



**FINA 5523: Financial Analytics**  
**MFin Summer 2026**

<b>Instructor</b>	Dr. Yuriy Zabolotnyuk, CFA, FRM
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<b>Class Times</b>	Wednesday 6-9pm
<b>Modality</b>	In-person
<b>Office Hours</b>	Wednesday 5-6pm
<b>Office Location</b>	NI7022
<b>TA Name/Email</b>	claudio@anthropic.com

**Pre-Requisites & Preclusions:**

Prerequisites: BUSI 5510 and FINA 5511

**Course Description/Instructor’s Statement**

Carleton Calendar Description

Developing statistical models and using simulations to understand financial data using Python. Awareness of financial models related to investments and corporate finance and ability to write simple code in Python to implement the models in real-world scenarios and to visualize and analyze financial data.

Instructor’s Course Description:

This course introduces students to the computational tools and methods used in modern financial analysis. Using Python as the primary platform, students learn to collect and process financial data from professional sources, conduct exploratory analysis across equity, fixed income, and fundamental data, and build quantitative models covering risk measurement, factor models, portfolio optimization, and machine learning for return prediction. The course emphasizes practical, replicable work using AI-assisted coding tools alongside industry-standard Python libraries, preparing students for analytical roles in asset management, risk, and quantitative research.

Course Learning Objectives:

1. Use Python and AI coding tools to acquire, clean, and analyze equity, fixed income, and fundamental financial data.
2. Conduct exploratory data analysis on return distributions, financial ratios, yield curves, and credit spreads.

3. Measure and manage risk across equity and fixed income using VaR, CVaR, drawdown metrics, duration, and convexity.
4. Implement CAPM, Fama-French factor models, and fixed income factor analysis using real market data.
5. Construct and backtest multi-asset portfolios and apply machine learning models for return prediction.

<b>Required/Optional Materials &amp; Prices</b>
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Students are not required to purchase textbooks or other learning materials for this course.

**Required:**

Scheuch, C., Voigt, S., Velte, P., & Weiss, P. (2023). *Tidy Finance with Python*. Chapman & Hall/CRC Press. <https://www.tidy-finance.org/python/> FREE ONLINE ACCESS

**Recommended:**

Hilpisch, Y. (2018). *Python for Finance: Mastering Data-Driven Finance (2nd ed.)*. O'Reilly Media. (available for FREE through Calreton Library)

VanderPlas, J. (2023). *Python Data Science Handbook: Essential Tools for Working with Data (2nd ed.)*. O'Reilly Media. <https://jakevdp.github.io/PythonDataScienceHandbook/> FREE ONLINE ACCESS

<b>Grading Scheme</b>
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Home Assignments (2x20%)	40
Contribution to Class Discussion	10
Final Project	50
TOTAL	100%

**Home assignments:** there will be 2 home assignments where students will have to apply concepts and techniques covered in class. You are encouraged to work in groups, but you will need to submit an individual copy of the assignment. The assignment due dates are specified in the course schedule.

**Class participation:** you are expected and encouraged to actively participate in class activities.

**Final project:** the take-home project will test your understanding of the concepts covered in class.

<b>Policies &amp; Accommodations</b>
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<https://students.carleton.ca/course-outline/>

<https://carleton.ca/pmc/current-students/academic-accommodations/>



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### Course Schedule

Date	Topic	Recommended materials and Python libraries
May 6, 2026	AI Tools and Financial Data	<p><b>TF</b> = Tidy Finance with Python (Scheuch et al.), <b>PFF</b> = Python for Finance (Hilpisch), <b>PDSH</b> = Python Data Science Handbook (VanderPlas)</p> <p><b>Textbook chapters:</b> TF: Setting Up Your Python Environment; Accessing and Managing Financial Data PFF: Ch. 1 Why Python for Finance; Ch. 5 Data Analysis with pandas PDSH: Ch. 2 Introduction to NumPy; Ch. 3 Data Manipulation with Pandas</p> <p>Cursor <a href="https://cursor.com/learn">https://cursor.com/learn</a> Claude Code <a href="https://code.claude.com/docs/en/overview">https://code.claude.com/docs/en/overview</a> GitHub Copilot <a href="https://github.com/features/copilot/tutorials">https://github.com/features/copilot/tutorials</a> yfinance — <a href="https://ranaroussi.github.io/yfinance/">https://ranaroussi.github.io/yfinance/</a> pandas — <a href="https://pandas.pydata.org/docs/">https://pandas.pydata.org/docs/</a> fredapi — <a href="https://github.com/mortada/fredapi">https://github.com/mortada/fredapi</a></p>
May 13, 2026	Exploratory Data Analysis	<p>TF: Working with Stock Returns; Financial Statement Analysis PFF: Ch. 7 Data Visualization; Ch. 8 Financial Time Series PDSH: Ch. 3 Data Manipulation with Pandas; Ch. 4 Visualization with Matplotlib</p> <p>scipy.stats — <a href="https://docs.scipy.org/doc/scipy/reference/stats.html">https://docs.scipy.org/doc/scipy/reference/stats.html</a> seaborn — <a href="https://seaborn.pydata.org/">https://seaborn.pydata.org/</a> Cont (2001). Empirical properties of asset returns. QF 1(2). <a href="#">DOI</a></p>

May 20, 2026	<p><b>Assignment 1 due on May 24@23:59</b></p> <p>Risk Measurement and Performance Metrics</p>	<p>PFF: Ch. 12 Stochastics; Ch. 13 Statistics</p> <p>Rockafellar &amp; Uryasev (2002). CVaR for General Loss Distributions. JBF 26(7). <a href="#">DOI</a></p> <p>Bailey &amp; López de Prado (2012). Sharpe Ratio Efficient Frontier. JPM 39(1). <a href="#">SSRN</a></p>
May 27, 2026	Factor Models	<p>TF: Beta Estimation; The CAPM; Replicating Fama-French Factors</p> <p>PFF: Ch. 8 Financial Time Series; Ch. 13 Statistics</p> <p>Fama &amp; French (1993). Common Risk Factors in Stock and Bond Returns. JFE 33(1). <a href="#">DOI</a></p>
June 3, 2026	<p><b>Assignment 2 due on June 7@23:59</b></p> <p>Portfolio Construction and Backtesting</p> <p><b>Final project briefing</b></p>	<p>TF: Modern Portfolio Theory; Univariate Portfolio Sorts; Parametric Portfolio Policies</p> <p>PFF: Ch. 15 Trading Strategies</p> <p>PyPortfolioOpt — <a href="https://pyportfolioopt.readthedocs.io">https://pyportfolioopt.readthedocs.io</a></p> <p>Plyakha, Uppal &amp; Vilkov (2012). Why Equal-Weighted Portfolios Outperform. <a href="#">SSRN</a></p> <p>López de Prado, M. (2016). Building diversified portfolios that outperform out of sample. <a href="https://doi.org/10.3905/jpm.2016.42.4.059">https://doi.org/10.3905/jpm.2016.42.4.059</a></p> <p>DeMiguel, Garlappi &amp; Uppal (2009). Optimal vs Naive Diversification. RFS 22(5). <a href="#">SSRN</a></p>
June 10, 2026	<p>Machine Learning for Finance</p> <p><b>Final project Q&amp;A</b></p>	<p>TF: Factor Selection via Machine Learning</p> <p>PDSH: Ch. 5 Machine Learning</p> <p>scikit-learn — <a href="https://scikit-learn.org/stable/">https://scikit-learn.org/stable/</a></p> <p>Moskowitz, Ooi &amp; Pedersen (2012). Time Series Momentum. JFE 104(2). <a href="#">SSRN</a></p> <p>Gu, Kelly &amp; Xiu (2020). Empirical Asset Pricing via ML. RFS 33(5). <a href="#">DOI</a></p> <p>Bailey et al. (2014). Pseudo-Mathematics and Financial Charlatanism. AMS 61(5). <a href="#">Free</a></p> <p>López de Prado (2018). 10 Reasons Most ML Funds Fail. JPM 44(6). <a href="#">SSRN</a></p>
June 24, 2026	<b>Final project due on June 24@23:59</b>	

## Use of Generative Artificial Intelligence

This is an AI-forward course. Students are expected to use generative-AI tools (e.g., ChatGPT, Claude, Copilot) as thought partners and assistants to enhance the quality of their work. Assignments will be graded assuming students had full access to AI support. Use these tools responsibly. That is, verify outputs, apply your own judgment, and cite AI use when relevant. The goal is not to outwit AI but to elevate your learning through it. You can access resources related to citing Generative AI on the [MacOdrum Library website](#). Additional resources are also available on Carleton's [Artificial Intelligence Hub](#).

### Contribution to Program Learning Goals (MFin):

MFin Learning Goal	Not Covered	Introduced	Taught but Not Assessed	Taught <u>and</u> Assessed
<b>Learning Goal 1 - Ethical and Professional Conduct</b> Graduates will conduct themselves in alignment with the CFA Code of Ethics and Standards of Professional Conduct.	✓			
<b>Learning Goal 2 - Financial Markets, Institutions, and Instruments</b> Graduates will demonstrate an understanding of financial markets, instruments, and institutions.				✓
<b>Learning Goal 3 - Portfolio Management</b> Graduates will understand the motivations of investors and manage an investment portfolio that achieves those objectives.				✓
<b>Learning Goal 4 - Data Analysis</b> Graduates will be proficient in data management, analytics, and modeling.				✓
<b>Learning Goal 5 – Communication</b> Graduates will be effective communicators.				✓

### ADDITIONAL INFORMATION

#### Course Sharing Websites:

Materials created for this course (including presentations and posted notes, labs, case studies,

assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).

### **Recommended Calculator for Examinations:**

If you are purchasing a calculator, we recommend any one of the following options: Texas Instruments BA II Plus (including Pro Model), Hewlett Packard HP 12C (including Platinum model), Staples Financial Calculator, Sharp EL-738C & Hewlett Packard HP 10bII

### **Group work**

The Sprott School of Business encourages group assignments in the school for several reasons. They provide you with opportunities to develop and enhance interpersonal, communication, leadership, followership, and other group skills. Group assignments are also good for learning integrative skills for putting together a complex task. Your professor may assign one or more group tasks/assignments/projects in this course. Before embarking on a specific problem as a group, it is your responsibility to ensure that the problem is meant to be a group assignment and not an individual one.

### **Grading**

In accordance with the Carleton University Undergraduate Calendar (p 34), the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A - = 80-84	B - = 70-72	C - = 60-62	D - = 50-52
F = Below 50			

Grades entered by Registrar:  
WDN = Withdrawn from the course  
DEF = Deferred

### **Academic Regulations**

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here:

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

### **Requests for Academic Accommodation**

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the *Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances*, are outlined on the Academic Accommodations website ([students.carleton.ca/course-outline](http://students.carleton.ca/course-outline)).

### **Pregnancy Accommodation**

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [pregnancy academic accommodation process](#).

### **Religious obligation**

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [religious academic accommodation process](#).

### **Academic Accommodations for Students with Disabilities**

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the [Paul Menton Centre website](#).

### **Survivors of Sexual Violence**

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the [Equity and Inclusive Communities website](#).

### **Accommodation for Student Activities**

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the [Senate Policy on Accommodation for Student Activities \(PDF, 25 KB\)](#).

### **Academic Consideration for Medical and Other Extenuating Circumstances**

Due to medical and other extenuating circumstances, students may occasionally be unable to fulfil the academic requirements of their course(s) in a timely manner. The university supports the academic development of students and aims to provide a fair environment for students to succeed academically. Medical and/or other extenuating circumstances are circumstances that are beyond a student's control, have a significant impact on the student's capacity to meet their academic obligations, and could not have reasonably been prevented. Students may request Academic Consideration for Coursework or Other Academic Deliverable. For further information please review the [Procedure for Academic Consideration](#) and the [FAQ page](#).

## **Scheduling and Examination Support**

Scheduling and Examination Services provides various supports for both in-term and end-of-term tests and exams. Details can be found on the [Exam Support website](#).

### **Academic Integrity:**

Violations of academic integrity—presenting another’s ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student—are a serious academic offence, weaken the quality of the degree, and will not be tolerated. Penalties may include; a grade of Failure on the submitted work and/or course; academic probation; a refusal of permission to continue or to register in a specific degree program; suspension from full-time studies; suspension from all studies at Carleton; expulsion from Carleton, amongst others. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy which is available, along with resources for compliance at: <https://carleton.ca/registrar/academic-integrity/>

### **Centre for Student Academic Support:**

The Centre for Student Academic Support (CSAS) is a centralized collection of learning support services designed to help students achieve their goals and improve their learning both inside and outside the classroom. CSAS offers academic assistance with course content, academic writing and skills development. Visit CSAS on the 4th floor of MacOdrum Library or online at: <https://carleton.ca/csas/>

### **Other Important Information:**

- Students must always retain a copy of all work that is submitted.
- All final grades are subject to the Dean’s approval.
- For us to respond to your emails, we need to see your full name, CU ID, and the email must be written from your valid CARLETON address. Therefore, in order to respond to your inquiries, please send all email from your Carleton cmail account. If you do not have or have yet to activate this account, you can do so by visiting <https://carleton.ca/its/get-started/new-students-2/>