**The George Washington University**

**School of Engineering and Applied Science**

**Department of Engineering and Systems Management**

**EMSE 6574: Programming for Analytics**

Professor: Joel Klein

**1- Course Information:**

Semester: Fall, 2018

Course: EMSE 6574, Section 10, Programming for Analytics

Meeting time: Mondays, 6:10pm – 8:40pm

Class Location: Tompkins, 410

**2- Instructor and Contact Information:**

Name: Joel Klein

Phone: (908)-894-9573

*Send me a text with name first, I don’t pick up numbers I don’t know*

E-mail: jdk514@gwu.edu

**3- Bulletin Course Description*:***

Introduction to programming for data analytics using the Python programming language. Topics covered include introduction to the Python programming language, structured program design in Python, data structures for analytics in Python, visualization/plotting, file I/O, basic data analytics methods, data acquisition from real world sources, database storage and retrieval, working with Python libraries including NumPy, SciPy, and Pandas. This course will prepare students for higher level courses in data analytics.

**4- Prerequisites:**

* Experience with programming
* Background with statistical analysis

**5- Required Text(s):**

**Title:** [**Python for Data Analysis**](https://www.amazon.com/Python-Data-Analysis-Wrangling-IPython/dp/1491957662/ref%3Dpd_lpo_sbs_14_t_0?_encoding=UTF8&psc=1&refRID=9B0V9R8G7KTVEDZ6ZYPK&dpID=51lod1FJujL&preST=_SX218_BO1,204,203,200_QL40_&dpSrc=detail)

Author(s): Wes Mckinney

ISBN 13: 978-1491957660

Publisher: O'Reilly Media

Edition: 2nd

**Supplementary Resources:**

* (Free Online) Python Practice Book - <http://anandology.com/python-practice-book/index.html>

**6- Learning Outcomes:**

* Design and implement Python programs for challenging problems involving real data

sources.

* Learn computational problem solving, in the context of data analytics applications and learn

about algorithm and data complexity.

* Experience object oriented programming.
* Experience program testing and debugging in Python.
* Understand and use various libraries for data manipulation, scientific computing and

Visualization (including, but not limited to – NumPy, pandas, Matplotlib).

* Learn how to take a data source and create visual and statistical insights
* Use and process real datasets from social networks, such as Twitter, Facebook and more.

# 7- Attendance:

Regular class attendance is strongly encouraged. You will be held responsible for all the class discussions as well as the reading assignments. Here is the university policy: <https://registrar.gwu.edu/university-policies#attendance>

# 8- Independent Learning:

 In a **15**-week semester, including exam week, students are expected to spend a minimum

 of 100 minutes of out-of-class work for every **50** minutes of direct instruction, for a minimum

 total of **2.5** hours a week.

 A **3**-credit course should include **2.5** hours of direct instruction and a minimum of **5** hours

 of independent learning or **7.5** hours per week. More information about GW's credit hour policy

 can be found at: <https://provost.gwu.edu/policies-procedures-and-guidelines>

 and click on Assignments of Credit Hour Policy (PDF), or see the PDF pages (webpage);

 [https://provost.gwu.edu/files/downloads/Resources/Assignment-of-Credit-Hours\_Final\_Oct- 2016.pdf](https://provost.gwu.edu/files/downloads/Resources/Assignment-of-Credit-Hours_Final_Oct-%202016.pdf)

**9- Class Schedule: [week-by-week]**

|  |  |  |
| --- | --- | --- |
| Week | Topic(s) and readings | Assignments? |
| 8/27 | * Introduction to Course
* Python 101
	+ Data types
	+ Control flows
 | Chapter 1Chapter 3 – Section 1 |
| 9/3 | * **Labor Day – No Class**
 |  |
| 9/10 | * Python 101 cont.
	+ Functions
	+ Objects/OOP
	+ Advanced Features
 | Chapter 3 – Section 2-4 |
| 9/17 | * Python 101 cont.
	+ File IO
* Introduction to the NumPy package
 | Chapter 4 |
| 9/24 | * NumPy cont.
* Matplotlib and data visualization
 | Chapter 9 |
| 10/1 | * Advanced visualizations
 |  |
| 10/8 | * **Fall Break – No Class**
 |  |
| 10/15 | * Introduction to the Pandas package
 | Chapter 5 |
| 10/22 | * Pandas cont.
 | Chapter 7/8 |
| 10/29 | * Pandas cont.
 | Chapter 7/8 |
| 11/5 | * Introduction to “Data Analytics”
* Introduction to Sklearn package
 |  |
| 11/12 | * Sklearn cont.
 |  |
| 11/19 | * SciPy package
 |  |
| 11/26 | * Special Topics
 |  |
| 12/3 | * Special Topics cont.
 |  |
| 12/10 | * **Last Class – Final Presentations**
 |  |

#  10- Assignments and Grades:

**1. Assignments:**

|  |  |  |
| --- | --- | --- |
| Due Date | Assignment | Total Points |
| 9/16 | Python 101 | 10 |
| 10/1 | NumPy | 10 |
| 10/29 | Pandas | 10 |
| 11/26 | Sklearn and SciPy | 10 |
|  | **Total Possible Points** | **40** |

**2. Grading:**

Final grades will be based on the standard [grade scale](http://ixd.ucsd.edu/home/f16/grading-scale.html).

Grade Percentages:

* Weekly assignments – **40%**
	+ Assignments submitted up to **1 week late** will earn a **maximum of 90/100**
	+ Assignments submitted up to **2 weeks late** will earn a **maximum of 70/100**
* In Class Work – **20%**
* Midterm – **15%**
* Final project – **25%**

# 11- Academic integrity:

 Academic integrity is central to the learning and teaching process. Students are expected to

conduct themselves in a manner that will contribute to the maintenance of academic integrity by making all reasonable efforts to prevent the occurrence of academic dishonesty. Academic dishonesty includes, but is not limited to, obtaining or giving aid on an examination, having unauthorized prior knowledge of an examination, doing work for another student, and plagiarism

of all types. Ignorance is no excuse.

The number one problem that students run into with regards to academic integrity is plagiarism. It is not okay to copy, use, or otherwise exploit other people’s ideas, words, or creations without giving them credit in the proper form. Sometimes this means you must use quotation marks; while other times a simple source citation will do the trick. Changing a few words in a paraphrase is not enough to turn source material into “your own words” – in fact, that’s a really bad idea to even try. Changing the phrasing order of sentences is not okay and using the thesaurus to find ways to change “happy” to “glad” is also a very bad idea. It is expected that students know how to correctly quote and cite material, and also how to write well. For those students who need assistance, the GWU Writing Center is available. Please see:

 <http://www.gwu.edu/~gwriter/> or

 <https://writingcenter.gwu.edu/>

**Academic Integrity Code:**

Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work,

taking credit for the work of others without crediting them and without appropriate authorization, and

the fabrication of information. For the remainder of the code, see:

[http://studentconduct.gwu.edu](http://studentconduct.gwu.edu/) or

 [studentconduct.gwu.edu/code-academic-integrity](http://studentconduct.gwu.edu/code-academic-integrity)

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# 12- What to Do If the Instructor Does Not Arrive:

 If the Instructor does not arrive for the class at the designated starting time and has not

 notified the class of a late starting time or the cancellation of the class, the students should wait in the classroom for at least ***30 minutes*** before departing. One member of the class

should be selected to notify the EMSE Department of the Instructor’s absence by calling the EMSE Department ***202-994-4892*** on next business day.

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# 13- University Policy on Religious Holidays:

In accordance with University Policy, students should notify faculty during the first week

of the semester of their intention to be absent from class on their day(s) of religious observance.

**1.** Students should notify faculty during the first week of the semester of their intention

 to be absent from class on their day(s) of religious observance.

**2.** Faculty should extend to these students the courtesy of absence without penalty Semester: [semester, year] on such occasions, including permission to make up examinations.

  **3.** Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course related activities. For more details and policy accommodations for religious holidays please see:

 <https://students.gwu.edu/accommodations-religious-holidays>

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# 14- Support for Students outside the Classroom:

 **Disability Support Services (DSS):**

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at***202-994-8250*** in the Rome Hall,

 Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to:

 [disabilitysupport.gwu.edu/](https://disabilitysupport.gwu.edu/)

 **Mental Health Services: Colonial Health Services: 202-994-5300​ (24Hours/7Days)**

 The University's​ ​Mental Health Services offers **24/7** assistance and referral to address students' personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations confidential assessment, counseling services (individual and small group), and referrals.

<https://healthcenter.gwu.edu/mental-health>

[counselingcenter.gwu.edu/](http://counselingcenter.gwu.edu/)

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# 15- Security and Safety Policy:

GW Campus Advisories; Students should check the GW Campus Advisories Web Site at: [http://www.campusadvisories.gwu.edu/](http://www.campusadvisories.gwu.edu/%20)

For current information related to campus conditions, closures, safety information and any other information concerning events that may disrupt normal operations.

**Division of Safety and Security;**

**Life-Threatening Emergencies** **ON CAMPUS: GWPD Emergency: (202)994-6111**

Non-Emergency: (202) 994-6110

 **GW Alert Notifications:**

 GW Campus Advisories; Students should check the GW Campus Advisories Web

 Site at: <http://www.campusadvisories.gwu.edu/index.cfm>

 for current information related to campus conditions, closures, safety information and any other information concerning events that may disrupt normal operations.

 **All students, faculty and staff registered in the GW banner system GW will receive emergency alerts, notifications and updates sent directly to their GW email address**.

 If individuals elect to receive these alerts on a mobile device they may log in to GWeb Information Web Site to include mobile **devices.log on** and update their contact information.

<https://banweb.gwu.edu/> <https://banweb.gwu.edu/PRODCartridge/twbkwbis.P_WWWLogin>

**16- Emergency Information:**

In the case of an emergency, if at all possible, the class should shelter in place. If the building

that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined location.

<https://campusadvisories.gwu.edu/>

<https://safety.gwu.edu/sites/safety.gwu.edu/files/downloads/HEMS_1718_2_EmergencyResponseHandbook2017_Web_FINAL.pdf>

<https://campusadvisories.gwu.edu/gw-emergency-response-handbook-and-pocket-guide-now-available>

<https://campusadvisories.gwu.edu/definition-crime-categories>