Hong Kong University of Science and Technology Department of Civil and Environmental Engineering

Rubric Title of course Instructor Teaching Assistants	CIVL 4450 (Spring 22-23) Carbon footprint analysis and reduction ZHOU, Wenwen TBA
Co-Requisite Credit	CIVL 4450 3
Text book	Textbook: Shelley Zhou (2020) Carbon Management for a Sustainable Environment https://www.springer.com/gp/book/9783030350611
Reference book(s):	1. Climate Change Information Kit 2. Kyoto Protocol 3. Paris Agreement http://unfccc.int/paris_agreement/items/9485.php 4. IPCC AR5 Summary for Policy Makers - Climate Change 2013: The Physical Science Basics 5. IPCC Special Report 2018: Global Warming 1.5C 6. ISO 14064: International Standard on Greenhouse Gases 7. GHG Protocol: The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard. 8. HKEPD and EMSD Guidelines: Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, residential or Institutional Purposes) in Hong Kong 2010 9. PAS 2050:2008: Specification for the Assessment of the Life Cycle Greenhouse Gas Emissions of Goods and Services 10. WWF (2008) A Comparison of Carbon Offset Standards 11. World Bank Group (2018) State and Trends of Carbon Pricing 2018 12. Clean Development Mechanism in China: http://cdm.ccchina.gov.cn/english 13. BEAM Plus: Hong Kong Building Environmental Assessment Methods 14. USEPA: Solid Waste Management and Greenhouse Gas, 2006
Learning Objectives	On successful completion of this course, students are expected to be able to: 1) understand basic concepts of climate change, greenhouse gas (GHG) emission and carbon management; 2) master the skill of carbon auditing; 3) familiar with a typical carbon management project in a real business environment; 4) understand the role of carbon consultant and the services and products offered; and 5) develop the competence of facing clients in future job & career development.
Topics	1) Climate change basics: i) Greenhouse Effect and GHGs

	ii) Anthropogenic Evidences iii) Climate Change Consequences iv) The Climate Change Convention v) Carbon Footprint Concept 2) Carbon footprint measurement: i) Define the boundaries ii) Quantifying emission iii) baseline and base year iv) Reporting tools v) Product carbon footprint vi) Product carbon footprint of construction materials 3) Carbon management: i) Carbon management concepts ii) Carbon trading and offsetting iii) Net zero and total carbon management cases 4) Carbon reduction solutions i) Low carbon management in green buildings ii) Carbon reduction solutions: Waste; Transport
Computer usage	None
Lab Tests	None
Relationships to the program objectives	***1. Provide professional skills in design, construction and management*** This course provides fundamental knowledge of climate change, carbon auditing and reduction solutions which aims to prepare the students with the required skills as a carbon management consultant. ***2. Train students with good communication skills*** The course requires students to form a company in a group project and present their carbon auditing results with proposed carbon management solutions for "clients". ***3. Stimulate self-learning and innovative problem-solving skills*** The course requires students to identify different scopes and find suitable emission factors from online resources to complete a mini carbon auditing assignment. ***4.* Expose students to real projects and cutting-edge research** This course will introduce several real carbon auditing and management projects delivered in lecturer's career life.
Relationships to program outcomes	***2. Understand fundamental principles of engineering science*** This course conveys fundamental knowledge in climate change, carbon

	auditing and carbon management. Students will be able to identify different carbon management business cases and propose solutions for different scenarios. ***5. Formulate problems and propose feasible solutions*** Students will complete a mini carbon auditing project by finding the suitable factors and solutions from online resources. ***6.* Obtain in-depth knowledge in at least on specialized area** Students will cover the basis of climate change and learn in-depth knowledge of carbon auditing and management, which is the essential skill to work as a carbon consultant. ***9. Communicate ideas effectively and able to work in teams*** Students will collaborate with their group-mates to form a company and write carbon management reports. At the end of the semester, they need to make a short presentation on their proposal. ***10. Recognize the need of lifelong learning*** Students will realize the emerging importance of climate change issues and the urging need of carbon auditing, management and reduction.
Assessment of Outcomes	1. Assignments and mid-term exam will be given to assess students' understanding of the subject during the learning process. (Outcomes 2, 5 and 6) 2. At the end of semester, a presentation and report will be graded to assess students' ability in a carbon management group project. (Outcomes 9) 3. Grade: □ Participation 10% □ Individual Assignment 10% □ Group Project Paper 20% □ Group Presentation 10% □ Final Exam 50%