

Advanced Accounting Analytics MSA/MBA 70129

Instructor:

Professor Elizabeth Chorvat, Ph.D., S.J.D.
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Office hours: Tuesdays and Fridays, 10:30 a.m.-12:00 p.m. and by appointment
(Get feedback on in-class labs, assignments, and midterms!)

Zoom link: <https://notredame.zoom.us/j/95836355412>

Teaching Assistants: Terri Brinkman, B.S., Accounting (Honors) candidate 2024 mbrinkm4@nd.edu
(Terri will be in class with us to assist you with any computer/coding issues.)

Lauren Taylor, B.S. Accounting, Economics candidate 2025 ltaylo24@nd.edu

Natalie Assink, B.S. Accounting, Finance candidate 2026 nassink@nd.edu

Class schedule

Mondays and Wednesdays, 3:00-4:45 p.m. (no break) Mendoza 159

Course site

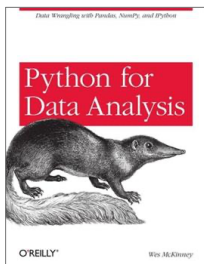
Please access [Canvas](#) using your NetID. You will want to focus on the
“Modules” tool for course materials and assignments.

Course overview

Basic programming is quickly becoming an essential skill for accounting and consulting professionals. Advanced Accountancy Analytics will introduce students to Python, a programming language employed by those accounting professionals who incorporate technology into cost, managerial, tax, and financial accounting. The AICPA has incorporated the use of Python into its audit standards. Consulting professionals utilize Python in statistical analysis, valuation simulations, modeling, and financial advisory engagements. In this course, students will learn the fundamentals of programming, and use Python packages for acquiring data from various sources, retrieving and parsing data, applying analytics to problem-solve, and producing effective and practice-relevant visualizations. Importantly, students will apply these methodologies to data analysis and interpretation in practice-specific contexts.

Required Materials (Rent or Purchase)

Wes McKinney, *Python for Data Analytics*, (O'Reilly, 2018), ISBN 978-1-491-95766-0 (\$37.50 Amazon paperback, black & white, \$37 on Kindle, in color and searchable which you may find helpful.)



Please note that this book is not recommended. It is required. You have a reading assignment for the first day of class, together with Tutorials that must be run before class, which will prepare you for the first lab on Wednesday, January 17th. The material is cumulative, so you will be much more comfortable if you begin class prepared. The assignments are not long, but they will require your undivided attention.

Course Learning Objectives

This course will introduce students to Python, a programming language employed by accounting and consulting professionals for cleaning, modeling, transforming, and analyzing data. Students will learn fundamentals of programming, use Python packages for acquiring data from various sources, learn skills to retrieve and parse data, apply analytics to problem-solve, and produce effective and practice-relevant visualizations. Importantly, students will apply these methodologies to data analysis and interpretation in practice-specific contexts. The objectives of the course include:

- Students will become comfortable with basic concepts common to programming, including data types, data structures, object-oriented programming (involving calls to objects, segments of code that can operate independently performing a specified function or calculation), mutable versus immutable, loops, etc. (MSA learning goals: Critical Thinking, Problem Solving)
- Students will be familiar with the fundamentals of Python programming, including: variables; creating, modifying, and returning elements from lists; creating and modifying sets; dictionaries, invoking and unpacking tuples; classes; iterators; 'for' and 'while' loops; defining and using functions such as range, map, date/time, etc.; conditional structures (if/else/elseif). (MSA learning goals: Problem Solving)
- Students will apply these Python programming basics to accounting applications using: data visualization techniques; sentiment analysis; model building; simulations; large dataset analysis; regression analysis; financial statement ratio analysis; fraud analysis; descriptive statistics; box plot; correlation matrix; linear regression; predictive analytics; network analysis; and web-scraping. (MSA learning goals: Critical Thinking, Problem Solving)
- Students will become familiar with commonly used Python libraries including: Pandas (data transformation), NumPy (computation on arrays and matrices), Matplotlib (data visualization and analysis), Beautiful Soup (web scraping from HTML files), SciPy (statistics), and Seaborn (data visualization and sentiment analysis). (MSA learning goals: Critical Thinking, Problem Solving, Communication)
- Students will apply their Python skills in practice-specific contexts including fraud investigation, pricing analysis, customer sentiment analysis, economic impact (revenue variance) analysis, cybersecurity, and executive compensation. The application of these concepts will include labs and case assignments. (MSA learning goals: Critical Thinking, Problem Solving, Communication, Ethics/Professionalism)
- Students will consider the ethical dimensions associated with the use of technology in accounting and business consulting and advising. (MSA learning goal: Ethics/Professionalism)
- Students will improve their oral and written communication skills through daily participation and discussion of assigned readings and written assignments. (MSA learning goal: Communication)

Grading Criteria

Final grades will be set to an average GPA from 3.3 - 3.6, consistent with the Mendoza Specialized Masters requirements. In the spirit of fairness, no extra credit will be awarded on an individual basis.

Course Work

Participation	10%
Assignments:	30%
Midterm Exam:	30%
Final Exam:	30%

Participation, Readings, Tutorials, and Assignments:

Attendance in all class sessions is expected. Having completed all assigned readings and worked through the tutorials, please come to class ready to actively participate in class labs. In order to provide students with as much support as possible, Bonus Tutorial Reviews will be held each Sunday afternoon at 5 p.m. For planned absences, you will want to notify me at least one week in advance so that assignments may be completed ahead of such an absence. Please inform me in a timely manner in the event of any unforeseen circumstances such as illness, so that I might better support you. Absences not falling within Notre Dame guidelines as excused will lower the participation score by three (3) points, missed assignments by two (2), and late assignments by one (1) point.

Participation also includes positive and active support of your classmates, in groups and in class, in a manner reflective of the College of Business and the University of Notre Dame.

Assignments:

Completed assignments should be submitted on the course Canvas web site by the due date and time. A ten percent (10%) penalty will be assessed on late submissions (no extensions will be granted) and, of course, no assignments will be accepted after the assignment solutions are reviewed in class.

Exams:

There will be two exams – a midterm and a final exam. The final exam will be comprehensive. Both exams may consist of multiple choice, problems, and cases much like those discussed in class. The course schedule indicates the dates and times of the exams, and makeups will be given only in extremely rare cases and only ahead of the scheduled exams. Phones must be stowed during the exam and when assignments and exams are reviewed in class.

Tips for Doing Well in the Course:

- ◊ Complete readings by the due date on the syllabus. Coding skills build on one another and you will feel more confident and will succeed on assignments and exams if you keep current on readings.
- ◊ Attempt all labs, assignments, and cases by the specified due date. As you move forward in the course, try to rely less on the text and notes. Building coding skill takes time and practice, but it is also something of an art, and there are many ways to accomplish the same goal.
- ◊ Work on group work collaboratively, as opposed to splitting up the work. To succeed, you need to understand each entire assignment individually.
- ◊ Actively listen and participate in class. Making good use of class time saves time outside of class.
- ◊ Take advantage of office hours to address any questions you may have.
- ◊ At least a week before each exam, begin reviewing tutorials, in-class labs, and assignments from each module. Again, try to do the problems without referring to the text or notes. Approaching new problems in this manner simulates what you will encounter on the exams.

Social Justice and Notre Dame Code of Honor

The University of Notre Dame is committed to social justice. I share that commitment and strive to maintain a positive learning environment based on open communication, mutual respect, and nondiscrimination. Any and all suggestions as to how to further such a positive and open environment will be appreciated and given serious consideration.

The University of Notre Dame Graduate Academic Code of Honor is observed in this class. Violations of the Honor Code include misrepresenting another's work as one's own, use of unauthorized external materials, or unauthorized collaborative effort on assignments or examinations. More specifically, it is your responsibility to fully comply with the Honor Code as set forth at https://mendozamsportal.nd.edu/assets/428590/honor_code_april_2021.pdf. Any violation of the Honor Code, no matter how small, will impact your grade for the course.

University of Notre Dame Health and Safety Protocols

We are part of a community of learning in which compassionate care for one another is part of our spiritual and social charter. Consequently, compliance with all University health and safety protocols is an expectation for everyone enrolled in this course. Persistent deviation from expected health and safety guidelines within the classroom may be considered by the university a violation of the University's "Standards of Conduct," as articulated in *du Lac: A Guide for Student Life*, and will be referred accordingly.

Accommodations

It is the policy and practice of the University of Notre Dame to provide accommodations for students with properly documented disabilities. Students may contact Sara Bea Accessibility Services for a confidential discussion in the Center for Student Accessibility Services or by phone at 574-631-7157. Because the University's Accommodations Processes generally require students to request accommodations well in advance of the dates when they are needed, students who believe they may need an accommodation for this course should contact Sara Bea Accessibility Services at their earliest opportunity. Additional information about Sara Bea Accessibility Services and the process for requesting accommodations can be found at <https://sarabea.nd.edu/>. Please inform the professor within the first two (2) weeks of class if you plan on seeking accommodations and which accommodations have been approved by Accessibility Services.

Faith Life

The Basilica of the Sacred Heart is open for public Masses and operating consistent with diocesan guidelines.

Most daily Masses will take place in residence halls and academic buildings, though adjusted as needed for physical distancing requirements.

Weekday Masses are held at convenient locations:

- ◊ 8:00 am, usually less than 30 minutes, Stinson-Remick chapel (across the quad from Mendoza)
- ◊ 11:30 am and 5:15 pm, usually 35-40 minutes, Basilica of the Sacred Heart (Sacrament of Reconciliation is offered in the 30 minutes before Mass)
- ◊ 12:05 pm, usually less than 30 minutes, St. Matthew's Chapel in the Stayer Center (next to Mendoza)

Sunday Masses in residence halls will conform to required guidelines, resulting in either multiple Masses in the hall chapel or a consistent alternative location and time each week.

Schedule At Glance

Date	Session	Day	In-Class Activity	Outside Assignment to be Completed before Date
1/17	1	W	Introduction to Python, the Jupyter UI, operators, variables, output, printing, input from the keyboard; pass out Assignment I	Install Jupyter Notebook and work through Tutorial 1 “Jupyter Notebook” and 2.1 Operators; read McKinney pp. 1-3, 8-14
1/22	2	M	Reading inputs from the keyboard, arithmetic operations, integer function, floor division, logical operators	Work through Tutorials 2.2-2.4 Variables, Strings, and Booleans; read McKinney pp. 4-7 on dataframes and libraries, 30-44 (skip duck typing, imports), 142-147 indexing, filtering, slicing
1/24	3	W	Lists, Dictionaries, Sets, Arrays, retrieving data from arrays; review Assignment 1 solutions; pass out Assignment II and Assignment III	Tutorials 3.1, 3.3 Lists and Sets; read McKinney pp. 54-59 (nota bene slicing, unpacking tuples), 61-69; Assignment 1 due Sunday 3/24 at 10 p.m.
1/29	4	M	Conditional Structures, Pandas and NumPy packages	3.2, 3.4-3.5 Tuples, Dictionaries, and Arrays; Read McKinney pp. 47-52 and review the posted Monte Carlo lecture
1/31	5	W	While loops, For loops; Seaborn library; Monte Carlo Simulation valuation engagement lab; review Assignment II	Tutorials 4.1-4.2 Conditional Stmts.; read McKinney pp. 120-124, 160-165, 314-316 on random number generation. Review lists, arrays, dataframes, and descriptive statistics. Assignment II due Sunday 4/2 at 10 p.m.
2/5	6	M	Python Lab ~ Basic Viz with Python, Matplotlib library; Machine Learning NW Traffic in-class lab; review Assignment III; pass out Assignment IV	Tutorials 5.1-5.2 While loops, For loops; 6.1-6.3 Functions, Arguments; read McKinney Chapter 9; Assignment III due Sunday April 7 at 10 p.m.
2/7	7	W	Data smoothing; CA Fruit Growers Pricing Engagement in-class lab	Tutorials 7.1-7.2 Visualizing Data; read McKinney pp 44-45 on range() function, review Tutorials 3.1, 3.3 Lists and 3.4 on Dictionaries
2/12	8	M	Plotly graphing library, Advanced Viz with Python; Audit Engagement in the Wine Country in-class lab; review Assignment IV; pass out Assignment V	Assignment III passed out (this is challenging, so give yourself plenty of time); Study Guide for Midterm passed out; Assignment IV due Sunday 4/14 at 10 p.m.
2/14	9	W	Exam 1 (in Mendoza L068)	Review for Exam 1 by developing code for the practice engagements.
2/19	10	M	Forensic Analytics with Python: the CPD and the Blue Paint Fraud passed out; Tech Stock Analytics and web scraping in class lab; review Assignment V	read McKinney pp. 160-162; Assignment V due Sunday, 4/21 at 10 p.m.
2/21	11	W	Walmart Sales in-class lab; Pass out Chicago Yellow Cab advisory case – predictive analytics, regression	McKinney pp. 318-319, 399-403 on the Statsmodels package for regression analytics; Tutorials 10.1-10.2 Summarizing Data;
2/26	12	M	Introduction to financial analysis with Python; Fashion Finance Python financial accounting case	CPD and the Blue Paint fraud case due; Tutorial 8.1 Classes and Objects, 8.2 Class Inheritance, 9.1 Pandas package; Chicago Cab advisory case due
2/28-3/1	14	W	Exam 2, Mendoza L068	Focus your studying on Python fundamentals such as lists, sets, dictionaries, and arrays and review the Forensic Analytics cases.

Appendix A

Substantive and Methodological Applications

Data Management / Audit

1. Data types, variables, data structures, dataframes, lists (including creating, modifying, retrieving elements from), dictionaries, sets (including creating, modifying), tuples (including invoking and unpacking), mutable v. immutable, classes, for loops, while loops, conditional structures (if/else/elif), functions (range, map, date/time), indexing, filtering, slicing

Data Visualization / Classification

1. Line charts, bar charts, scatter plots, histograms, pie charts, area charts, donut charts
2. Visualizing networks, visualizing text, word clouds, use of color in Seaborn package
3. Pricing Analytics Engagement in the Wine Country engagement
4. The California Fruit Growers engagement ~ pricing analytics engagement

Simulations / Cost Accounting

1. Executive Compensation Monte Carlo Simulation lab ~ random sampling, random number generation, application of Pandas and NumPy packages, Seaborn library
2. Model building
3. Cost/Managerial Accounting application

Statistical Analysis / Audit Analytics

1. The California Fruit Growers engagement (with HTML application)
2. Enron Audit Analytics, regression analysis
3. Data smoothing, Pricing analytics
4. Executive Compensation Monte Carlo Simulation lab ~ descriptive statistics

Forensic Analytics

1. The CPD and the Blue Paint Fraud case (with HTML application)
2. Procurement fraud

Predictive Analytics / Advisory

1. Regression analytics with Python ~ Chicago Yellow Cab case (with HTML application)
2. Accounting Advisory application
3. Statsmodel package, use of HTML

Intro to Machine Learning with Python

1. Time Series Analytics
2. Data Smoothing
3. Impact of COVID on commuter traffic patterns for Seattle municipal authority

Stock Analytics

1. Importing data from Yahoo Finance using Pandas datareader
2. Stock Analytics with Python and performing time series and predictive analytics of stock returns using the Pandas, SciPy, Matplotlib, NumPy, and Seaborn libraries for Python

Natural Language Processing / Cybersecurity

1. RegEx for Regular Expression pattern recognition ~ Cybersecurity case
2. Application of Statsmodels package
3. Sentiment Analysis ~ Audit Engagement in the Wine Country case