

## Data Science for Business : Technical TECH-UB57 Sections 1-2

**Professor:** Dr. Chris Volinsky

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**Office:** KMC 8-81

**Office Hours:**

Tuesdays 6-7PM on Zoom (<https://nyu.zoom.us/my/volinsky>)

Wednesdays 2-3 PM in office (KMC 8-81) and Zoom (<https://nyu.zoom.us/my/volinsky>)

**Teaching Fellows:**

Section 1:

Stuti Mishra

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Section 2:

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Office Hours: TBD

**Class Time:**

- TECH-UB 57 Section 1
  - o M W 9:30-10:45 AM
  - o Classroom: KMC 2-90
  
- TECH-UB 57 Section 2
  - o M W 11:00 – 12:15
  - o Classroom: KMC 2-90

**Prerequisites:**

**Python:** It is required that you have some programming experience in Python prior to taking this class. You do NOT have to be a Python expert or an expert coder. Any introduction to Python class and some experience with programming should suffice. I will **not** be teaching Python basics or fundamentals in this class - you are expected to already know how to work with Python notebooks, libraries, and functions and you likely will not have time to learn on the fly.

**Statistics:** At least one introductory statistics, data analysis, machine learning, or data science class is required. Knowledge of basic statistics – measures of central tendency and variation, basic laws of probability and statistical concepts like confidence intervals and hypothesis testing will be assumed.

## Course Objectives:

This course will teach you how to think about data based problems in the business world through the lens of data analytics. We will focus on data-analytic thinking, how to approach problems, how to develop insights using data, how to apply machine learning and other analytic techniques, how to validate and assess algorithmic results, and how to communicate those results to a business audience.

We will study the fundamental principles and techniques of data science, machine learning, and data-driven artificial intelligence, all by the examination of real-world examples and case studies to place data science techniques in context.

After taking this course you should:

1. *Approach business problems data-analytically.* Think carefully & systematically about whether & how data can improve business outcomes, to make better-informed decisions for product management, marketing, sales, operations, consulting, etc.
2. *Understand the fundamental principles of data science that underlie processes, algorithms & systems.* Know when and how to apply different methods, and how to evaluate and communicate them.
3. *Have had hands-on experience implementing machine learning algorithms in relevant business contexts.* This includes a term project using data of your choosing. You will formulate a relevant business problem, and do a complete analysis, write-up and presentation.

This is not an algorithms class...we will learn about popular machine learning algorithms, and learn how to implement and evaluate them in Python, always within the context of solving a business problem.

## Textbook:

The **mandatory** textbook for the class will be the following:

**[DSB]** *Data Science for Business*. By Provost & Fawcett (O'Reilly, 2013) – 2<sup>nd</sup> Edition

The book will be available as a coursepack through Brightspace.

This book covers the fundamental material that will provide the basis for you to think and communicate about data science and business analytics.

There are secondary books I will draw from during the semester that will be helpful in getting a fully rounded view of the material. All are available for free:

**[ISL]** *An Introduction to Statistical Learning (with Applications in Python)*, by James, Witten, Hastie, Tibshirani, Taylor. Available free at <http://statlearning.com>. This book is a bit technical for students who want to go deeper, and provides more statistical background than we will cover in class. It also goes into other algorithms and methods that we will not cover in class, but you might want to consider for your class project. Additionally the book contains detailed Python snippets to apply these methods to real data.

[Shmueli] *Data Mining for Business Analytics (Applications in Python)*, by Shmueli, Bruce, Gedeck, and Patel. Available freely in digital form at NYU Libraries. Covers similar material to what we are covering with many excellent Python examples.

[OpenIntro] *OpenIntro Statistics*. PDF available for free at <https://www.openintro.org/book/os/>. An online introductory statistics course. Excellent for brushing up on statistical topics and data-oriented thinking.

## Software:

As noted above, some working knowledge of Python is required as a prerequisite. We will spend our time exploring the data analysis and machine learning libraries that you will use through the class (mainly Pandas and sklearn). I will provide several iPython notebooks that we will work through together to help you learn the basics of the key data science and machine learning libraries and functions. These notebooks will help you learn the tools you will need for your term project.

This is not meant to be a programming or algorithms class – you need to know enough Python to implement data analysis solutions, but do not need to be an expert. You can use whatever means you have to program, including stackoverflow, ChatGPT or other AI tools. However, rote cut and paste of code from other sources – in addition to technically being plagiarism – is a bad idea for learning and often for correctness.

I will be sharing Python notebooks with you, and we will be running the notebooks on [Google's Colab platform](#). You must have access to a computer on which you can access and run the class Colab notebooks. If you do not have such a computer, please see me immediately so we can make alternative arrangements. You should bring your computer to class. If you need additional help with Colab or Python, please see your teaching assistant.

## Grading:

- Homework: 30%
- Exams (Two in-class quizzes plus final): 30%
- Term Project: 35%
- Participation / Attendance: 5%

## Grading Policies:

NYU Stern policy for core classes is that no more than 35% of the class will receive a grade of A or A-. Therefore, the point value cutoff for an A/A- grade will be scaled based on the performance of the class. Outside of that cap, the majority of students will receive Bs, with only a few poorly-performing students receiving C's or lower. Note that the actual distribution for this course and your own grade will depend upon how well the class performs.

Although you will get your grades back from homeworks and quizzes quickly, you may not know how this transfers to a letter grade. Mid-semester, I will provide an assessment of where you are letter-wise so it will provide an opportunity for course correction if needed.

**Homework:** Homeworks are required and important. Homework is due as specified in the syllabus. Homeworks submitted up to 24 hours late will have a 25% penalty, up to three days late will be a 50% penalty. Homeworks can be done collaboratively, but each student is required to submit their own unique homework and is responsible for their own learnings.

The homework will be provided as iPython notebooks that you are meant to save to your own Google Drive, edit with your solutions, and submit into Brightspace as .ipynb notebooks. Please add commenting to your code so we can see your reasoning in case the answer is wrong so we can give partial credit.

There are not a lot of homework assignments in this class, but they can be substantial, and especially for those that are not as comfortable with coding, they may take significant time. Please start the assignments early and leave time to ask questions during class or during office hours so there is not a last minute crunch.

**Readings and Articles:** Please note the readings and articles that are assigned and do the reading before the associated class. Questions may come up in class, and you may be called on randomly. Reading material is fair game for exams.

**Quizzes:** Two in-class quizzes will be done throughout the year, covering material from lectures and readings. Quizzes will be open notes, but you will not be able to use a phone or computer. **Make-up quizzes will not be offered** – if you have a hardship requiring you to miss an exam, you will need to let me know with at least a week's notice, with a documented reason.

**Participation/Attendance:** This is a measure of a student's engagement in the course. Students who show up to class and regularly respond to professor's questions and engage in discussions will receive the full 5%. I try to get to know every student by name, but it can be hard - making sure that I know who you are is a good way to do well on this grade! Please use your name placards regularly throughout the semester so that I can best learn your name. Other opportunities to boost this component include seeking help on HW or course material through office hours, participating in online discussions, or reaching out to the professor or teaching fellow for extra help. Poor attendance, late arrivals or leaving class early will lower this component. Please feel free to reach out to me to discuss this grade aspect at any time.

Attendance will be taken by sign-in sheet in class. **Having someone else sign your name to the attendance sheet is considered a violation of Stern Code of Conduct and will be subject to appropriate disciplinary action.**

All classes will be recorded and posted on the Content=>Mediasite tab in Brightspace.

**Class Term Project:** Your class project will consist of: defining a business problem that can be addressed by collecting data; writing up and proposing the analysis; collecting the data; cleaning and preparing the data; performing the proper analysis; providing an appropriate evaluation and defense of the model selected; and communication of the results via a presentation. You will be working in groups of 4 to do the project – you can pick the groups if you like, otherwise they will be assigned for you. Learning how to work within a team is one main point of the project. Some of you will be better coders, others will be better communicators, and the team should make use of the skills of all members of the team in the best way possible while trying to balance the responsibilities. You will be asked to evaluate the contributions of your team members at the end of the project.

You will have several benchmarks over the course of the term to meet in order to successfully complete the project, including an initial proposal writeup of the business question, and a “plan of attack”, and a project update around the middle of the term. Your team will be expected to provide a writeup of the project and present the project and solution in a class presentation the last week of the class. More information will be provided.

### Other Policies:

- **Religious Holidays:** NYU Stern is committed to ensuring an equitable educational experience for all students regardless of identity or circumstances and strives to recognize the obligations its students have outside of Stern. Please review all class dates at the start of the semester and review all course requirements to identify any foreseeable conflicts with exams, course assignments, projects, or other items required for participation and attendance. If you are aware of a potential conflict, please contact me **at the start of the semester** to discuss any potential conflicts to determine whether/how they can be accommodated. [University Calendar Policy on Religious Holidays](#)
- **Accommodations:** If you will require academic accommodation of any kind during this course, you must apply through the [Moses Center for Student Accessibility](#) (212-998-4980, [mosescsa@nyu.edu](mailto:mosescsa@nyu.edu), ). The Moses Center will send me an official notice of accommodation. If you will need to take an exam at the Moses Center for Student Accessibility, you must submit a completed Exam Accommodations Form to them at least one week prior to the scheduled exam time to be guaranteed accommodation.
- **In-class:** You should bring a laptop to class with you if possible, as it will be helpful for you to be working through the python notebooks with me in real time. If you do not have a laptop, I can make sure you are in a group that does have one. **When class is in session and during lectures I expect that your phones will be turned off and inaccessible and laptops will be closed.**
- **Inclusion:** This course strives to support and cultivate diversity of thought, perspectives, and experiences. I am committed to every student feeling a sense of belonging in the classroom. If

for any reason you feel excluded, I ask that I be your first point of contact to discuss your concern. I am open to hearing your concerns and learning from each other.

- **Academic Integrity:** We take pride in our well-rounded education and approach our academics with honesty and integrity. Indeed, integrity is critical to all that we do here at NYU Stern. As members of our community, all students agree to abide by the [NYU Academic Integrity Policies](#) as well as the NYU Stern Student Code of Conduct, which includes a commitment to:
  - Exercise integrity in all aspects of one's academic work including, but not limited to, the preparation and completion of exams, papers and all other course requirements by not engaging in any method or means that provides an unfair advantage.
  - Clearly acknowledge the work and efforts of others when submitting written work as one's own. Ideas, data, direct quotations (which should be designated with quotation marks), paraphrasing, creative expression, or any other incorporation of the work of others should be fully referenced.
  - Refrain from behaving in ways that knowingly support, assist, or in any way attempt to enable another person to engage in any violation of the Code of Conduct. Our support also includes reporting any observed violations of this Code of Conduct or other School and University policies that are deemed to adversely affect the NYU Stern community.
- **Stern Code of Conduct:** The Stern Code of Conduct and Judiciary Process applies to all students enrolled in Stern courses. Information can be found here: <https://www.stern.nyu.edu/uc/codeofconduct>. The full Student Conduct Policy can be found here: <https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/university-student-conduct-policy.html>