

# CSE231 - Lab 01

Syllabus Day, Types, Variables, Assignment, Mathematical Operators, Comments, Error Messages and Introduction to the Python SL

# Welcome to CSE231

## Introduction to Programming I!

# Preface

This is going to be longer than usual. We have to go through the syllabus and a lot of introductory Python.

My presentations will not normally be this long.

# Before we begin...

Did everyone get my lengthy email?

If you did not receive it, tell me when I'm done  
lecturing and I'll send it to you

# Who am I?

I'm Braedyn, I'm a TA (ULA).

I'm a Computer Science major, my focuses are software engineering and data science. You can feel free to ask me questions about the major and future classes you'll be taking, (although I probably haven't done much more compared to you guys).

Contact details in a bit.

# What is this class?

This is (possibly) your first introduction to programming. In this class we'll be teaching you guys Python, a very intuitive and powerful programming language.

Through Python, we'll show you guys all of the fundamental concepts that go into almost all other programming languages, so you can begin to become, not a Python programmer, but a ***general*** programmer.

Once you go through this class, you'll (hopefully) find that learning more programming languages is extremely easy.

And of course, you'll also be able to apply your knowledge gained here to your future programming internships and jobs.

# Why is this class so dreaded?

You've probably heard legends of this class, either online or through people that have taken it already.

This class has ***a lot*** of homework. It sucks, yes. But there's a good reason for why there's so much, although you may disagree.

There are reasons for why this class is structured the way it is. If you want to fight me on it, I can and will.

# How the class is graded

- Exams - 45%
  - Two midterms, one final
    - Midterm 1 - 10%
    - Midterm 2 - 15%
    - Final - 20%
  - You are allowed a single sheet of paper notes, front and back. No electronic devices.
- Projects - 45% (We'll talk more about projects in a second here)
  - Due on Mondays, submissions on Mimir, there is a small intro video for every one
  - Most points come from passing the automated test grading, with some points given by me.
  - Submissions reduced by 50% for being one day late, no credit after one day
    - Condition can be changed under an emergency situation
  - Infinite amount of submissions before deadline -- *best* submission is graded
- Exercises - 10%
  - Due on Saturdays, submissions on Mimir
  - Problems are credit/no credit or partial credit, I play no role in grading them -- all grading is done automatically
  - Infinite amount of submissions before deadline -- *latest* submission is graded (I believe)



# You probably noticed...

The labs DO NOT contribute to your overall grade. But...

If you miss more than two labs, your **overall** course grade GPA is reduced by 0.5 for each lab missed beyond two.

If you had a 4.0 prior, and missed 4 labs, you will drop to a 3.0.

- Two free misses
- Two real misses
  - $4.0 - 2(0.5) = 3.0$
  - :(

Contact me before lab (preferably early) if you are *guaranteed* to miss one and you don't want it to count against you, your miss must be for a good reason.

# Why the labs, then? What are the pre-labs for?

The labs are simply just another opportunity for you to get more practice with the concepts you learned in the lecture videos, without having to worry about being graded for perfection (although you should try to be perfect).

You must complete the pre-lab before coming here, or else I cannot give you credit on the in-class lab. The pre-labs are formatted like questions you would see on the exams (code-reading).

I keep track of whether or not you attended and gave the lab a good shot. I'm also here to help with the class in general. If you need help understanding the lectures, or you've encountered a problem in your Mimir exercises and/or project, feel free to ask.

# Course Links / Tips to 4.0

There are ***a lot*** of links to keep track of for this course. I'm going to try and make this as easy as possible for you guys.

This is hopefully the only link you'll need. You can navigate everywhere else from here. This was talked about in my lengthy email.

[github.com/braedynl/CSE231-020-SS20](https://github.com/braedynl/CSE231-020-SS20)

Using my repo is completely optional. I don't like the main course site, so I made this as an alternative and for a place to store things for the course.

# Academic Dishonesty Reports (ADR)

Like I said, you ***cannot***, under any circumstance, share code for the projects. Even seeing another person's implementation of a solution may lead you to doing something similar. Please don't risk trying to copy another person's work, it's not worth it.

If we find that your code has been plagiarized, you will receive an ADR. Course punishment may vary (I believe you typically get an instant course failure), but a report is always filed with the University.

You can appeal if you believe you have wrongly been reported.

[https://ombud.msu.edu/academic-integrity/academic\\_dishonesty\\_report.html](https://ombud.msu.edu/academic-integrity/academic_dishonesty_report.html)

# Contact Details

This is going to be another reiteration of something I talked about in my email.

You can email me at [letting4@msu.edu](mailto:letting4@msu.edu) or [braedynlettinga@gmail.com](mailto:braedynlettinga@gmail.com), I look at both an equal amount.

You can email, text or arrange to meet with me with any questions you might have or if you're struggling on something. Talk to me in-person if you want my phone number/social media.

I have one rule, and that is that **you cannot contact or meet me on Mondays**. I'm extremely busy on Mondays :(

For easier meetups, I'll be in the CSE help-room on Sundays from 4:00-6:30PM. Help-room schedule is on the repo/course website if you want to go to different days and meet other TAs.

Use me as a last resource. Most students are able to get the help they need from Piazza.

# Now that all of that's out of the way...

Let's talk about Python.

In the videos we talked about types, assignment and the mathematical operators.

We'll quickly cover these again, but I'm going to cover some extra stuff that I think you guys should know that'll be useful for exams and later content.

# Fundamental Types

In the lectures, we discussed the fundamental types:

- int, an integer number value
- float, a decimal number value
- string, a series of characters
- bool, true or false

These are all part of the base language, and are typically what make up future types that we'll be discussing at a later date.

Demo time, L1-1

# Type-Casting / Type Conversion

A lot of the time, you're going to have to deal with the conversion of variable types. Certain types will only work with certain functions or have some sort of functionality that another doesn't. These are cases where you would want to convert between types.

You can use the `int()`, `float()`, `str()`, and `bool()` functions to cast your objects into your desired type. Not every type can explicitly be converted into another, however. It mostly depends on the value being held.

Demo time, L1-2



# Variables and the Assignment Operator

You guys have seen variables and assignment in action a lot already, now.

Variable names hold the value and type they are assigned through the assignment operator, '='.

You initialize variables when you plan on reusing that value somewhere else in your code. Variables in Python can hold **a lot** of different things, as we'll see later on in the course.

**Please for all that is holy, make your variable names clear.**

This is a good habit to get into for readability, not only for yourself, but for other people as well. (Like me and your future managers -- don't disappoint your managers)

This is also a requirement for the projects. (We'll talk about that in a second)

# Variable Naming Conventions

Good:

- `avg_interest_rate = 11`
- `current_credit_score = 660`

Bad:

- `a = 24`
- `cool_str = "This is my cool string."`

How good your variable name is, however, can depend on context. You'll have to make the call on whether or not your variable's name implies it's usage.

Also note how variables are lowercase and use underscores. This is not a requirement, but a common practice.

# What I mean by “dependent on context”

An example of this might be a well-known mathematical formula where its variables are commonly expressed with certain names.

```
def f(x, m, b):  # Slope-Intercept Form
    y = m*x + b
    return y
```

This is a function example. We'll be talking about how functions work a lot later.

# ~~Illegal~~ Variable Names

You'll likely come across this writing code during your time in this class, but I'll quickly cover it here.

- `123_var = 123`    # Leading number values
  - `var_123 = 123`    # Non-leading = legal
- `+var = "var"`        # Operators/syntactic elements
- `print = 3.14`        # Previously declared namespace of a function, type or class

Typically raises a `SyntaxError`

# (Mathematical) Operators

There are a lot more operators that we'll get to at a later date, but for right now we're going to look at the ones that we can do math with.

- +, addition
- -, subtraction
- \*, multiplication
- /, division
- %, modulus
- //, floor/integer division
- \*\*, power

# Compound Assignment Operators

Alongside all of the mathematical operations, there are variations of each that also double as an assignment operation. You do this by appending an '=' symbol to any of the operations we just talked about.

Examples:

- +=, adds value *and then* assigns to variable
- \*\*=, raises value to power *and then* assigns to variable

Demo time, L1-3

# The Python Standard Library (SL)

Python, by default, comes with **a lot** of different functions and utility. We'll be teaching a lot of them to get you started throughout this course, but we won't have time to cover everything in it.

You've already seen `print()`, which is integrated with the language and doesn't need to be imported from the rest of the standard library.

You might have seen something like `math.sqrt()` being used before. This comes from the 'math' module in the Python SL. The Python SL is split into separate modules to allow more room for user-created namespaces among other things.

# Modules / import

You've likely seen the line:

```
import math
```

Or something to that effect in Python code at the top of a file. The 'import' keyword brings in utilities from a library or file for you to use in your program.

The 'math' module has a ton of different functions that you can then use in your code. To invoke a function from the module, we have to call through 'math', and use dot notation to denote what function we want to use from it. To access it's square root function for example, we would say:

```
math.sqrt()
```



# print()

The print function takes an object or many objects and displays it in the console for the user to see. Like in mathematics, the variables input to the function are put inside the parentheses.

You can input multiple objects to a function by separating each object with a comma. These inputs are called **parameters**, and the print() function can take an infinite amount of them.

This is getting a bit too in-depth for now though, we'll be covering how functions work and how to create your own at a later date.

# round()

If you want to round your floating-point numbers, you can do that using the round() function. It takes two parameters:

```
round(number[, ndigits])
```

- number, the value you want to round
- ndigits, the nth decimal place you want to round to (optional)

The formatting for the parameters of the function shown above is commonplace in online documentation, and so it's important to know how to read this. The square brackets denote that the following parameters are *optional*. You can invoke the function solely with a number value, (which, with how the function is programmed, will round to the ones place), or with a number value **and** an ndigits value.

# input()

This is a function you'll be getting quite familiar with in this class. `input()` pauses your program and waits for a user to input text to the console. It takes one optional parameter:

`input([prompt])`

- `prompt`, a string that displays an inline message to the console for the user to read

Anything read from `input()` is returned as a string. You'll have to type-cast if you want to perform int/float operations.

Demo time, L1-4

# Comments

One of the most important things you can do as a developer is document your code. Documenting your code **is a requirement** for the projects because it makes it easier for you to come back to your code, and because your manager at a dev job is going to want you to anyways. (It's good practice!)

There are two types of comments, single-line and multi-line.

- Single-line is denoted by a '#' character. You can then type any message you want in the same line after the '#'.
- Multi-line is denoted by three single quotes. Any text continuing afterwards in the same and following lines is considered a comment until another set of three single quotes.

You **do not** have to comment on every single line of code. Please don't. Instead, give overview comments on blocks of code, or single-line comments on complex-looking lines.

# Projects

This class has a project due on Mimir nearly every Monday (good to check the course schedule). I've waited this long to talk more about projects because you have to be aware of comments. You might have noticed on the main course site and my repo that there is this thing called the "Coding Standard".

The TAs are required to partially grade each project. Part of the points we reward are given to you if you follow the parts of the coding standard that are necessary for the project. The relevant coding standard procedures you need to follow will (should) be listed in the project description.

I'll be pretty lenient about following the standard for the first couple of weeks, but I will be enforcing and docking more points after. It's good to get into the habit of following the standards right now.

At this stage in the course, the most important things you'll want in your project code are simple comments and headers. Use comments where you think an explanation is necessary -- you'll have to make the judgment call.

## Projects (cont.)

Projects will always have a procedure to follow on its respective project link-hub thing. The procedure can range anywhere from extremely specific to heartbreakingly vague. Again, it's good to **start projects early** to get questions you have answered before the deadline.

Projects will always use the concepts we learned from its proceeding weeks. Concepts in programming build-off of each other, so this should be implicit.

If you did not buy the book, you will likely need to do a bit more Googling than normal. Even if you consistently read the book and watch the lecture videos regularly, you probably will end up needing to Google quite a bit (this is normal, especially in the industry). There's a lot of things you'll probably forget after this week, there's nothing wrong with just Googling it to remind yourself how to code a certain thing.

# The remaining TA points

So part of the points I reward are for following the coding standard, but the remaining are for clean-looking, understandable code.

What this means is that you should have descriptive variable names (like the ones we've discussed), and non-repetitive code (we'll talk about what I mean by this in the coming weeks, the first point is more important for right now).

I tend to be fairly generous with points.

If you believe you should have gotten more points on a past project, talk to me in lab about it and we can argue. Please note, however, that I may be restricted in giving some points out due to instructions given to me by Dr. Enbody.

# The Book

Okay, so this is a point of contention for a lot of students.

Look, I'm a TA for the class. My guidelines require that I endorse the book.

I personally went through this class without it and ended with a 4.0, but that was with a lot of research I did on my own time for anything I didn't understand.

I also had another class, CSE291, that directly aligns its course schedule with 231 to further reinforce and get you more practice with the concepts of the week. I'm unsure if 291 still exists and/or does the same thing, but if you find yourself struggling a lot, I would look into it. When I took the class, it was 1 credit, and met once a week. For me, 291 pretty much nullified the lecture videos because I ended up getting so much practice with the concepts.

If you are debating on whether or not you need the book, ask yourself if you are willing to do a bit more outside research. If you've programmed a lot before, I'm going to say that you're probably safe in skipping the text.



# Reading Error Messages

A lot of beginner students panic when they get an error message. This is probably the worst thing you could do. Calmly read what it says, and go to the area where it says there's a problem.

```
"c:\CS\CSE231SS20TA\Lab 01\ouch.py" "  
  File "c:\CS\CSE231SS20TA\Lab 01\ouch.py", line 7  
    this+var = "cool"  
      ^  
SyntaxError: can't assign to operator
```

Googling error messages usually won't find *your* problem specifically, since error messages cover such a broad range of problems that could occur. It's best if you walk through your code thinking about what's being input to the line that could be resulting in the issue.

In this message, we simply have incorrect syntax on line 7.

# Due Date Reminders

The first week for CSE classes is notoriously the messiest. The Mimir Exercises and Projects will usually be due on Saturdays and Mondays respectively each week. Sometimes there won't be either.

Tonight (1/10) at 11:59PM, Lab 00 is due

Saturday (1/11) at 11:59PM, the first Mimir Exercise is due

Monday (1/13) at 11:59PM, the first Project is due (get started early)

# It's finally lab time, sorry about all that

Today's lab should be pretty simple. Go to either my repository or the course website,

[github.com/braedynl/CSE231-020-SS20](https://github.com/braedynl/CSE231-020-SS20) / [www.cse.msu.edu/~cse231/](http://www.cse.msu.edu/~cse231/)

and navigate to the lab for this week. For the labs, you'll follow and complete the instructions given on labXX.pdf. Sometimes you'll download starter-code with it, a labXX.py file, that will be part of those instructions.

For the first couple of weeks, you are to work on the lab with another person in the room.

On Mimir, you can find a submission domain to test your program. Show me that your finished program can complete all of the test cases and you're free to go whenever.

Call me over if you have questions or are having trouble!