Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+
If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to Data Transformation Status for more information.

Expected Implementation in Academic Year	AY2025-2026
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1
Course Author * Faculty proposing/revising the course	Celine Schulze
Course Author Email	CS-CELINE.SCHULZE@ntu.edu.sg
Course Title	Carbon Markets: Towards a Low-Carbon Future
Course Code	MS6007
Academic Units	2
Contact Hours	28
Research Experience Components	

Course Requisites (if applicable)

Pre-requisites	
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

"Carbon Markets: Towards a Low-Carbon Future" aims to provide you (as a student) with a solid understanding of the fundamentals of carbon markets, as a market-based approach to cap carbon emissions, and therefore mitigate climate change. By the end of the course, you will have mastered how carbon markets function (including the different types of carbon credits and their pricing mechanism), and you will have built some precious real-life skills (teamwork; and public speaking in front of peers). Learning about the various options available to companies to reduce their carbon footprint and crafting your own opinion will be very valuable for your future career.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Evaluate Current Impact of Carbon Credits by industry and/or company.
ILO 2	Critique Regulatory Frameworks of Carbon Credits by Region.
ILO 3	Assess the Origins and Current Trends of Carbon Credits.
ILO 4	Identify and Appraise Carbon Credits Projects.

Course Content

Mechanism of carbon markets

Carbon pricing

Tools for climate action per industry and region (US, APAC, EU)

Reading and References (if applicable)

- EDB, GIC, Mc Kinsey & Company (2021). The development of robust and transparent carbon markets could help decarbonise the global economy | Singapore EDB
- UNEP (2021). The role of market mechanisms in bridging emissions gap. https://wedocs.unep.org/bitstream/handle/20.500.11822/36998/EGR21_CH7.pdf
- UNDP (2022). What are carbon markets and why are they important? https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important
- VCMI (Voluntary Carbon Markets Integrity Initiative). (2023). Claims Code of Practice. https://vcmintegrity.org/wp-content/uploads/2023/06/VCMI-Claims-Code-of-Practice.pdf
- European Parliament (2023). Review of the EU ETS. https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698890/EPRS_BRI%282022%29698890_EN.pdf
- Berkeley College of Natural Resources. California-China Climate Institute (2021). China launches world's largest carbon market. https://ccci.berkeley.edu/news/2021/07/china-launches-world-s-largest-carbon-market
- European Commission (2023). EU ETS Handbook. https://climate.ec.europa.eu/system/files/2017-03/ets_handbook_en.pdf
- Cambridge Elements, Betz, R., Michaelowa, A., Castro, P. (2022). Chapter 4 of The Carbon Market Challenge. The Carbon Market Challenge (cambridge.org)
  DOI: https://doi.org/10.1017/9781009216500
- ArcelorMittal (2024). Climate Action Report. https://corporate.arcelormittal.com/sustainability/climate-action-reports
- Kleinman Center for Energy Policy. Sun, A. (2022). East meets West. Linking the China and EU ETS's. https://kleinmanenergy.upenn.edu/wp-content/uploads/2022/06/KCEP-Digest46-East-Meets-West.pdf
- United Nations. Chichilnisky, G. (2023). Financial Innovations and Carbon Markets. https://www.un.org/en/chronicle/article/financial-innovations-and-carbon-markets
- European Commission (2024). Blockchain for climate action. https://digital-strategy.ec.europa.eu/en/policies/blockchain-climate-action
- UNEP (2023). Chapter1,2,3,6,7 of Climate risks in the oil and gas sector. Oil-and-Gas-Sector-Risks.pdf (unepfi.org)
- McKinsey & Company, Blaufelder, C., Levy, C., Mannion, P., Pinner, D. (2021). A blueprint for scaling voluntary carbon markets to meet the climate challenge. A blueprint for scaling voluntary carbon markets to meet the climate challenge (mckinsey.com)
- KPMG Singapore (2024). How can we scale a trusted voluntary carbon market? How can we scale a trusted voluntary carbon market? (kpmg.com)

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	1. Towards net-zero (the Paris Agreement; UN Climate Framework; COP29 Policy Outcomes); 2. The role of carbon markets in climate action; 3. From the origins of the global carbon market to the current situation; 4. Carbon market mechanism; 5. The carbon markets stakeholders; 6. Course briefing	2, 3	EDB, GIC, Mc Kinsey & Company (2021). The development of robust and transparent carbon markets could help decarbonise the global economy | Singapore EDB UNDP (2022). What are carbon markets and why are they important? https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important	In-person	Lecture (3 hrs): Students may share any questions they might have on the origins and mechanisms of carbon markets.

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
2	1. The Voluntary Carbon Markets; 2. In-depth study of a carbon project; 3. MRV, Co-benefits, baseline standards and integrity of emissions reductions; 4. The three types of carbon credits: avoidance, reduction, removal.	2, 3, 4	VCMI (Voluntary Carbon Markets Integrity Initiative). (2023). Claims Code of Practice. https://vcmintegrity.org/wp-content/uploads/2023/06/VCMI-Claims-Code-of-Practice.pdf	In-person	Lecture (1 hr) + Tutorial (2 hrs): Consisting in class group discussion around a specific carbon project. Gaining a comprehensive understanding of the carbon credit project mechanisms. concepts. Shaping and expressing one's own opinion.

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
3	1. The compliance market; 2. The role and mechanism of Emissions Trading Systems (EU ETS, RGGI, China ETS); 3. Discussion on the opportunities and challenges that offer compliance carbon markets.	1, 2	European Parliament (2023). Review of the EU ETS. https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698890/EPRS_BRI%282022%29698890_EN.pdf Berkeley College of Natural Resources. California-China Climate Institute (2021). China launches world's largest carbon market. https://ccci.berkeley.edu/news/2021/07/china-launches-world-s-largest-carbon-market European Commission (2023). EU ETS Handbook. https://climate.ec.europa.eu/system/files/2017-03/ets_handbook_en.pdf Cambridge Elements, Betz, R., Michaelowa, A., Castro, P. (2022). Chapter 4 of The Carbon Market Challenge. The Carbon Market Challenge (cambridge.org) DOI: https://doi.org/10.1017/9781009216500	In-person	Lecture (3 hrs): Class interaction on the efficiency of national and regional compliance markets.
4	Deep dive on specific compliance market mechanism and climate efficiency	1, 2, 3	N/A	In-person	Lecture (1 hr) + Tutorial (2 hrs): Homework presentation in groups

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
5	Current gaps in achieving our collective goal: 1. Tech; 2. International cooperation; 3. Carbon markets and plastic credits, biodiversity credits, nutrients credits, SDG, CBAM, leakage, competitiveness	1, 2, 3	ArcelorMittal (2024). Climate Action Report. https://corporate.arcelormittal.com/sustainability/climate-action-reports Kleinman Center for Energy Policy. Sun, A. (2022). East meets West. Linking the China and EU ETS's. https://kleinmanenergy.upenn.edu/wp-content/uploads/2022/06/KCEP-Digest46-East-Meets-West.pdf	In-person	Lecture (3 hrs): Recent, real-life case studies
6	1. Continuous Assessment 1 (CA1) - Individual Mid-Term Quiz: Critical analysis of published articles; 2. Lecture on industry challenges	1, 2, 3, 4	N/A	In-person	Continuous Assessment 1 (CA1) - Individual Mid-Term Quiz (2 hrs) + Lecture (1 hr)
7	Climate finance: carbon pricing, trading & risk assessment	1, 2, 3, 4	United Nations. Chichilnisky, G. (2023). Financial Innovations and Carbon Markets. https://www.un.org/en/chronicle/article/financial-innovations-and-carbon-markets European Commission (2024). Blockchain for climate action. https://digital-strategy.ec.europa.eu/en/policies/blockchain-climate-action	In-person	Lecture (1 hr) + Tutorial (2 hrs): Class discussion around case studies

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
8	Towards a sustainable future: cost, opportunities, risk, expectations for the carbon market industry; Submission of Continuous Assessment 3 (CA3) - Individual Written Research Report	1, 2, 3, 4	UNEP (2023). Chapter1,2,3,6,7 of Climate risks in the oil and gas sector. Oil-and-Gas-Sector-Risks.pdf (unepfi.org) McKinsey & Company, Blaufelder, C., Levy, C., Mannion, P., Pinner, D. (2021). A blueprint for scaling voluntary carbon markets to meet the climate challenge. A blueprint for scaling voluntary carbon markets to meet the climate challenge (mckinsey.com) KPMG Singapore (2024). How can we scale a trusted voluntary carbon market? How can we scale a trusted voluntary carbon market? (kpmg.com)	In-person	Lecture (1 hr) + Tutorial (2 hrs): Team work, opportunity to discuss the challenges faced while preparing the final exam's group delivery; Submission of Continuous Assessment 3 (CA3) - Individual Written Research Report

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
9	Continuous Assessment 2 (CA2) - Group Presentation; Feedback for Continuous Assessment 3 (CA3) - Individual Written Research Report	1, 2, 3, 4	N/A	In-person	Continuous Assessment 2 (CA2) - Group Presentation (4 hrs): Verbal presentation of corporate or project analysis with feedback from and interaction with the instructor; Feedback for Continuous Assessment 3 (CA3) - Individual Written Research Report

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Case studies	This will engage you in real-life scenarios and seamless learning of this course content. Reading and reacting to cutting-edge situations that are currently demanding the attention of private companies and public sector organisations, will keep you up to date with the latest carbon market developments and innovation for climate action, which will be very valuable for your future career.
Group work on published carbon credit projects	This will provide the opportunity for you to articulate the recently learned content, learn from other students, and develop skills that are highly valued by employers (such as problem solving, leadership, critical thinking, time management, capacity to state clearly one's opinion while being respectful of others' suggested solutions).

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Test/Quiz(Continuous Assessment 1 (CA1) - Individual Mid-Term Quiz)	1, 2, 3, 4		30	Individual	Analytic	Relational
2	Continuous Assessment (CA): Presentation(b. Continuous Assessment 2 (CA2) - Group Presentation – 30% Team points + 10% Individual Peer Review points)	1, 4		40	Team	Holistic	Extended Abstract
3	Continuous Assessment (CA): Report/Case study(Continuous Assessment 3 (CA3) - Individual Written Research Report)	1, 3, 4		30	Individual	Analytic	Extended Abstract

Description of Assessment Components (if applicable)

Continuous Assessment 1 (CA1) - Individual Mid-Term Quiz
You will have to complete 1 closed-book written test (30 MCQs). This test will last 2 hours. The test will be held during one of the scheduled lecture hours.

Continuous Assessment 2 (CA2) - Group Presentation - 30% Team points + 10% Individual Peer Review points
You will have to complete a group assignment which consists of a team verbal presentation. Each team is composed of 4-5 students. Each team will have 10 minutes to present its analysis of a real-life case study chosen by the team, including interaction with the lecturer. The assessment will be held during one of the scheduled lecture hours.

Continuous Assessment 3 (CA3) - Individual Written Research Report
You will deliver an individual research report based on one industry (e.g., energy; cement, steel) or carbon project of your choice. An assignment brief on the expected deliverables and structure of the written essay will be provided to students.

Formative Feedback

Continuous Assessment 1 (CA1) - Individual Mid-Term Quiz
The correct answers will also be shared and explained to the class during contact hours.

Continuous Assessment 2 (CA2) - Group Presentation - 30% Team points + 10% Individual Peer Review points
You will receive verbal feedback after your presentation.

Continuous Assessment 3 (CA3) - Individual Written Research Report
Upon request, you will receive customized written feedback.

Students are encouraged to attend the instructor's consultation hours to clarify any doubts in the lecture and discuss any issues, if needed. You may also approach the instructor during any class for questions, feedback and extra explanation.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Collaboration	Basic
Sense Making	Intermediate
Information Literacy	Intermediate
Critical Thinking	Basic
Systems Thinking	Intermediate

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

You are expected to complete all assigned readings, activities, assignments, attend all classes punctually and complete all scheduled assignments by due dates. You are expected to take responsibility to follow up with assignments and course related announcements. You are expected to participate in all project critiques, class discussions and activities.

Policy (Absenteeism)

In-class activities make up a significant portion of your course grade. Absence from class without a valid reason will affect your participation grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for in-class activities.

Policy (Others, if applicable)

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