LECTURE 2

PYTHON TOUR PART I

TYPES, CONTROL STRUCTURES, I/O

MCS 275 Spring 2022

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LECTURE 2: PYTHON TOUR

Course bulletins:

- Read the syllabus
- Discord open (link in the zoom chat or Blackboard).
- Homework 1 schedule adjustment due to MLK holiday: deadline will be Noon on Wed 19 January.

PLAN FOR TODAY

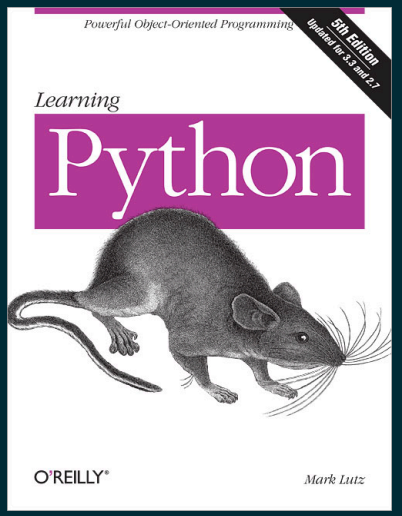
Start our quick tour of Python, summarizing some material I think you saw in a previous course*.

I'll indicate where you can find more detail in optional texts and the online MCS 260 materials from my Fall 2021 course.

* If I mention things today that are completely new to you, please let me know afterward.

TEXTBOOK NOTE

The most comprehensive optional text is



Learning Python, 5ed, by Mark Lutz

Written in 2013, so it discusses Python 3 and Python 2. Since then, Python 2 has been phased out. We only talk about Python 3.

NOTES FOR SELF STUDY

I'll do most examples as live coding today.

Options to study this outside of lecture:

- These slides: Main points summarized succinctly.
- MCS 275 Python tour: Lots of code examples.
- All the MCS 260 lecture slides: Much more detailed (perhaps *too* detailed)

SCRIPTS AND REPL

Two ways to run Python code:

- One statement at a time, in **interactive mode**, also known as the **REPL** (read-eval-print loop)
- A whole file at a time, in **script mode**

See *Lutz*, Chapter 3 or MCS 260 Lec 2.

VARIABLES AND TYPES

Create new vars by assignment, `name = value`

Dynamically typed: No need to specify the type of a variable, nor for it to remain the same.

Basic types include: int, float, boolean, string, None

See *Lutz*, Chapters 4-6 and MCS 260 Lec 3.

LISTS AND DICTS

Lists are mutable ordered collections of elements, accessible by integer index.

```
[260,275,"hello",True,None,None,-1.5]
```

Dictionaries (dicts) are mutable key-value mappings. Index like lists, but use key instead of position.

```
{ "name": "Stinger", "age": 403,
  "species": "space wasp", "hostile": True }
```

See *Lutz*, Chapter 8 and MCS 260 Lec 5 and Lec 10.

STRINGS

Strings support some list-like features, such as indexing and slicing.

Lists have useful methods such as `.lower()`, `.startswith(...)`, `.format(...)`, and many more.

See *Lutz*, Chapter 7 and MCS 260 Lec 7.

IF-ELSE-ELIF

If statement (or **conditional**) runs a block of code only if a condition is True. Elif/else allow chained tests.

```
if GREAT:
    RUNS_IF_GREAT_IS_TRUE
elif OKAY:
    RUNS_IF_OKAY_IS_TRUE_AND_GREAT_IS_FALSE
else:
    RUNS_OTHERWISE
```

Non-boolean conditions are coerced: empty list, empty dict, empty string, None, and zero map to False.

See *Lutz*, Chapter 12 and MCS 260 Lec 6 and Lec 18.

LOOPS

While: Keep going until a condition becomes False

```
while CONDITION:
    STUFF_TO_DO  # should modify things in the condition
```

For: Take items (list elements, dict keys) out, one at a time, and do something with each.

```
for ITEM in CONTAINER:
    STUFF_TO_DO  # should use the ITEM
```

See *Lutz*, Chapter 13 and MCS 260 Lec 6.

FILES

`open(filename,mode,...)` opens a file and returns a **file object**. Mode string selects reading ("r"), writing ("w"), ...

Methods of the file object perform input/output (I/O).

Read/write text to text files ("t" in mode), bytes to binary files ("b" in mode).

`.close()` a file when finished.

The basics are in *Lutz*, Chapter 9 and MCS 260 Lec 13 and Lec 14.

REFERENCES

- The MCS 275 Python tour is an expanded written version of the live coding examples from today's lecture.
- Today's slides referenced chapters from *Lutz* (Learning Python 5ed).
  - UIC students can access the online book for free, but login is required. Instructions on Blackboard.
- MCS 260 Fall 2021 home page has slide presentations, sample code, and other resources for review.

REVISION HISTORY

- 2022-01-12 Initial publication