

# OPIM 6607 Programming II

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| **Semester/Year** | Fall 2024/Mod 2 |
| **Professor** | Gregory Lyon ([Gregory.Lyon@georgetown.edu](mailto:Gregory.Lyon@georgetown.edu)) |
| **TAs** | Tian Tong ([yt583@georgetown.edu](mailto:yt583@georgetown.edu)) |
| **Schedule** | Hoya: 6:00pm to 7:20pm ET (Thursdays)  Saxa: 8:00pm to 9:20pm ET (Thursdays) |
| **Office Hours** | See Canvas home page for office hour schedules and links |
| **Course Webpage** | Canvas |

# Live Sessions

Week 1: October 31

Week 2: November 7

Week 3: November 14

Week 4: November 21

Week 5: December 5

Week 6: December 10 (Tues.)

# Course Description

This course expands on the topics covered in Programming I and introduces Python to prepare students to employ business analytics in R and Python. We will cover programming skills that will allow you to understand and develop data infrastructure using R and Python. The course will focus primarily on Python, one of the most popular programming languages in the world in data science and business analytics. Python, along with R, is one of the most highly demanded programming skills for job applicants in a range of industries.

The course will not only cover the technical tools, but also how to apply the tools in business situations and to solve business problems. We will focus on how programming and analytics intersect with real- world business questions. As a result, students will be equipped to both use the core tools of analytics as well as explain their utility and how and when to apply them in actual business settings.

# Learning outcomes

By the end of this class students will be able to:

1. **Program** in Python and identify main data structures, loops and creation of functions
2. **Write** Python scripts to import, filter, subset, aggregate, and summarize data to facilitate data- driven decision making in real-world business situations
3. **Analyze,** model, and visualize data in Python and lead organizational change by employing a range communication tools to produce professional reports and presentations to spearhead initiatives
4. **Communicate** the steps taken in an analysis, the results, and actionable insights to non-technical business audiences using cutting-edge tools widely used in for business analytics by growing numbers of businesses in all industries

# Texts and Materials

We will provide slides for all lectures via Canvas. Please make sure you can access this.

We will use books that are available online as well as resources and readings listed in Canvas “Learning Materials” for each module:

* McKinney, Wes. *Python for Data Analysis.* O’Reilly Media.
  + Available online through GU library: [link](https://wrlc-gu.primo.exlibrisgroup.com/permalink/01WRLC_GUNIV/1met7gs/cdi_askewsholts_vlebooks_9781491957639)
* Chen, Daniel Y. *Pandas for Everyone*. O’Reilly Media.
  + Available online through GU library: [link](https://wrlc-gu.primo.exlibrisgroup.com/permalink/01WRLC_GUNIV/1met7gs/cdi_askewsholts_vlebooks_9780134547060)
* Muller, Andreas C*. Introduction to Machine Learning with Python*
  + Available online through GU library: [link](https://wrlc-gu.primo.exlibrisgroup.com/permalink/01WRLC_GUNIV/15eloc1/alma991037142743804111)

Additional materials include:

* [What Is Python?](https://www.python.org/doc/essays/blurb/)
* [Official Python documentation](https://docs.python.org/3/tutorial/index.html)
* [An Informal Introduction to Python](https://docs.python.org/3/tutorial/introduction.html)
* [W3 Schools Python](https://www.w3schools.com/python/)
* [Pandas documentation](https://pandas.pydata.org/docs/)
* [Python data visualization gallery (matplotlib and seaborn)](https://www.python-graph-gallery.com/)
* [Plotnine: Grammar of Graphics for Python](https://datascienceworkshops.com/blog/plotnine-grammar-of-graphics-for-python/)
* [Scitkit-learn documentation](https://scikit-learn.org/stable/)

# Required Technology

We will use Jupyter Notebook in this course. Please visit the Anaconda website ([link](https://www.anaconda.com/products/individual)) and download the Individual Edition of Anaconda before the course begins. Anaconda contains Jupyter Notebook and it can be launched from the Anaconda GUI (graphical user interface). We will also use git and VS Code for version control and scripting. Please see Canvas for details.

Jupyter Notebook is widely used for business analytics by businesses ranging from large companies to mid-size organizations to innovative and up-and-coming start-ups. It is a powerful browser-based program that is useful for programming and analysis but also for embedding your analysis in text to create reports and presentations. This will be important when you need to share your analysis and results with decision-makers, non-technical audiences, colleagues, managers, and the broader analytics and data science community.

**Grading**

A 98-100

A- 95-97

B+ 90-94

B 85-89

B- 79-84

C+ 70-78

F <70

**Note**: Grades will be curved according to McDonough School of Business’ Max-Mean policy in which the mean aggregate GPA must be <= 3.5.

**Late submissions**: Assignments that are submitted late without documentation of an excuse will lose five points for each day late.

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| **Schedule** | **Details** | **Before Session** | **After Session** |
| W1 ASync Material | Background and business questions; Python variables; data types | Study all W1 content presented in Canvas (including videos, required resources, and  interactive media) | See Canvas for assignment due dates and materials |
| W1 Sync Session | R and Python programming, Jupyter notebook | View W1 Recording | See Canvas for assignment due dates and materials |
| W2 ASync Material | Operators, conditionals, and loops | Study all W2 content presented in Canvas (including videos, required resources, and  interactive media) | See Canvas for assignment due dates and materials |
| W2 Sync Session | Operators, conditionals,  and loops, command line | View W2 Recording | See Canvas for assignment due dates and materials |
| W3 ASync Material | User-defined functions, classes, objects, and object-oriented programming | Study all W3 content presented in Canvas (including videos,  required resources, and interactive media) | See Canvas for assignment due dates and materials |
| W3 Sync Session | Functions, classes, objects, and object- oriented programming, git and command line | View W3 Recording | See Canvas for assignment due dates and materials |
| W4 ASync Material | DataFrames and series, reading tabular data, filtering and subsetting, merging and joining | Study all W4 content presented in Canvas (including videos, required resources, and  interactive media) | See Canvas for assignment due dates and materials |
| W4 Sync Session | Pandas for business  Analytics, visualization, virtual environments | View W4 Recording | See Canvas for assignment due dates and materials |
| W5 ASync Material | Transform, aggregate, analyze data | Study all W5 content presented in Canvas (including videos,  required resources, and interactive media) | See Canvas for assignment due dates and materials |
| W5 Sync Session | Data transformation, aggregation, and analysis, classification and regression models and evaluation | View W5 Recording | See Canvas for assignment due dates and materials |
| W6 ASync Material | Data visualization and modeling | Study all W6 content presented in Canvas (including videos, required resources, and  interactive media) | See Canvas for assignment due dates and materials |
| W6 Sync Session | Data visualization and modeling, recap | View W6 Recording | See Canvas for assignment due dates and materials |

**Adhering to Policies:** For the course to be effective and run smoothly, it is essential that you and I strictly follow these course policies. Therefore, please read them carefully and contact me if you have any questions or concerns. By taking this course you are agreeing to follow these policies. I will treat these policies as a contract and to be fair to everyone, will not grant any exceptions.

**Grading weights:**

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| See Canvas assignment tab for weights |  |
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# Due Dates:

Due dates for each of the projects are given on Canvas.

**Grades and Feedback on Assignments:** I will post your grades for the assignments and my feedback on Canvas.

**Policy on Grade Appeals:** If you believe you have found a grading error in the assignments (unfortunately, they occasionally do happen), *please provide a written request (no more than a page, focusing on the specific questions of concerns) along with the original assignment within 1 week of the original grade being distributed.* I will be glad to address your concerns, but please be aware that the entire assignment will be re-graded and you may lose points by resubmitting it for grading.

**Attendance:** Empirical evidence shows that poor performance is strongly correlated with poor class attendance. Therefore, we strongly encourage you to attend all live classes. Please plan your travel and other activities around course deadlines. If you miss any class for any reason, it is your responsibility to let the instructor know and cover the missed class material on your own. Make sure you borrow a classmate’s notes. Moreover, if you miss a class, you will miss an opportunity to participate in class discussion.

**Assistance:** It is your responsibility to keep up and utilize all help and resources available to you. If you find that you are falling behind or you feel that the course is difficult, do not hesitate to seek help. Come to my office hours and ask questions during class. If you cannot meet during the office hours, make an appointment for a mutually convenient time.

**Live Session Classroom Etiquette, Ethics, and Georgetown University Honor Code:** I expect from you the same level of professionalism, both in your approach to work and in the “products” you deliver, as your boss will. We expect all students to be live with their videos switched on, so the instructors speak with you instead of a blank canvas.

Your effort to log-in on-time, not to chat, and not to engage in extraneous activities during class will be greatly appreciated. Unless otherwise stated by the instructor on a particular day, Excel, Word, PowerPoint, and Radiant are the only programs you are allowed to run during the live session. The only web page you are allowed to access is the Canvas site for this class. No other web, Facebook, e- mail, twitter, Instagram, WeChat, WhatsApp etc. checking is allowed (unless I specifically ask you to). Please be respectful to others and follow this computer-use policy.

You are expected to be familiar with the Georgetown University Honor System and the Honor code and are bound by requirements. As a faculty member, I am also obligated to report any suspicion related to violations of the Georgetown Honor System. For more details, please see [http://honorcouncil.georgetown.edu/.](http://honorcouncil.georgetown.edu/) Cheating and plagiarism will not be tolerated. In order to communicate expectations regarding group work vs. individual work, each assignment will be designated a type. Please consult the community standards document, which will indicate the guidelines for each assignment. Please ask me if you have any questions about this.

Students agree that by taking this course, the written project reports may be subject to submission to SafeAssign for the detection of plagiarism. SafeAssign compares the report with a huge pool of student papers and reports from Georgetown and a host of other institutions. All submissions may be added as source documents in the SafeAssign reference database solely for the purpose of detecting plagiarism of such papers in the future.

Finally, the syllabus cannot identify all possible solutions which represent honor code violations and is not meant to be comprehensive in this regard. Students are expected to abide by the intent and the letter of the honor code and are required to report any honor code violations that are observed.

***For policies on all individual work, refer to the Academic and University Resources section of the*** [***MSBA Program Home page***](https://georgetown.instructure.com/courses/120918/modules#module_325824)***.***

***For all group assignments (project deliverables), we will follow rules for collaboration from the Student Syllabus Policies Document.*** For all deliverables, I restate the items in the document below:

* Permitted with designated group, and expected that group members work together to complete the assignment
* Group submits one project/ assignment
* Group members receive the same grade (some adjustments may be made on a person by person basis by the professor based on student feedback, etc.)

# Instructional Continuity:

Please see the Instructional Continuity section of the MSBA Student Syllabus Policies document. Deadlines for cases and homework submissions will not be affected by the university closure, unless otherwise notified.

# Academic Accommodations:

Please see the Academic Accommodations section of the MSBA Student Syllabus Policies document.

# Religious Observances:

Please see the Religious Observances section of the MSBA Student Syllabus Policies document.

# Copyright of Course Materials:

Please see Copyright of Course Materials section of the MSBA Student Syllabus Policies document.

**HOW TO SUCCEED IN THIS COURSE**

1. Do the readings.
2. Complete all assignments and participate in discussions.
3. Ask questions.
4. Connect what we are learning to your substantive interests or career goals.
5. Take notes *in your own words*.
   1. When you synthesize complex information in your own words, you’re more likely to learn because your mind is *encoding* the information. This is a vital first step in knowledge acquisition. (The second step is information *storage* and the final step is information *retrieval*.)
6. Practice and have fun.