

Unit 7: Data Structures

Lesson 5: Dictionaries in Python

This is an optional lesson. Read this document, experiment with the code, and implement the **U7L4 challenge** using dictionaries instead of lists.

Dictionaries in Python are a special data structure that can be used to **associate** values with a **key**. You can have as many **keys** as you'd like, and each key can have its own value. Here is an example of what a dictionary looks like:

```
lesson_info = {  
    "unit_number": 7,  
    "lesson_number": 5,  
    "topic": "Dictionaries in Python",  
    "date": "2/17/2023"  
}
```

You can create a dictionary in Python directly like this by typing the information!

The **keys** in this dictionary are `unit_number`, `lesson_number`, `topic`, and `date`.

Each **key** has an associate value. Here is a table representation of this dictionary:

key	value
unit_number	7
lesson_number	5
topic	Dictionaries in Python
date	2/17/2023

Important fact! Every key in your dictionary **MUST** be a String. The value for each key can be **ANY** data type (integer, float, String, list, or even **ANOTHER** dictionary!)

Dictionaries: Python syntax

Here are examples of how to create, modify, and access information inside a dictionary!

```
# Let's create a dictionary that describes a music album!
# Creating an empty dictionary:

example = {}

# Adding a key and an associated value:
example["artist"] = "Metallica"
example["album_name"] = "Ride the Lightning"
example["tracks"] = 8

# Changing a value for a given key
example["album_name"] = "Ride the Lightning (Remastered)"

# Retrieving a value given a key
x = example["tracks"]
print(x)      # This will print 8!

# Adding a key where the value is a list!
example["genre"] = [ "Metal" ]

# Updating a key that has a list as its value!
example["genre"].append("Thrash Metal")

# getting every key in a dictionary!
for key in example.keys():
    print(key)

print(example)      # Print the dictionary and see all its updates!
```

Explore and tinker to see how dictionaries work!

Try to implement the U7L4 challenge using a dictionary! Create a dictionary as an attribute to the Student class that will map a course as a key to a value (a list of grades!). For example:

```
{
    "AP CSP": [ 100, 99, 84, 77 ],
    "History": [ 80, 85, 99, 91 ]
}
```