NYU TANDON SCHOOL OF ENGINEERING

Finance & Risk Engineering

Fall 2021

FRE 6951 – Special Topics: Sustainable Investments

Saturdays, 1:30pm – 4:11pm
Rogers Hall, Rm 602, Brooklyn Campus

Instructor Information

- **Lecturer:** Bruno G. Kamdem, Ph.D.
- **Contact:** bgk8384@nyu.edu

- **Office Hours:** Saturdays (before/after class) or virtually.

Course Information

- **Prerequisite:** Graduate standing.
- **Description:**
  China recent opening of a national carbon emissions trading market is generating an unprecedented momentum for sustainable investing. The global carbon market was worth US$125 billion in 2000 and could eventually reach EUR 1.4 trillion according to Bloomberg New Energy Finance. The impact of ESG investing on asset pricing in the corporate bond market is getting more and more acute. Furthermore, large institutions such as insurance companies, pension funds, wealth management, retail investors, and sovereign wealth funds are investing significantly in ESG strategies. Corporate green bonds are becoming more and more prevalent, particularly in industries where the environment is financially tangible to firm operation. A sustainable finance economy whose contours are gradually taking shape is emerging. In this new climate economy, much wealth will be created by firms that get in front of the opportunities and equally, lost by firms that fail to see, or fall behind the challenges. Consequently, there is an urgent need to develop a graduate skills base that can serve growing employer demand for expertise in the area of sustainable investing. This course provides a foundation in sustainable investing and a detailed understanding of sustainable financing products. In addition to elucidating on how carbon markets work, the course also provides the analytical tools for appraising the effectiveness and efficiency of carbon markets as policy instruments for mitigating climate change. We will also cover the role of impact investing, sustainability-linked strategies, and the identification of SRI investment funds.
- **Learning Goals:** This course aims at the following key goals:
  1. Recognize ESG scoring and explain ESG performance in the stock market and the corporate bond market.
  2. Identify and explain SRI investment funds, green bonds, social bonds, and other sustainability-linked strategies.
  3. Implement climate risk modelling and critically explain the implications of the regulation of climate risk. Understand and explain the factors driving portfolio management with climate risk.
  4. Understand and explain the economics of carbon trading, market participants and carbon financial instruments, and the rationale for carbon pricing. Describe and critically evaluate the challenges of carbon leakage (windfall profits, illiquidity, volatility).

5. Understand and discuss the policy of Emissions Trading Schemes (ETS) in terms of market stability reserve solutions (hedging, banking, borrowing).

- **Structure:**
  Weekly in-person lectures, student presentations, expert panel discussions (through guest speakers) will constitute the core of this course. Weekly homework assignments, a project, a midterm, and a final exam will frame the course. Refer to the Course Schedule below for specific details on the course structure and expectations.

- **Materials:**
  - Required Texbooks:
    1. Principles of Sustainable Finance (D. Schoenmaker & W. Schramade, 2019).
    2. Carbon Markets: Microstructure, Pricing and Policy (G. Ibikunle & A. Gregoriou, 2018).
  - Current industry and academic papers on ESG investing, green bonds, and carbon markets.

- **Readings:**
  Selected chapters of the above core texts and current industry and academic papers on ESG investing, green bonds, and carbon markets have already been determined (see the Readings list below). Recommended readings will be downloaded on *NYU Brightspace* for your convenience. Required readings may be placed on "course reserves" at *NYU Libraries*. In addition, weekly lecture notes will be available prior to class to all students on *NYU Brightspace*.

- **Resources:**
  - Access to course materials: NYU Brightspace
  - Databases, journal articles, miscellaneous: Bern Dibner Library
  - Collection of business research resources: NYU Business Library
  - 24/7 technology assistance:
    * Tandon IT Help Desk: soehelpdesk@nyu.edu, (646) 997-3123.
    * NYU IT Service Desk: AskIT@nyu.edu, (212) 998-3333.

- **Expectations:**
  Weekly readings should be reviewed by students prior to class. Students should attend classes and come prepared to engage, participate, and ask questions on concepts they do not fully grasp from the lecture notes. All assignments are due at 11:59pm on the last day of the class week (See the Course Schedule below). All assignments should be submitted on time to the teaching assistant for full credit. It is important that you spend the necessary time working in this course to achieve the expected outcomes by the end of the term. If you face challenges at any time during the semester, please let me know. Please contact me if you expect to miss class. I am available and ready to support your success.

Performance Evaluation

- **Class Presentation:**
  Each student will be assigned to a group. The ideal group size for this class is 3 or 4 (certainly no more than 4). I strongly urge that you prepare for every class in study groups, whether or not there is a group assignment. Each group will lead a brief 10 to 15 minutes verbal discussion at the beginning of each class. The discussion will comprise a market update on one or more key financial market developments relevant to ESG investments, green bonds, or carbon markets over the prior week.

- **Group Project:**
  The group project will consist of a written and in-class presentation on a subject relevant to ESG investments, green bonds, or carbon markets. Details of the project will be shared separately in class and on *NYU Brightspace*. Students must form groups and submit a written proposal with the subject and details of their group project no later than the end of week 2. Please, refer and abide by the deadlines below:

Initial proposal submission	5%	due by the end of week 2
Revised proposal submission	5%	due by the end of week 4
Final written presentation	10%	due by the end of week 6
In-class oral presentation	10%	to be held on week 7 & week 8

Each group member must contribute equally to the project. No work for this project may be partially or wholly part of an assignment prepared for another course. In case a student is unable to form a group and/or find a subject on his/her own, he/she will be assigned to a group and/or topic. For the purpose of providing effective feedback, experts evaluations will be resorted to. Although the project will be a collective effort, grades will be allocated individually.

- **Homework Assignments, Class Attendance, and Weekly Discussions:**
  Weekly homework assignments will be posted on *NYU Brightspace*. All homework assignments should be submitted electronically by 11:59pm at the end of each class week (See the Course Schedule below) for full credit to the teaching assistant. Attendance is expected at each class meeting. If you have to miss a class meeting for family or health obligation, notify me in advance. A class roster will be taken before the start of each class. Consistent and constructive class participation may result in a student's grade being rounded up if very close to a higher letter grade once the curve is complete. Please, regularly check for new announcements on *NYU Brightspace*.

- **Final and Mid-term Exams:**
  You will have a 3 hours-window to complete the Final Exam throughout the 72 hours available dates on *NYU Brightspace*. Once started, you should finish the Final Exam within 3 hours. The Final Exam is open book but should represent your own personal work to be submitted electronically by 11:59pm on the last day of the term. The Mid-term Exam is an open book take-home exam to be completed individually and submitted electronically by 11:59pm at the end of week 5.

- **Grading:**

Homework	35%	weekly
Class Presentation	5%	weekly
Midterm Exam	15%	Saturday, October 2
Group Project	30%	week 7 & week 8
Final Exam	15%	Sunday, October 24
TOTAL	**100%**	

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\begin{aligned}
&\texttt{if grade} \geq 93\% \Leftrightarrow \texttt{4.00:A}\\
&\texttt{else if } 90\% \leq \texttt{grade} \leq 92\% \Leftrightarrow \texttt{3.67:A-}\\
&\texttt{else if } 87\% \leq \texttt{grade} \leq 89\% \Leftrightarrow \texttt{3.33:B+}\\
&\texttt{else if } 84\% \leq \texttt{grade} \leq 86\% \Leftrightarrow \texttt{3.00:B}\\
&\texttt{else if } 80\% \leq \texttt{grade} \leq 83\% \Leftrightarrow \texttt{2.67:B-}\\
&\texttt{else if } 77\% \leq \texttt{grade} \leq 79\% \Leftrightarrow \texttt{2.33:C+}\\
&\texttt{else if } 70\% \leq \texttt{grade} \leq 76\% \Leftrightarrow \texttt{2.00:C}\\
&\texttt{else F}
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Academic Misconduct

(A) **Introduction (School of Engineering Student Code of Conduct):** The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School's rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School's Policy on Academic Misconduct.

(B) **Definition:** Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to the following:

1. **Cheating:** intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
2. **Fabrication:** including but not limited to, falsifying experimental data and/or citations.
3. **Plagiarism:** intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
4. **Unauthorized collaboration:** working together on work that was meant to be your own.
5. **Duplicating work:** : presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.
6. **Forgery:** altering any academic document, including, but not limited to academic records, admissions materials, or medical excuses.

Inclusion Statement

The NYU Tandon School values an inclusive and equitable environment for all our students. I hope to foster a sense of community in this class and consider it a place where individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations, and abilities will be treated with respect. It is my intent that all students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. If this standard is not being upheld, please feel free to speak with me.

Unexpected Events

You may encounter unforeseen family, health, or other issues during the semester which create circumstances that prevent you from meeting course requirements. In this case, please raise the issue(s) directly with **Deanna Rayment** in the Office of Student Affairs at (646) 997-3046 or deanna.rayment@nyu.edu before requesting any accommodation from the instructor.

Disability Disclosure Statement

Academic accommodations are available for students with disabilities. Please contact the **Moses Center for Students with Disabilities (CSD)** at (212) 998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at `www.nyu.edu/csd`. The Moses Center is located at 726 Broadway on the 2nd floor.

Readings

Week & Topic	Required Readings	Recommended Readings
Week 1 **ESG Investing**	Principles of Sustainable Finance 1.3. The role of the financial system 1.4. Three stages of sustainable finance 1.5. Challenges to integration of sustainability into finance	•"Report on US Sustainable and Impact Investing Trends 2020."-US SIF (2020)
Week 2 **Climate Risk**	Principles of Sustainable Finance 1.2. Sustainability challenges	•"Economic Modeling of Climate Risks." -Theo Le Guenedal (2019)
Week 3 **Sustainable Financing Products 1**	Principles of Sustainable Finance 1.1. Why does sustainability matter? 9.1. Basics of bonds 9.2. Why does sustainability matter to bonds?	•"Corporate Green Bonds." -Caroline Flammer (2021) •"ESG Investing and Fixed Income: It's Time to Cross the Rubicon." -Slimane et al (2019) •"ESG Investing in Corporate Bonds: Mind the Gap."-Slimane and Le Guenedal (2019)
Week 4 **Sustainable Financing Products 2**	Principles of Sustainable Finance 9.3. Integrating sustainability into bond investing 9.4. Green bonds and social bonds	•"ESG Investing in Corporate Bonds: Mind the Gap."-Slimane et al (2019) •"How ESG Investing Has Impacted the Asset: Pricing in the Equity Market." -Bennani et al (2018)
Week 5 **Carbon Markets 1**	Carbon Markets: Microstructure, Pricing and Policy Chapter 2: Emissions Trading in Europe: Background and Policy Chapter 4: The Price Impact of Block Emissions Permit Trades	•"China Opened a National Carbon Market. Here's Why it Matters." -Chris Buckley (2021) •"Applying Blockchain to the Australian Carbon Market."-Hartmann and Thomas (2020) •"Linking Asian Carbon Markets: Opportunities and Barriers." -Heggelund et al (2021)
Week 6 **Carbon Markets 2**	Carbon Markets: Microstructure, Pricing and Policy Chapter 6: Liquidity and Market Efficiency in Carbon Markets	•"The Tail Dependence of the Carbon Markets: The Implication of Portfolio Management." -Zhang and Zhang (2020) •"Application of Blockchain in Carbon Trading", Pana et al (2021) •"Tradeable Carbon Permit Auctions: How and Why to Auction not Grandfather." -Cramton and Kerr (2002)
Week 7 **Impact Investing 1**	Principles of Sustainable Finance 8.2. Why does sustainability matter to equities? 8.3. Integrating sustainability into equity investing	•"The Alpha and Beta of ESG Investing." -Thierry Roncalli (2019) •Exchanges at Goldman Sachs (Podcast): "How Companies Are Deploying Decarbonization Strategies." July 13, 2021 •"The Green Bond Market in Hong Kong: Developing a Robust Ecosystem for Sustainable Growth." -Hong Kong Academy of Finance (2020)
Week 8 **Impact Investing 2**	Principles of Sustainable Finance 8.4. Impact investing	•"Harnessing Blockchain for Sustainable Development: Prospects and Challenges."-Hanna Halaburda (2021) •Exchanges at Goldman Sachs (Podcast): "Sustainable ESG Investing: Turning Promises into Performance." July 14, 2020

Course Schedule

SESSIONS & TOPICS	LECTURES	ASSIGNMENTS
Week 1 (Thu, Sep 2 – Wed, Sep 8) **1.Introduction to sustainable finance** **2.ESG scoring** **3.Performance in the stock market** **4.Performance in the corporate bond market**	**ESG Investing** Sat, Sep 4 (1:30pm – 4:11pm)	1.Homework 1 2.Group project (proposal)
Week 2 (Thu, Sep 9 – Wed, Sep 15) **1.Introduction to climate risk** **2.Climate risk modeling** **3.Regulation of climate risk** **4.Portfolio management with climate risk**	**Climate Risk** **Group in-class presentation** **Guest speaker 1** Sat, Sep 11 (1:30pm – 4:11pm)	1.Homework 2 2.Group project (proposal)
Week 3 (Thu, Sep 16 – Wed, Sep 22) **1.SRI Investment funds** **2.Green bonds**	**Sustainable Financing Products 1** **Group in-class presentation** **Guest speaker 2** Sat, Sep 18 (1:30pm – 4:11pm)	1.Homework 3 2.Group project (revised proposal)
Week 4 (Thu, Sep 23 – Wed, Sep 29) **1.Social bonds** **2.Other sustainability-linked strategies**	**Sustainable Financing Products 2** **Group in-class presentation** **Guest speaker 3** Sat, Sep 25 (1:30pm – 4:11pm)	1.Homework 4 3.Group project (revised proposal)
Week 5 (Thu, Sep 30 – Wed, Oct 6) **1.Economics of carbon markets** **2.Introduction to carbon trading** **3.Understanding carbon price drivers**	**Carbon Markets 1** **Group in-class presentation** **Guest speaker 4** Sat, Oct 2 (1:30pm – 4:11pm)	**1.Miterm Exam (Sat, Oct 2)** 2.Homework 5 3.Group project (final writing)
Week 6 (Thu, Oct 7 – Wed, Oct 13) **1.Carbon leakage, illiquidity, and volatility** **2.ETS (hedging, banking, borrowing)** **3.New market mechanisms**	**Carbon Markets 2** **Group in-class presentation** **Guest speaker 5** Sat, Oct 9 (1:30pm – 4:11pm)	1.Homework 6 2.Group project (final writing)
Week 7 (Thu, Oct 14 – Wed, Oct 20) **1.Definition (Impact Investing)** **2.Sustainable development goals (SDG)**	**Impact Investing 1** **Group project in-class oral presentation 1** Sat, Oct 16 (1:30pm – 4:11pm)	1.Homework 7
Week 8 (Thu, Oct 21 – Tue, Oct 26) **1.Voting policy, shareholder activism** **2.The challenge of reporting**	**Impact Investing 2** **Final Exam Review** **Group project in-class oral presentation 2** Sat, Oct 23 (1:30pm – 4:11pm)	**1.Final Exam (Sun, Oct 24)**