



**MAHIDOL
UNIVERSITY**

Wisdom of the Land

[SCPY204]

Computer Programming

for Physicists

Class 07: 23 Feb 2017

Content: File I/O, data visualization

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2017

“Happy Thursday”

No quiz today!

But, there are things I want to show you.

English (and other languages):

- > www.grammarly.com
- > <https://www.duolingo.com>

Courses and other skills:

- > www.khanacademy.org
- > www.coursera.org
- > Lynda and Udemy / more on youtube

Time management:

- > <https://pantip.com/topic/36138614>

โดย ดร.ชัชชาติ สิทธิพันธุ์

(ไม่เกี่ยวกับการเมืองนะครับ)

Today's Goals

Part I: File I/O

Part II: Introduction to Python modules
(mainly NumPy and Matplotlib)

File I/O: Python

These websites summaries the file I/O in Python quite well.

- > <http://www.pythonforbeginners.com/files/reading-and-writing-files-in-python>
- > https://www.tutorialspoint.com/python/python_strings.htm

File I/O: Python

How to simply WRITE and READ

First, create file object

```
file_object = open("filename", "mode")
```

File Mode

- **'r'** – Read mode which is used when the file is only being read
- **'w'** – Write mode which is used to edit and write new information to the file (any existing files with the same name will be erased when this mode is activated)
- **'a'** – Appending mode, which is used to add new data to the end of the file; that is new information is automatically amended to the end
- **'r+'** – Special read and write mode, which is used to handle both actions when working with a file

Try 1

```
file = open("testfile.txt", "w")  
file.write("Hello World")  
file.write("Second line.")  
file.write("and the third line.")  
file.close()
```

File I/O: Python

How to simply WRITE and READ

Try 2

```
file = open("testfile.txt","r")

# Try these commands
print(file.read())
print(file.read(5))
print(file.readline():)
print(file.readline(1):)

file.close()
```

File I/O: Python

How to simply WRITE and READ

Try 3

```
file = open("testfile.txt", "r")
for line in file:
    print(line)
```

Try 4

```
with open("testfile.txt") as f:
    for line in f:
        print(line)
```


File I/O: Python

How to simply WRITE and READ

Try 5: Splitting

```
with open("hello.text", "r") as f:
    data = f.readlines()

for line in data:
    words = line.split()
    print(words)
```

File I/O: Python

Try reading this tutorial:

1. http://www.python-course.eu/python3_file_management.php
2. http://www.python-course.eu/python3_formatted_output.php

Exercise 1: Try creating a simple file containing numbers in each line. Read those number into a list.

Exercise 2: Create a text file containing numbers in array format. Try reading it into a list.

Exercise 3: Score of 100 students is prepared in the course website. Try reading it into a list and do the following tasks.

- a) Find max, min, mean, median, mode and SD.
- b) Make a histogram inside a terminal and into a file.
- c) Write a file with grade after score in each line.

File I/O: Python

How to read numbers from file?

For a simple 1-D list, try using append.

For a 2-D array formatted file.

Way I:

```
file = open ( 'input.txt' , 'r')
arr = [ map(int,line.split(',')) for line in file ]
print(arr)
```

Way II:

```
arr = []
with open('input.txt', 'r') as file:
    for line in file:
        line = line.strip()
        if len(line) > 0:
            arr.append(map(int, line.split(',')))
print(arr)
```

Way III:

```
from numpy import loadtxt
lines = loadtxt("input.txt", delimiter=",", dtype="i")
```

File I/O: Python

How to write formatted string to file?

Try these tricks:

```
# Assume you had strings variable: filename, type, size and modified

f.write('%-40s %6s %10s %2s\n' % (filename, type, size, modified))

# or

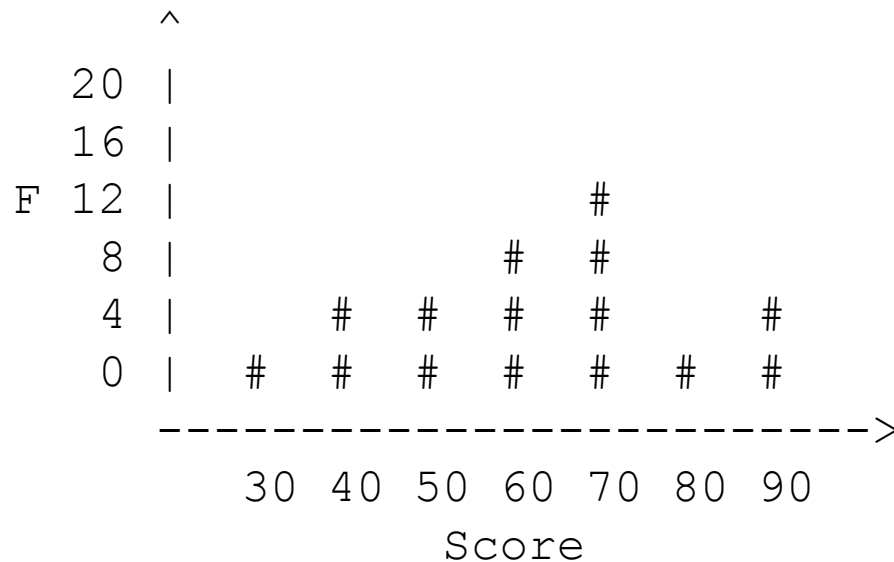
f.write(
    "{0} {1} {2} {3}".format(
        filename.ljust(40),
        type.rjust(6),
        size.rjust(10),
        modified.rjust(2)
    )
)
```

File I/O: Python

Exercise 3: Output example

Graph: histogram of student scores

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Average = xxxx

Mean = xxxx, SD = xxxx

Mode = xxxx, Median = xxxx

Python: Modules

Try reading the manual from <http://matplotlib.org/>

Exercise 1: Making a sine curve from 0 to 4π .

Exercise 2: Plot a histogram of a previous exercise.