CS65: Introduction to Computer Science

January 25, 2022

Syllabus
Logistics
Introduction to Algorithms

Drake
UNIVERSITY

Road Map

- Brief introduction
- Course logistics
- Topics
  - Algorithms
  - Programming
  - Computer program
  - How to program
  - Pseudocode
  - Writing program in a specific language eg Python
  - Integrated Development Environment (IDE)

Welcome to CS 65

Introductions

- Md Alimoor Reza
    - Assistant Professor of Computer Science, Dept. of Mathematics and Computer Science, Drake University
    - **Office:** 314 Collier-Scripps
    - **Email:** md.reza@drake.edu
    - **Phone:** 515-271-1972
    - **Office hours:** T/W/R: 12:30-1:30pm CDT
      additionally by appointment

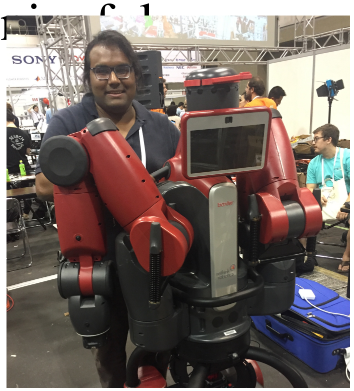
Introductions

- Prior teaching experience
  - Indiana University Bloomington
    - Computer Vision (Spring'21)
    - Artificial Intelligence (Fall'18)
  - George Mason University
    - Introduction to Computing , Object Oriented Programming, Data Mining
  - Drake University
    - Introduction to Computer Science (Fall'21)

- Research
  - Passionate about Artificial Intelligence (A.I.) for Robots
  - Studying various types of images and finding meaningful concepts from them

Object Detection

Semantic Segmentation



Introductions

- Additional help
    - CS tutors are provided (free for CS 65)
    - Individual appointments:
        - Starfish->Services->Tutoring Center

- Now your turn, briefly introduce yourselves!
    - Your name
    - Major
    - Hobby/interest
    - Why you are interested in this course?

Course Logistics

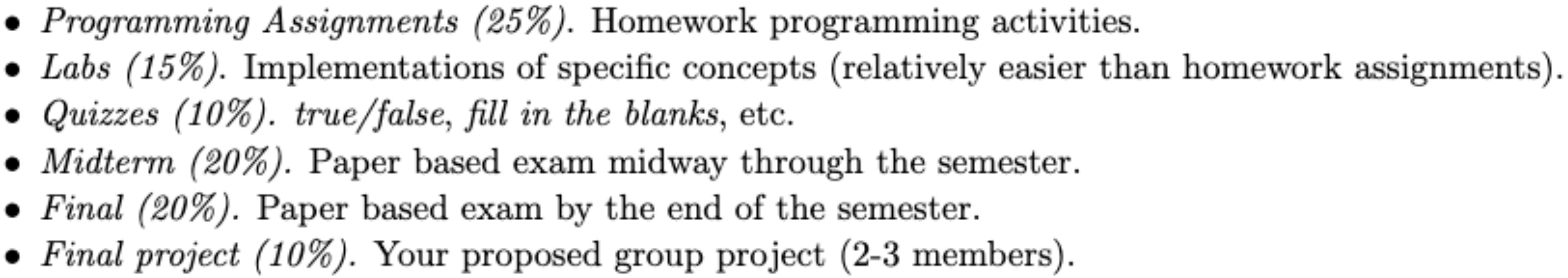
- This is an introductory course. Four years of high school mathematics or MATH 20. Logical thinking and basic familiarity with computer and its applications are helpful

- Most of the course content lectures, assignments, labs, etc will be hosted at https://drake.blackboard.com. Coursework for will include
  - attending the class (in-person)
  - individual and collaborative programming assignments
  - lab assignments,
  - quizzes
  - a final project
  - a midterm and a final exam

- Read the syllabus @ Blackboard:
  - https://homes.luddy.indiana.edu/mdreza/cs65_sp22/cs65_syllabus.pdf

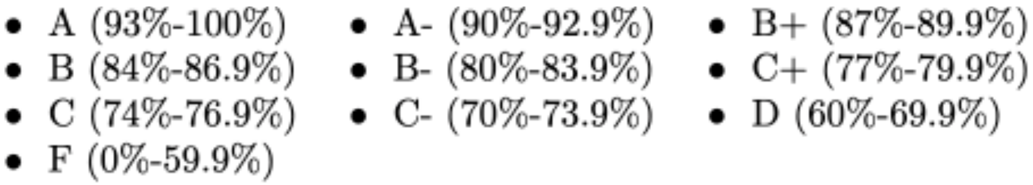
Course Logistics

- Grading policy:



- *Programming Assignments (25%).* Homework programming activities.
- *Labs (15%).* Implementations of specific concepts (relatively easier than homework assignments).
- *Quizzes (10%). true/false, fill in the blanks*, etc.
- *Midterm (20%).* Paper based exam midway through the semester.
- *Final (20%).* Paper based exam by the end of the semester.
- *Final project (10%).* Your proposed group project (2-3 members).

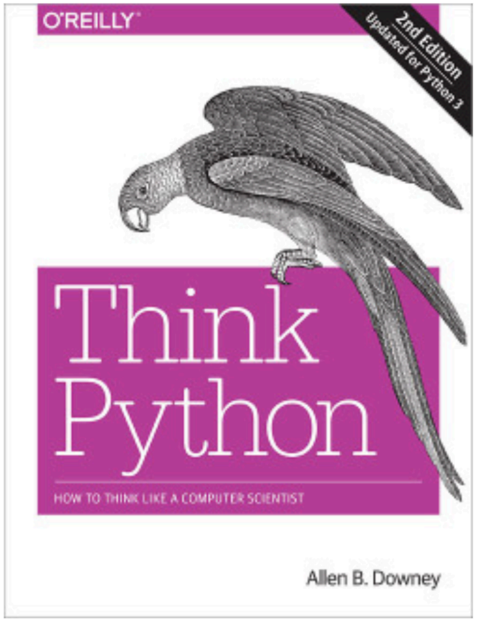
- Grading scale:



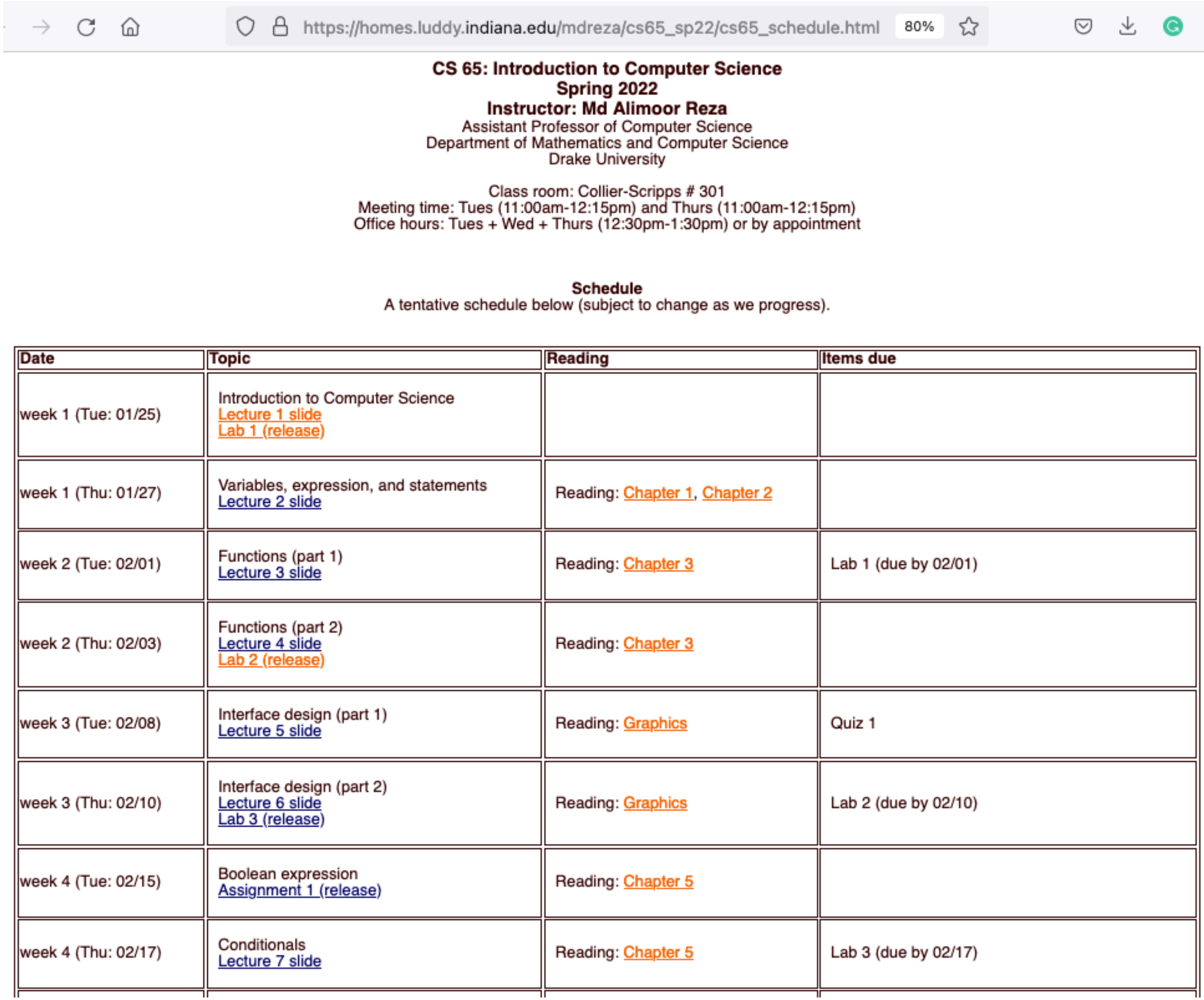
- A (93%-100%)
- A- (90%-92.9%)
- B+ (87%-89.9%)
- B (84%-86.9%)
- B- (80%-83.9%)
- C+ (77%-79.9%)
- C (74%-76.9%)
- C- (70%-73.9%)
- D (60%-69.9%)
- F (0%-59.9%)

Course Logistics

- Textbook
  - Think Python 2nd Edition by Allen B. Downey
  - free copy available online at https://greenteapress.com/wp/think-python-2e
  - Weekly readings are provided



Course Schedule (tentative)



https://homes.luddy.indiana.edu/mdreza/cs65_sp22/cs65_schedule.html

CS 65: Introduction to Computer Science
Spring 2022
Instructor: Md Alimoor Reza
Assistant Professor of Computer Science
Department of Mathematics and Computer Science
Drake University

Class room: Collier-Scripps # 301
Meeting time: Tues (11:00am-12:15pm) and Thurs (11:00am-12:15pm)
Office hours: Tues + Wed + Thurs (12:30pm-1:30pm) or by appointment

Schedule
A tentative schedule below (subject to change as we progress).

Date	Topic	Reading	Items due
week 1 (Tue: 01/25)	Introduction to Computer Science Lecture 1 slide Lab 1 (release)		
week 1 (Thu: 01/27)	Variables, expression, and statements Lecture 2 slide	Reading: Chapter 1, Chapter 2	
week 2 (Tue: 02/01)	Functions (part 1) Lecture 3 slide	Reading: Chapter 3	Lab 1 (due by 02/01)
week 2 (Thu: 02/03)	Functions (part 2) Lecture 4 slide Lab 2 (release)	Reading: Chapter 3	
week 3 (Tue: 02/08)	Interface design (part 1) Lecture 5 slide	Reading: Graphics	Quiz 1
week 3 (Thu: 02/10)	Interface design (part 2) Lecture 6 slide Lab 3 (release)	Reading: Graphics	Lab 2 (due by 02/10)
week 4 (Tue: 02/15)	Boolean expression Assignment 1 (release)	Reading: Chapter 5	
week 4 (Thu: 02/17)	Conditionals Lecture 7 slide	Reading: Chapter 5	Lab 3 (due by 02/17)

Course Logistics

- Read the syllabus @ Blackboard:
  - https://homes.luddy.indiana.edu/mdreza/cs65_sp22/cs65_syllabus.pdf

- Important highlights:
  - Grading requirement and grading scale (tentative)
  - Attendance policy
  - Deadline policy
  - Technology requirement
  - Academic integrity
  - Mask policy

Road Map

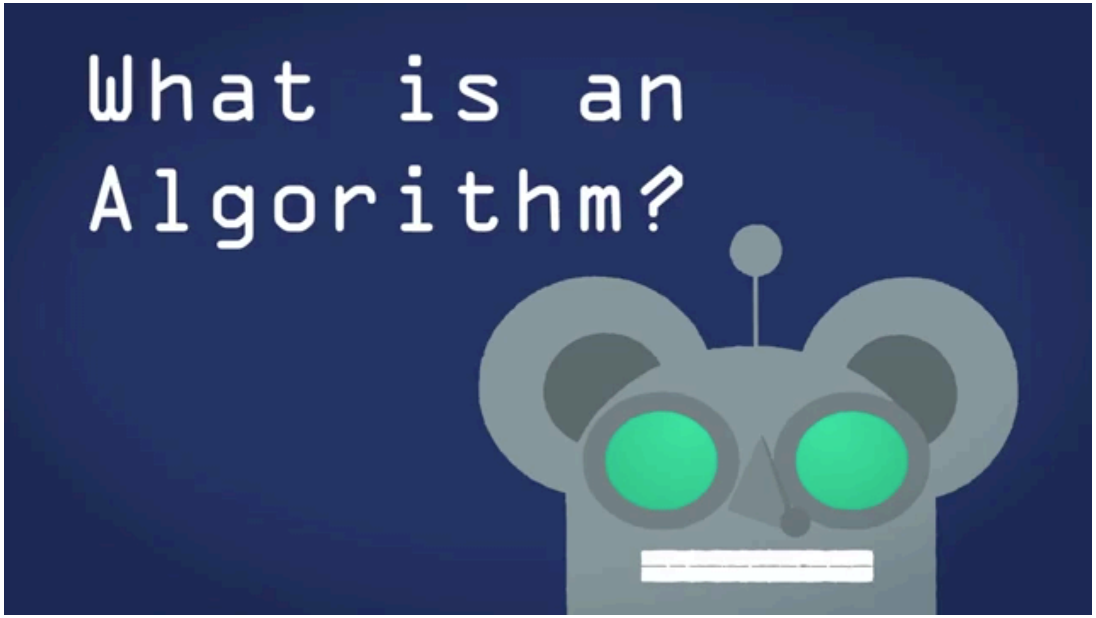
- Brief introduction

- Course logistics

- Topics
    - Algorithms
    - Programming
    - Computer program
    - How to program
    - Pseudocode
    - Writing program in a specific language eg Python
    - Integrated Development Environment (IDE)

Introduction to Computer Science

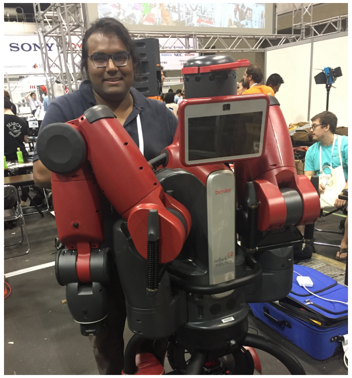
- Focus of this course would be the study of computer algorithms
- Algorithm
  - A crucial component in problem solving
  - step-by-step instructions to be executed by the machine
  - here is a toy example



Reference: BBC Learning

Introduction to Computer Science

- Algorithm:
  - step-by-step instructions to be executed by the machine
  - more realistic algorithm in robotics (from my research)

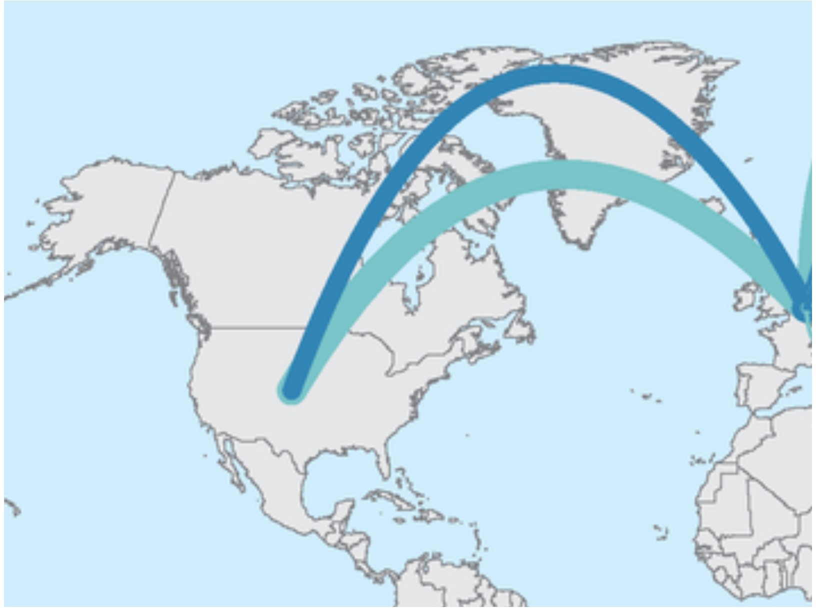


Me with Baxter

Baxter robot with a goal of fetching an specific object ie, Pringles from the shelf

Introduction to Computer Science

- Algorithm:
    - step-by-step instructions to be executed by the machine
    - your turn! let’s do a group activity for 5 minutes
    - Describe the process of making a trip from USA to Europe?
        - Person next to you is your partner
        - Write down the steps



What is programming?

- Computers/computing devices are everywhere
  - desktop, laptop, smartphone, robot, microwave, etc

- Computers/computing devices are tools that can be programmed to perform many functions:
  - implement algorithms to solve problems
  - calculate numbers
  - watch videos
  - write notes
  - design models etc

What are computer programs?

- A program is a sequence of instructions that specifies how to perform a computation
  - can be written by a specific programming language

- Programming languages are formal language to express computations
  - **Python**
  - Java
  - C/C++

- Programming languages have strict rules, known as syntax that must be followed
  - Specific keywords need to be used to perform some action
  - Specific structure to be followed
  - Naming convention

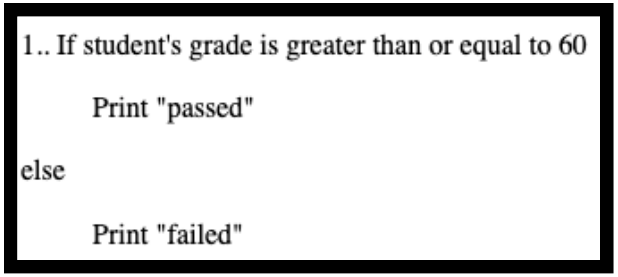
How to write a program?

- Programs must be designed before they are written

- Program development cycle
  - Design a program (eg, in pseudocode)
  - Write the code (in a programming language like python)
  - Correct the syntax errors
  - Test the program
  - Correct the logic errors

Pseudocode

- Pseudocode is an informal language that has no syntax
    - the examples we have seen before (brushing tooth, robot grasping, making Euro trip) can be written in pseudocode



```
1.. If student's grade is greater than or equal to 60
        Print "passed"
else
        Print "failed"
```

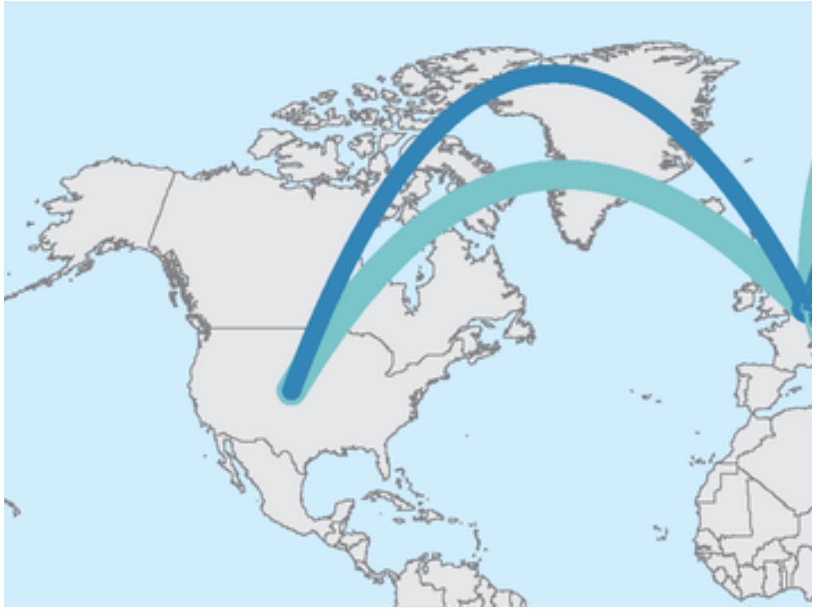
example pseudocode

- Not meant to be compiled or executed

- Used to create model program
    - less worry about the syntax, more focus on the logic/design
    - Can be translated into actual code in any programming language eg, **Python**

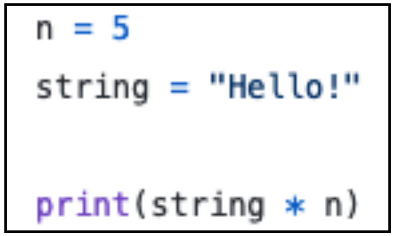
Exercise

- Describe the process of making a trip from USA to Europe?
    - Person next to you is your partner (in zoom breakout room)
    - Now write down your previous solution in pseudocode

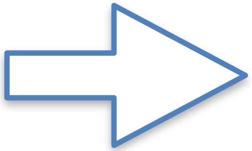


Python

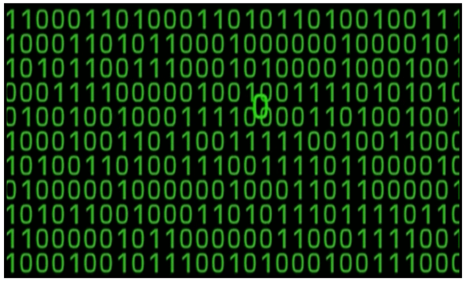
- Python is a programming language
- Purpose is to convert
  - what a programmer writes —> machine executable instructions
- Programmer writes python source code following specific <u>syntax</u>
- There is an interpreter (another program which executes computer code)



```
n = 5
string = "Hello!"

print(string * n)
```



Interpreter



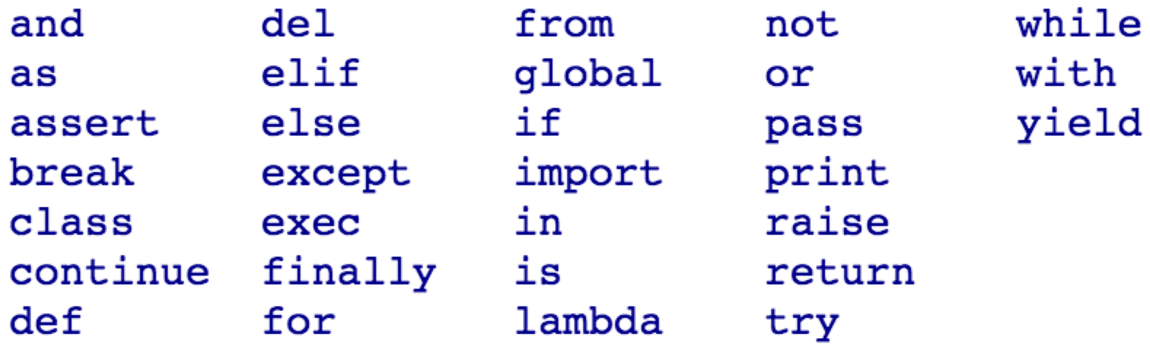
Python code

Machine readable instructions

Python Keywords

- Programming languages have keywords/reserved words
  - Words that have specified meaning as part of the syntax of the language

- Python’s keywords



```
and        del        from       not        while
as         elif       global     or         with
assert     else       if         pass       yield
break      except     import     print
class      exec       in         raise
continue   finally    is         return
def        for        lambda     try
```

Integrated Development Environment

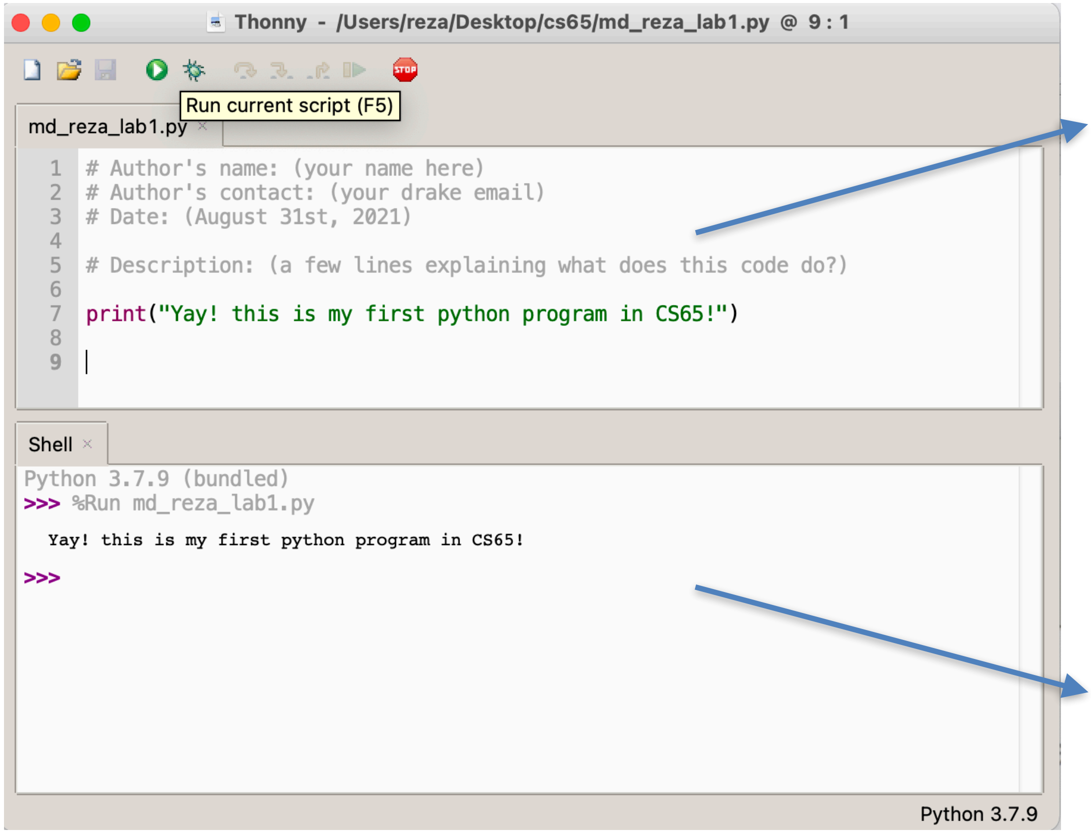
- Integrated Development Environment (IDE) is tool or software system that programmers use to create, run, and test new programs
  - text editor
    - writing python code
  - compiler/interpreter
    - for translating the code into machine understandable instructions
  - executable environment
    - for showing the result of the program

- We will be using the Python programming language along with an IDE for creating Python programs

- Thonny as an IDE
  - very user friendly tool
  - freely available online

Integrated Development Environment

- Demo by Reza in his computer



```
# Author's name: (your name here)
# Author's contact: (your drake email)
# Date: (August 31st, 2021)

# Description: (a few lines explaining what does this code do?)

print("Yay! this is my first python program in CS65!")

```

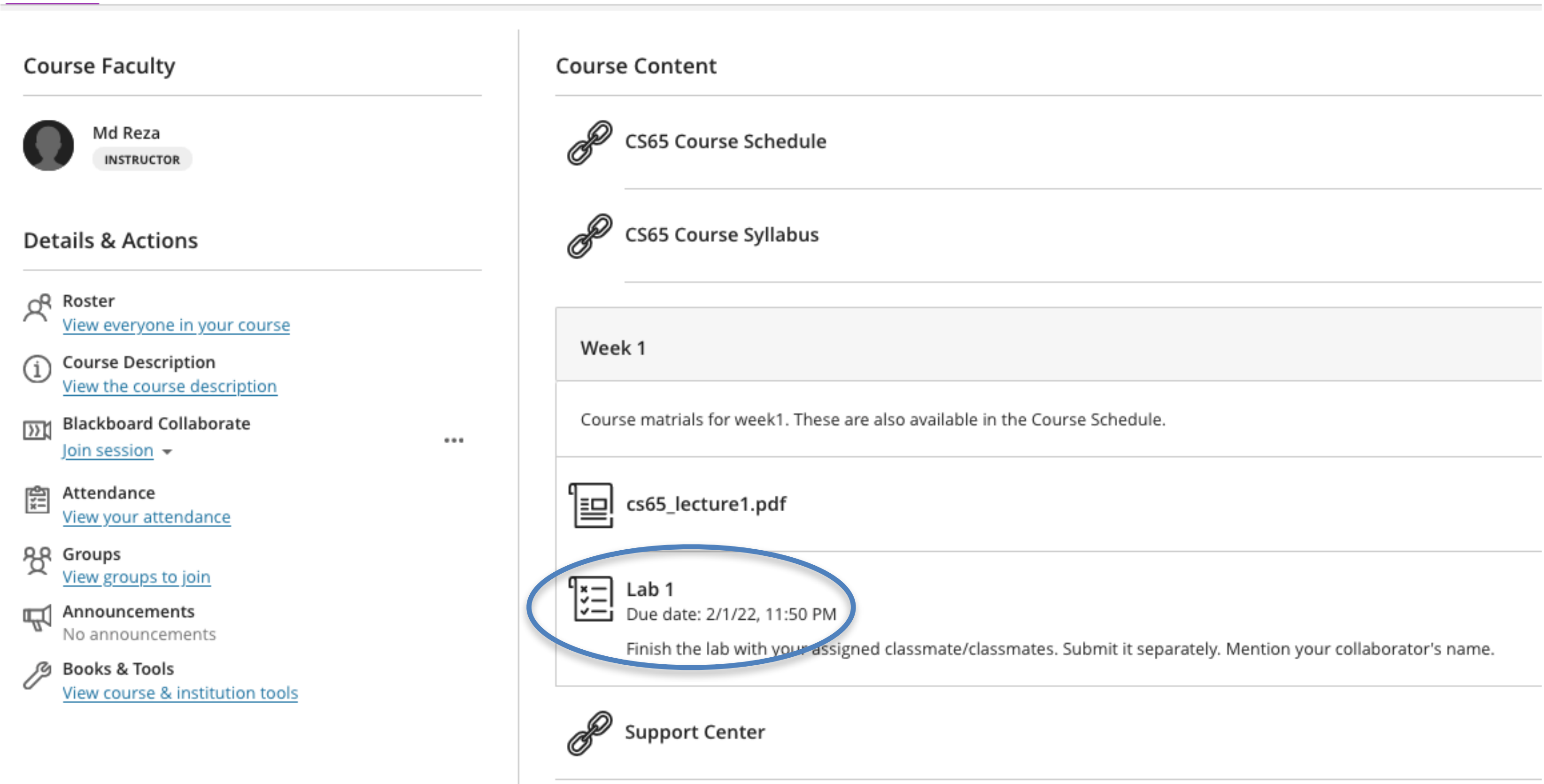
```
Python 3.7.9 (bundled)
>>> %Run md_reza_lab1.py

  Yay! this is my first python program in CS65!

>>>
```

Editor

Executable environment

Lab Activity

- Go to Blackboard and download the Lab1 under 'Week 1'



Course Faculty

Md Reza
INSTRUCTOR

Details & Actions

Roster
View everyone in your course

Course Description
View the course description

Blackboard Collaborate
Join session

Attendance
View your attendance

Groups
View groups to join

Announcements
No announcements

Books & Tools
View course & institution tools

Course Content

CS65 Course Schedule

CS65 Course Syllabus

Week 1

Course matrials for week1. These are also available in the Course Schedule.

cs65_lecture1.pdf

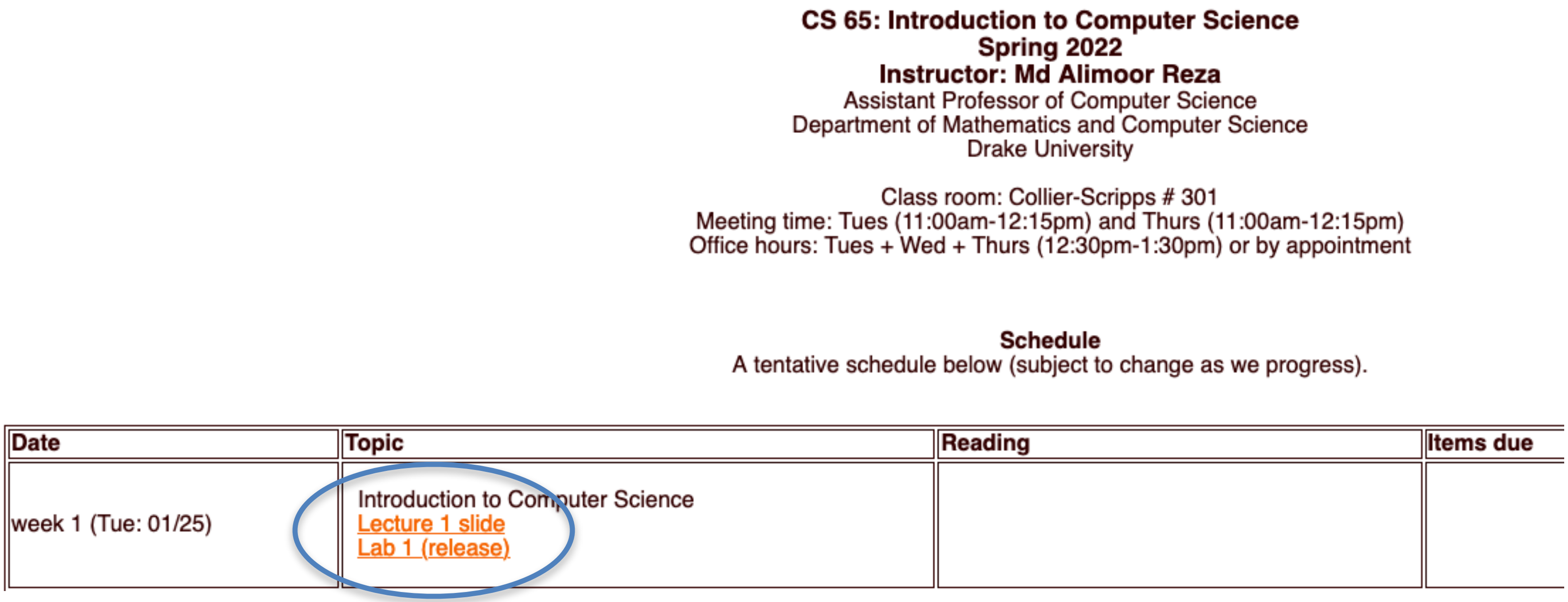
Lab 1
Due date: 2/1/22, 11:50 PM
Finish the lab with your assigned classmate/classmates. Submit it separately. Mention your collaborator's name.

Support Center

- Follow the steps as provided in the Lab1 guide to setup Thonny in your computer

Lab Activity

- Additionally— all the materials will be available (as links) in the schedule



CS 65: Introduction to Computer Science
Spring 2022
Instructor: Md Alimoor Reza
Assistant Professor of Computer Science
Department of Mathematics and Computer Science
Drake University

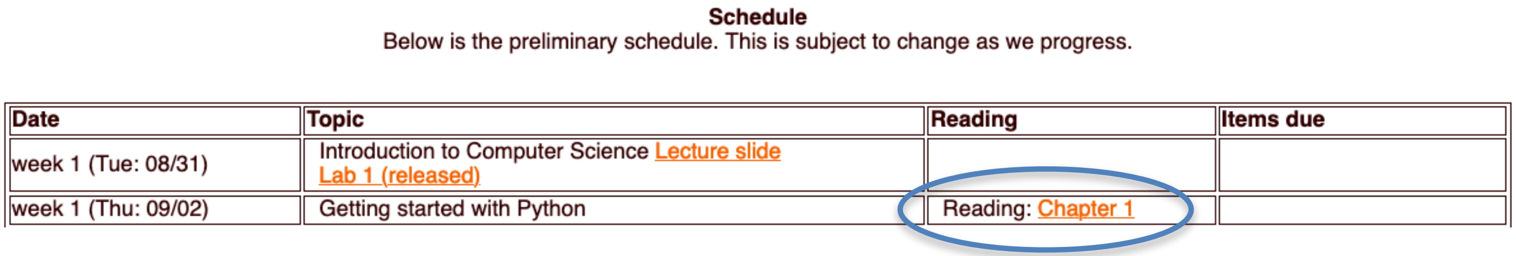
Class room: Collier-Scripps # 301
Meeting time: Tues (11:00am-12:15pm) and Thurs (11:00am-12:15pm)
Office hours: Tues + Wed + Thurs (12:30pm-1:30pm) or by appointment

Schedule
A tentative schedule below (subject to change as we progress).

Date	**Topic**	**Reading**	**Items due**
week 1 (Tue: 01/25)	Introduction to Computer Science Lecture 1 slide Lab 1 (release)		

Summary

- Main takeaway from this lecture:
  - We will be studying algorithms
  - You will be implementing various algorithms using Python programming language in Thonny (IDE)
- To do: Follow the instructions in Lab1 — Thonny installation
- To do: Finish the provided reading — Chapter 1



Schedule

Below is the preliminary schedule. This is subject to change as we progress.

Date	Topic	Reading	Items due
week 1 (Tue: 08/31)	Introduction to Computer Science Lecture slide Lab 1 (released)		
week 1 (Thu: 09/02)	Getting started with Python	Reading: Chapter 1	