

## Master of Science in Sustainability Management

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### SUMA PS5320 Sustainable Investing & Economic Growth

**Credits: 3**

**Elective Course**

**Instructor:** Satyajit Bose, [sgb2@columbia.edu](mailto:sgb2@columbia.edu)

**Office Hours:** TBD

**Response Policy:** TBD

**Teaching Assistant:** TBD

**Office Hours:** TBD

**Response Policy:** TBD

### Course Overview

The course provides a grounding in modern portfolio theory, the capital asset pricing model and the framework to evaluate hypotheses and accepted techniques in sustainable investing. We examine the financial economics foundations of modern portfolio theory and the standard factor-based return and risk attribution framework in order to provide a context for responsible investment practices in the marketplace. It examines the relationship between investment return expectations, economic growth and sustainability initiatives.

The course has three related goals:

- To provide a set of performance attribution tools to detect the incremental impact of sustainable investing approaches;
- To examine the potential and pitfalls of the standard measures of growth, risk and return;
- To review the links between the proper function of financial markets and the sources of economic growth.

This course will primarily focus on tying ESG performance evaluation to investment management practices based on the standard empirical finance research and on connecting investment choices with macro-outcomes.

This course is not recommended as a first course in finance.

Throughout the course we will:

Employ new and emerging data sources and methods of due diligence and portfolio screening that combine standard financial sources with information from alternative channels such as human rights organizations, supply chain assessment aggregators, natural scientists' open data initiatives and commercial data providers.

By the end of the semester:

Students should be prepared to make a persuasive, balanced and evidence-based case for sustainable investing in specific securities within their constituencies and to deploy and refine methods of implementation.

This course is designed for both practitioners in the financial services and asset management industry who are interested in new and emerging models of investment analysis that examine the environmental, social and governance impact of investment choices as well as those broadly interested in the links between the economy and the environment.

### Learning Objectives

This course is both for those who want to analyze investment choices for their sustainability impact and for those who want to develop a critical understanding of standard methods of investment analysis.

By the end of the course, students will critique an investment rationale from their chosen sustainability perspective, as well as conceive, plan and implement a data collection strategy to gather the information necessary to evaluate an investment.

By the end of the course, students should be able to:

L1 Demonstrate an understanding of the financial ecosystem, the flow of savings and investment and outline the key incentives of the major institutions that comprise the ecosystem

L2 Explain in clear and concise language the meaning of theoretical concepts that are foundational to sustainable investing such as: fiduciary duty, corporate governance, due diligence, financial leverage, volatility, tracking error, correlation, portfolio optimization, factor decomposition.

L3 Explain in clear and concise language the relationship between economic growth and its determinants

L4 Demonstrate an understanding of quantitative techniques/skills necessary to compute changes in gross domestic product or portfolio risk or return measures caused by select real or hypothetical events.

L5 Explain the results of econometric analyses performed by others to an investment decision maker.

L6 Articulate whether there are risks to revenue and profit growth resulting from specific environmental, social or governance factors.

L7 Develop proficiency in the language of investment decision-making, including the ability to structure a clear, concise and evidence-based argument both verbally and in writing, with a special emphasis on security selection.

## Readings/Videos

1. Aizenman, J. and Y. Jinjara (2012). "Income Inequality, Tax Base and Sovereign Spreads." *FinanzArchiv* 68(4): 431-444.
2. Bolton, P. and M. Kacperczyk (2021). "Do investors care about carbon risk?" *Journal of Financial Economics* 142(2): 517-549.
3. Bose, S., D. Guo & A. Simpson. (2019) *The Financial Ecosystem: The Role of Finance in Achieving Sustainability*. Palgrave Macmillan.
4. Bose, S. (2020). "Evolution of ESG Reporting Frameworks." in T. Cort and D. C. Esty, *Values at Work: Sustainable Investing and ESG Reporting*. Palgrave Macmillan.
5. Busch, T. and G. Friede (2018). "The Robustness of the Corporate Social and Financial Performance Relation: A Second-Order Meta-Analysis." *Corporate Social Responsibility & Environmental Management* 25(4): 583-608.
6. Byers, S. S., et al. (2015). "Using portfolio theory to improve resource efficiency of invested capital." *Journal of Cleaner Production* 98: 156-165.
7. Chatterji, A. K., et al. (2016). "Do Ratings of firms converge? Implications for Managers, Investors and Strategy Researchers." *Strategic Management Journal* 37(8): 1597-1614.
8. Cornell, B., et al. (2021). "Inflation, Investment and Valuation." *Journal of Business Valuation and Economic Loss Analysis* 16(1): 1-13.
9. Damodaran, A. (2023) *Tesla in 2023: A Return to Reality, The Start of the End or Time to Buy?*
10. Dari-Mattiacci, G., et al. (2017). "The Emergence of the Corporate Form." *Journal of Law, Economics, and Organization* 33(2): 193-236.
11. Edmans, A. (2011). "Does the stock market fully value intangibles? Employee satisfaction and equity

- prices." *Journal of Financial Economics* 101(3): 621-640.
12. Fabozzi, F. J., et al. (2002). "The Legacy of Modern Portfolio Theory." *Journal of Investing* 11(3): 7.
  13. Greenbaum, S. I., Thakor, A. V. & Boot, A. W. A. (2016). *Contemporary Financial Intermediation*. Elsevier. Ch 2.
  14. Grover, J. and A. M. Lavin (2007). "Modern Portfolio Optimization: A Practical Approach Using an Excel Solver Single-Index Model." *The Journal of Wealth Management* 10(1): 60-72,68
  15. Holthausen, R. W. and M. E. Zmijewski (2012). "Valuation with Market Multiples: How to Avoid Pitfalls When Identifying and Using Comparable Companies." *Journal of Applied Corporate Finance* 24(3): 26-38.
  16. Keynes, J.M. (1936) *The General Theory of Employment, Interest and Money*. Chs 11, 12 & 24.
  17. Lydenberg, S. (2016). "Integrating Systemic Risk into Modern Portfolio Theory and Practice." *Journal of Applied Corporate Finance* 28(2): 56-61.
  18. Merker, C. K. and S. W. Peck (2019). *Fiduciary Duty. The Trustee Governance Guide: The Five Imperatives of 21st Century Investing*. C. K. Merker and S. W. Peck. Cham, Springer International Publishing: 13-19
  19. Mobius, M. and U. Ali (2021). "ESG in Emerging Markets: The Value of Fundamental Research and Constructive Engagement in Looking beyond ESG Ratings." *Journal of Applied Corporate Finance* 33(2): 112-120.
  20. Monks, R. A. G. and N. Minow (2011). *Corporate governance*. Hoboken, NJ, John Wiley & Sons. Ch 1.
  21. Pástor, L., et al. (2022). "Dissecting green returns." *Journal of Financial Economics* 146(2): 403-424.
  22. Perold, A. F. (2004). *The Capital Asset Pricing Model*. *Journal of Economic Perspectives*, 18(3), 3-24.
  23. PRI. (2013). "The Value Driver Model: A Tool for Communicating the Business Value of Sustainability."
  24. PRI. "A Practical Guide to ESG Integration for Equity Investing." 2016. pp 12-55. Weimer, J. and J. C. Pape (1999). "A Taxonomy of Systems of Corporate Governance." *Corporate Governance: An International Review* 7(2): 152.
  25. Werner, R. A. (2016). "A lost century in economics: Three theories of banking and the conclusive evidence." *International Review of Financial Analysis* 46: 361-379
  26. Wilford, D. S. (2012). "True Markowitz or assumptions we break and why it matters." *Review of Financial Economics* 21(3): 93-101.
  27. Youngdahl, J. (2014). *The Basis of Fiduciary Duty in Investment in the United States*. Cambridge Handbook of Institutional Investment and Fiduciary Duty. J. P. H. e. al. Cambridge, Cambridge UP: 20-30.
  28. UNEP and PRI (2019). *Fiduciary Duty in the 21st Century*. Final Report.

## Assignments and Assessments

Your final course grade will be computed using a weighted index of numeric grades that combine performance under written assignments (discussion boards and weekly assignments), attendance and participation, the midterm exam, and the final term project. The weighted index will be scaled into a letter grade scale from F to A+ based on an expectation that a class representative of the population of Columbia masters students will receive a median grade of B+ or A-.

*Specific rubrics for each assignment will be provided on the Canvas course site. General evaluation criteria is provided in each description.*

## Session Attendance & Contribution (Individual) - 10% of final grade

Regular participation in class discussions and project activities is required. Students are expected to have done the readings for each session prior to the lecture. We expect your contributions to enhance the quality of the class experience for yourself and others.

Contributing means enhancing the quality of the class experience for yourself and others. It involves making relevant, useful and non-obvious comments, or posing pertinent questions, in clear and succinct language; Be prepared to give 2 minute answers to impromptu questions regarding the readings in the lectures.

**Class Presentation or Discussion Posts (Individual) - 10% of final grade**

Present in class a 10-minute presentation on a previously assigned reading for that class (presentations on readings will begin in Class 2);

OR

Provide at least two carefully considered and substantive (600 word) posts in the discussion board. Posts should address the readings and topics discussed in class, with an application to current events in the context of sustainable finance.

**Problem Sets (Group) - 20% of final grade**

Three times during the course, you will complete problem sets in small groups (minimum size 2, maximum size 4). The problem sets will consist of quantitative exercises and essays interpreting quantitative information. Each problem set will be graded on a categorical scale from check- to check+. A check will be equivalent to 85 out of 100. Absent extenuating circumstances, problem sets will be graded by the TA and returned to students approximately one week after they are due.

**Take Home Midterm Exam (Individual) - 30% of final grade**

Two take-home midterms consisting of short quantitative exercises, multiple choice questions, computation of financial analysis ratios, and essays interpreting data. Each midterm will be graded on a numeric scale from 1 to 100.

**Final Term Project (Groups of 3-4 people) - 30% of final grade**

A position paper, supporting spreadsheet analysis and an oral presentation arguing for a specific decision regarding a narrow aspect of sustainable investing for an institutional investor or a responsible consumer or other stakeholder will be prepared in groups assigned by the instructor based on stated topic preference.

The position paper, supporting spreadsheet and oral presentation will be graded on a letter grade scale from F to A+.

**Grading**

The final grade will be calculated as described below:

**FINAL GRADING SCALE**

Grade	Percentage
A+	98–100 %

<b>A</b>	93–97.9 %
<b>A-</b>	90–92.9 %
<b>B+</b>	87–89.9 %
<b>B</b>	83–86.9 %
<b>B-</b>	80–82.9 %
<b>C+</b>	77–79.9 %
<b>C</b>	73–76.9 %
<b>C-</b>	70–72.9 %
<b>D</b>	60–69.9 %
<b>F</b>	59.9% and below

Assignment/Assessment	% Weight	Individual or Group/Team Grade
Session Attendance & Contribution	10	Individual
Presentation or Discussion Post	10	Individual
Problem Sets	20	Group
Midterm	30	Individual
Final Project	30	Group

### Course Schedule/Course Calendar

SPS holds each member of its community responsible for understanding and abiding by the SPS Academic Integrity and Community Standards posted at

<http://sps.columbia.edu/student-life-and-alumni-relations/academic-integrityand-community-standards>. You are required to read these standards within the first few days of class. Ignorance of the School's policy concerning academic dishonesty shall not be a defense in any disciplinary proceedings.

Accessibility Columbia is committed to providing equal access to qualified students with documented disabilities. A student's disability status and reasonable accommodations are individually determined based upon disability documentation and related information gathered through the intake process. For more information regarding this service, please visit the University's Health Services website: <http://health.columbia.edu/services/ods/support>

Module/Week	Topics and Activities	Readings (due on this day)	Assignments (due on this date)
Module 1 <b>The Financial Ecosystem</b>	<ul style="list-style-type: none"> <li>• Circular flow of savings and investment</li> <li>• Financial intermediation and links to natural and social ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>• Bose et al. (2019) Chs. 1 &amp; 2.</li> <li>• Keynes (1935) Chs. 11, 12 &amp; 24.</li> <li>• Greenbaum et al. (2016) Ch. 2.</li> </ul>	Background Survey

Module 2 <b>Corporate Governance</b>	<ul style="list-style-type: none"> <li>• Fiduciary duty and corporate governance</li> <li>• Characteristics of the joint stock corporation</li> <li>• Comparative corporate governance across jurisdictions</li> </ul>	<ul style="list-style-type: none"> <li>• Bose et al. (2019) Ch. 3.</li> <li>• Monks &amp; Minow (2011) Ch. 1.</li> <li>• Youngdahl (2014)</li> <li>• Merker &amp; Peck (2019)</li> <li>• Weimer &amp; Pape (1999)</li> </ul>	
Module 3 <b>Modern Portfolio Theory</b>	<ul style="list-style-type: none"> <li>• Volatility, tracking error, correlation</li> <li>• Mean-variance efficiency</li> <li>• Systemic risks</li> </ul>	<ul style="list-style-type: none"> <li>• Bose et al. (2019) Ch. 10.</li> <li>• Fabozzi et al. (2002)</li> <li>• Byers et al. (2015)</li> </ul>	Problem Set 1
Module 4 <b>The Capital Asset Pricing Model</b>	<ul style="list-style-type: none"> <li>• Portfolio optimization</li> <li>• Single-index models</li> <li>• Factor decomposition of return</li> </ul>	<ul style="list-style-type: none"> <li>• Perold (2004)</li> <li>• Grover &amp; Lavin (2007)</li> <li>• Lydenberg (2016)</li> </ul>	
Module 5 <b>A Primer on Valuation Analysis</b>	<ul style="list-style-type: none"> <li>• Comparable company analysis</li> <li>• Precedent transactions analysis</li> <li>• DCF analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Bose et al. (2019) Ch. 4.</li> <li>• Holthausen et al. (2012)</li> <li>• Damodaran (2023)</li> <li>• Cornell (2021)</li> <li>• PRI (2013)</li> </ul>	Problem Set 2
Module 6 <b>ESG Integration</b>	<ul style="list-style-type: none"> <li>• Passive investing, active investing, quantitative and fundamental strategies and ESG integration</li> <li>• Risk-adjustment, factor attribution and the influence of strategy type</li> </ul>	<ul style="list-style-type: none"> <li>• Bose (2020)</li> <li>• PRI (2016)</li> <li>• Edmans (2011)</li> <li>• Mobius &amp; Ali (2021)</li> </ul>	
Module 7 <b>Sustainability &amp; Financial Return I</b>	<ul style="list-style-type: none"> <li>• Link between corporate social performance and financial performance</li> </ul>	<ul style="list-style-type: none"> <li>• Bose et al. (2019) Ch. 5.</li> <li>• Chatterji et al. (2016)</li> <li>• Busch &amp; Friede (2018)</li> <li>• Utz &amp; Wimmer (2014)</li> </ul>	Problem Set 3
Module 8 <b>Sustainability &amp; Financial Return II</b>		<ul style="list-style-type: none"> <li>• Bolton &amp; Kacperczyk (2021).</li> <li>• Pastor et al. (2022)</li> </ul>	
Midterm Exam			
Module 9 <b>Inequality &amp; Sovereign Risk</b>	<ul style="list-style-type: none"> <li>• Kuznets curve and empirical results</li> </ul>	<ul style="list-style-type: none"> <li>• Aizenman &amp; Jinjarak (2012).</li> </ul>	Investment Outline

	<ul style="list-style-type: none"> <li>• Tax base and credit spread volatility relationship</li> </ul>	<ul style="list-style-type: none"> <li>• Biglaiser &amp; McGauvran (2021)</li> </ul>	
<b>Module 10 The Principal-Agent Problem</b>	<ul style="list-style-type: none"> <li>• Examples of principal-agent problems in financial intermediation</li> <li>• Incentive misalignment and its impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Imhoff (2003)</li> <li>• Bebchuk &amp; Fried (2003)</li> <li>• Woods (2022)</li> <li>• Dyck et al. (2010)</li> </ul>	
<b>Module 11 Climate Risk</b>	<ul style="list-style-type: none"> <li>• Physical &amp; transition risk</li> <li>• Climate VaR</li> <li>• Climate scenario analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Dietz et al (2016)</li> <li>• Tokat-Acikel et al. (2021)</li> <li>• Giese et al. (2021)</li> </ul>	
<b>Module 12 Economic Growth &amp; Decentralized Credit Creation</b>	<ul style="list-style-type: none"> <li>• Link between credit and economic growth</li> <li>• Differentiation between financing of new capacity and re-financing of existing obligations</li> </ul>	<ul style="list-style-type: none"> <li>• Werner (2016)</li> <li>• Lietaer &amp; Hallsmith (2011)</li> <li>• Focardi &amp; Fabozzi (2022)</li> </ul>	
<b>Module 13 Tentative Solutions</b>	<ul style="list-style-type: none"> <li>• Impact investing</li> <li>• Community currencies</li> <li>• Place-based investing</li> </ul>	<ul style="list-style-type: none"> <li>• Vallet (2016)</li> <li>• Clarkin &amp; Cangioni (2016)</li> <li>• Cho (2017)</li> </ul>	Term Projects
Student Presentations			

## Course Policies

### *Participation and Attendance*

I expect you to come to class on time and thoroughly prepared. I will keep track of attendance and look forward to interesting, lively, and confidential discussions. If you miss an experience in class, you miss an important learning moment, and the class misses your contribution. More than one absence will affect your participation grade.

### *Late work*

Assignments not submitted on the due date noted in the course syllabus without advance notice and permission from the instructor will be graded down 1/3 of a grade for every day it is late (e.g., from a B+ to a B).]

### *Citation & Submission*

All written assignments must use standard citation format (e.g., MLA, APA, Chicago), cite sources, and be submitted to the course website (not via email).



### *Statement Restricting Artificial Intelligence Usage*

Students are not allowed to use AI generative or machine learning tools to complete deliverables for this course. In accordance with Columbia University's academic integrity policy, individuals must complete their own work and properly acknowledge the circumstances, ideas, sources, and assistance upon which that work is based.

## **School and University Policies and Resources**

### *Copyright Policy*

Please note—Due to copyright restrictions, online access to this material is limited to instructors and students currently registered for this course. Please be advised that by clicking the link to the electronic materials in this course, you have read and accept the following:

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials. Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

### *Academic Integrity*

Columbia University expects its students to act with honesty and propriety at all times and to respect the rights of others. It is fundamental University policy that academic dishonesty in any guise or personal conduct of any sort that disrupts the life of the University or denigrates or endangers members of the University community is unacceptable and will be dealt with severely. It is essential to the academic integrity and vitality of this community that individuals do their own work and properly acknowledge the circumstances, ideas, sources, and assistance upon which that work is based. Academic honesty in class assignments and exams is expected of all students at all times.

SPS holds each member of its community responsible for understanding and abiding by the SPS Academic Integrity and Community Standards posted at <https://sps.columbia.edu/students/student-support/academic-integrity-community-standards>. You are required to read these standards within the first few days of class. Ignorance of the School's policy concerning academic dishonesty shall not be a defense in any disciplinary proceedings.

### *Diversity Statement*

It is our intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that the students bring to this class be viewed as a resource, strength and benefit. It is our intent to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture.

### *Accessibility*

Columbia is committed to providing equal access to qualified students with documented disabilities. A student's disability status and reasonable accommodations are individually determined based upon disability documentation and related information gathered through the intake process. For more information regarding this service, please visit the University's Health Services website:



<https://health.columbia.edu/content/disability-services>.

#### *Class Recordings*

All or portions of the class may be recorded at the discretion of the Instructor to support your learning. At any point, the Instructor has the right to discontinue the recording if it is deemed to be obstructive to the learning process.

If the recording is posted, it is confidential and it is prohibited to share the recording outside of the class.

#### *SPS Academic Resources*

The Division of Student Affairs provides students with academic counseling and support services such as online tutoring and career coaching:

<https://sps.columbia.edu/students/student-support/student-support-resources>.

#### *Columbia University Information Technology*

[Columbia University Information Technology](#) (CUIT) provides Columbia University students, faculty and staff with central computing and communications services. Students, faculty and staff may access [University-provided and discounted software downloads](#).

#### *Columbia University Library*

[Columbia's extensive library system](#) ranks in the top five academic libraries in the nation, with many of its services and resources available online.

#### *The Writing Center*

The Writing Center provides writing support to undergraduate and graduate students through one-on-one consultations and workshops. They provide support at every stage of your writing, from brainstorming to final drafts. If you would like writing support, please visit the following site to learn about services offered and steps for scheduling an appointment. This resource is open to Columbia graduate students at no additional charge.

Visit <http://www.college.columbia.edu/core/uwp/writing-center>.

#### *Career Design Lab*

The Career Design Lab supports current students and alumni with individualized career coaching including career assessment, resume & cover letter writing, agile internship job search strategy, personal branding, interview skills, career transitions, salary negotiations, and much more. Wherever you are in your career journey, the Career Design Lab team is here to support you. Link to <https://careerdesignlab.sps.columbia.edu/>