework must be neat and legible, you will **lose points** for submitting rough work.

You will receive no points for turning in work that you can't competently defend.

Activities: Programming activities will use Colab, an online Python programming environment. Colab runs in the Google Chrome browser. The programming activities are designed to give students the opportunity to practice the theoretical concepts covered in class.

Co-curricular Requirement: The Mathematics, Computer Science and Physics department offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face these disciplines. Each student is required to attend at least **one** of these sessions, and turn in a short paper describing the contents of the session, and your critical reflections about the topic and content. **All papers must be submitted by email before April 26**. List of all talks can be found [here](#).

Course Policies

Grading Policy

The final grade will be computed based on the grades in the quizzes, tests, the final exam, home works and programming projects according to the following weights:

- **4%**: Co-curricular **10%**: Homework **26%**: Programming assignments
- **20%**: Papers **20%**: Midterm **20%**: Final exam

The final course grade will be calculated as follows:

- **> 92%: A** **90-92%: A-** **86-89%: B+** **83-85%: B** **80-82%: B-** **76-79%: C+**
- **73-75%: C** **70-72%: C-** **66-69%: D+** **63-65%: D** **60-62%: D-** **< 60%: F**

All grades will be posted on Inquire. These grades are **not weighted, pay no attention to the total graded on Inquire**. The grades on Inquire are for record purposes only.

During Class

Please do not multitask during class. I encourage you to take hand written notes as you may be allowed use them during pop quizzes.

Attendance Policy

Regular attendance in class is highly recommended. Regardless of attendance, students are responsible for all material covered or assigned in class.

Policies on Incomplete Grades and Late Assignments

Late assignments will be accepted for no penalty if a valid excuse is communicated to the instructor before the deadline. Otherwise, **you will receive no credit.**

Academic Integrity and Honesty

Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be strictly the work of the student unless otherwise specified by the instructor. The policies as outlined in the Academic Integrity handbook will be enforced in the course.

Graded programs are subject to the Roanoke College Academic Integrity policies. Copying a program or a portion of a program (even a single line) or reading another person's program to obtain ideas for solving a problem is plagiarism. Other examples of integrity violation include writing code for someone else, using code written by someone else, telling someone else how to solve a problem or having someone tell you how to solve a problem (and using his/her method). These cases apply to any work that is handed in for a grade under the instructor's assumption that the work is your own. Unless specified otherwise by the instructor, discussion among students should be limited to general discussion of concepts and language details, not specific aspects of a solution to the assigned problem.

Subject Tutoring

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm – 9 pm, Sunday – Thursday. We are a Level II Internationally Certified Training Center through the College Reading and Learning Association (CRLA). Subject Tutors are friendly, highly-trained Roanoke College students who offer free, one-on-one tutorials in a variety of general education and major courses such as: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, INQ 250, and Social Sciences (see all available subjects at www.roanoke.edu/tutoring). Tutoring sessions are available in-person or online in 30 or 60-minute appointments (please specify if you prefer to meet with a tutor online or in-person when you make your appointment). All in-person appointments will maintain at least 6 feet of physical distance, desks will be cleaned between appointments, and masks must be worn in all indoor, public spaces. In the event that all classes go online this semester, Subject Tutoring will remain available online, too. Schedule an appointment at www.roanoke.edu/tutoring or contact us at 540-375-2590 or subject_tutoring@roanoke.edu.

We hope to see you soon!

Writing Center

The Writing Center @ Roanoke College, located on the Lower Level of Fintel Library, offers tutorials focused on writing projects and oral presentations for students working in any field. Writers and

presenters at all levels of competence may consult the Writing Center at any point in their process—including brainstorming, drafting, organizing, editing, or polishing presentation skills—to talk with trained peer tutors in informal, one-on-one sessions. Schedule a virtual or in-person appointment by going to www.roanoke.edu/writingcenter, where our staff members and workshops are also posted. If it becomes necessary to temporarily discontinue face-to-face services at any time, online tutorials will still be available. Questions? Email writingcenter@roanoke.edu or call 375-4949.

Disability Support Services

The Office of Disability Support Services, located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library, provides reasonable accommodations to students with identified disabilities. Reasonable accommodations are provided based on the diagnosed disability and the recommendations of the professional evaluator. In order to be considered for disability services, students must identify themselves to the Office of Disability Support Services. Students requesting accommodations are required to provide specific current documentation of their disabilities. Please contact Rick Robers, M.A., Coordinator of Disability Support Services, at 540-375-2247 or e-mail robers@roanoke.edu. If you are on record with the College's Office of Disability Support Services as having academic or physical needs requiring accommodations, please schedule an appointment with Mr. Robers as soon as possible. You need to discuss your accommodations with him before they can be implemented. Also, please note that arrangements for extended time on exams, testing, and quizzes in a distraction-reduced environment must be made at least one week before every exam.

Topics

This course expects you to spend at **least 12 hours** of work each week inside and outside of class.

- Week 1: Defining Computation, Reading: Section 1.0
- Week 2: Computation in Python: Turtle Graphics, Programming Assignment 1
- Week 3: Computation in Python: Arithmetic Operators, Reading: Section 2.1, Programming Assignment 2
- Week 4: Computation in Python: Variables, Reading: Section 2.1.1, Programming Assignment 3
- Week 5: Computation in Python: Logical Operators, Reading: Section 2.2, Paper 1
- Week 6: Computation in Python: Iteration, Reading: Section 2.4, Midterm
- Week 7: Introduction to Algorithms, Reading: Section 3.1, Programming Assignment 4

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- Week 8: Positional Numbering System and Representing Numbers in Binary,
Reading: Binary Number (Wikipedia) Programming
Assignment 5
 - Week 9: Representing Numbers in Other Bases, Paper 2
 - Week 10: Binary logic,
Reading: Boolean Algebra (Wikipedia)
Programming Project
 - Week 11: Truth Tables
Reading: Truth Table (Wikipedia)
 - Week 12: Computing with Bits
Reading: Adder (electronics) (Wikipedia)

Exams

Midterm: 1:10 - 12:40 PM, Thursday, March 3rd

Final: 8:30 - 11:30 AM, Tuesday, May 3rd