FUNDAMENTALS OF CLIMATE CHANGE AND NATURAL DISASTERS (3 ECTS)

Fall semester, 2021-2022

Cooordinator	College of Environment and Natural Resources
Credits	3 ECTS
Lecturers	**Le Anh Tuan**
Level	Master
Host institution	Can Tho University
Course duration	30 hours in-class, 65 hours of self-study (total 95)

Summary

The module equips students with the basics of climate, natural disasters and climate change, and scenarios of change in climate change research., Impacts of natural disasters and climate change aspects of life, production, identification of impact mitigation and adaptation measures, and disaster management.

Target student audiences

Master in Climate Change & Delta Management

Prerequisites

Required courses (or equivalents): NO

Aims and objectives

The main course objective is to equip students with knowledge of:

- Identify climatic phenomena and to explain on the basis of science.
- Identify Global Climate Change and Sea Level Rise and Climate Change and Sea Level Rise in Vietnam & Mekong Delta.
- Identify Impacts of Climate Change and Sea Level Rise globally, Vietnam & Mekong Delta.
- Effective solutions to mitigate and adapt to climate change and sea level rise, examples in Vietnam and the Mekong Delta

Authentic Tasks:

Desired learning outcomes:

By the end of the course, successful students will:

Knowledge	• The basics of climate, natural disasters and climate change, change scenarios in climate change research. • Impacts of natural disasters and climate change. impact on life, rural production, urban development, ecological and socio-economic

	environment, impact mitigation and adaptation measures, and disaster management.
Comprehensive	• Understand the basics of climate change, natural disasters and climate change, and change scenarios in climate change research.
Application	• Impact minimization and adaptation measures.
Analysis	• Analysis of impacts of natural disasters and climate change on livelihoods, rural production, urban development, ecological environment and socio-economic.
Synthesis	• Coursework is part of the Disaster Management system

Overview of sessions and teaching methods

The course will make most of interactive and self-reflective methods of teaching and learning and, where possible, avoid standing lectures and presentations.

Learning methods

- Video presentations
- Group work, write articles / essays
- Project Based Learning
- Literature review
- Stakeholder analysis / customer consultation

Literature

- Compulsory

[1] Nguyen Duc Ngu (2008). Climate Change. Science and Technics Publishing House, Hanoi

[2] Joel B. Smith, Richard J.T. Klein and Saleemul Huq (2003). Climate change, adaptive capacity and development, Imperial College Press, London

[3] Thomas E. Downing, Alexander J. Olsthoorn, Richard S.J. Tol (1999). Climate, change and risk. Taylor & Francis e-Library, London and New York.

[4] Lê Quang Tri, Le Anh Tuan, Nguyen Hieu Trung, Đang Kieu Nhan, Van Pham Dang Tri, Nguyen Thanh Binh, Dao Trong Tu, Lam Thi Thu Suu, Nguy Thi Khanh, Dinh Diep Anh Tuan (2015): Managing the Risks from Climate Extremes at the Local Level. In: Viet Nam Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Tran Thuc, Koos Neefjes, Ta Thi Thanh Huong, Nguyen Van Thang, Mai Trong Nhuan, Le Quang Tri, Lê Đinh Thanh, Huynh Thi Lan Huong, Vo Thanh Son, Nguyen Thi Hien Thuan, Lê Nguyen Tuong], Viet Nam Publishing House of Natural Resources, Environment and Cartography, HaNoi, Vietnam, pp. 189-226, ISBN 978-604-904-623-0.

[5] TTK & SEA START RC, 2009. Water and Climate Change in the Lower Mekong Basin: Diagnosis & recommendations for adaptation, Water and Development Research Group, Helsinky University of Technology (TTK), and Southeast Asia START Regional Center (SEA START RC), Chulalongkorn University, Water & Developmement Publications, Helsinky University of Technology, Espoo, Finland

- Literature

Technical reports, articles and articles on websites of Universities, Research Institutes, and Journal of Specialized Science.

Course workload

The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload (hours)
In-class activities (25 hours of theory and 5 hours of group presentations)			
Lectures	Understand theories, concepts, methodologies and tools	Join the class	24 hours/ 6 topics
Moderated in-class discussions	Discuss each case of the lesson	Class participation and preparedness for discussions	1
In-class assignments, homework assignment	Plenary discussion	Class participation and preparedness for assignments	
Reading and discussion of assigned papers for preparation for lectures		Class participation, creative and active contribution to discussion	
Presentation group	Depending on the number of academies and topics, it will be classified into appropriate groups	Quality group exercises and individual presentations	5
Independent work (65 hours)			
Working group: - Contribution to group case studies projects - Contribute to the preparation and delivery of personalized presentations - Contribute to web application		Quality group exercises and individual presentations	25 hours
Course group exercises			
Self Study		Self study and reading of learning materials	40 hours
Total			***105***

Course outline

Week	Topics
Week 1	Topic 1: The Basics of Climate Science
Week 2	Topic 2. Disaster Phenomena
Week 3	Topic 3. Climate Change and Sea Level Rise
Week 4	Topic 4. Impacts of Climate Change and Sea Level Rise
Week 5	Topic 5. Responding to Climate Change
Week 6	Topic 6. Disaster Risk Management
Week 7	Group presentations
Week 8	Final examination

Course Schedule

Topic 1: Climate Science Foundation	
Learning objectives	Equip climate science background, climate system concepts and related weather elements
Learning outcomes	Knowledge and Skills to identify climatic phenomena and to explain on the basis of science
Student deliverables	Exercise: Questions & Answers and Plenary Discussion in Class
Topic materials	Lesson [1] Nguyen Duc Ngu (2008). Climate Change. Science and Technics Publishing House, Hanoi [2] Joel B. Smith, Richard J.T. Klein and Saleemul Huq (2003). Climate change, adaptive capacity and development, Imperial College Press, London [3] Thomas E. Downing, Alexander J. Olsthoorn, Richard S.J. Tol (1999). Climate, change and risk. Taylor & Francis e-Library, London and New York. • Video: https://www.youtube.com/watch?v=N3EqcUNdIl8
Outline	1.1. Definitions 1.2. Earth Climate System 1.3. Major Meteorological Factors 1.4. Greenhouse effect 1.5. Weather Observation and Forecasting
Topic 2. Natural Disaster Phenomena	
Learning objectives	Understand general concepts of natural disasters on earth and feature some common disaster images.
Learning outcomes	Knowledge and Skills to identify global disaster phenomena and explain the causes - characteristics of a common type of natural disaster in Vietnam
Student deliverables	Exercise: Questions & Answers and Plenary Discussion in Class

Topic materials	Lesson [3] Thomas E. Downing, Alexander J. Olsthoorn, Richard S.J. Tol (1999). Climate, change and risk. Taylor & Francis e-Library, London and New York. • Video: https://www.youtube.com/watch?v=oRiLLd2hX0E
Outline	2.1. Overview of Disaster 2.2. Thunderstorms, Tropical Depressions, Storms 2.3. Floods and Droughts 2.4. Landslides and subsidence
Topic 3. Climate Change and Sea Level Rise	
Learning objectives	Climate Change Awareness, Global Climate Change Evidence, Climate Change and Sea Level Rise scenarios, emphasis on Viet Nam and Mekong Delta
Learning outcomes	Knowledge and Skills to Identify Global Climate Change and Sea Level Rise and Climate Change and Sea Level Rise in Vietnam & Mekong Delta.
Student deliverables	Exercise: Questions & Answers and Plenary Discussion in Class
Topic materials	Lesson 1] Nguyen Duc Ngu (2008). Climate Change. Science and Technics Publishing House, Hanoi [2] Joel B. Smith, Richard J.T. Klein and Saleemul Huq (2003). Climate change, adaptive capacity and development, Imperial College Press, London [3] Thomas E. Downing, Alexander J. Olsthoorn, Richard S.J. Tol (1999). Climate, change and risk. Taylor & Francis e-Library, London and New York. • Video: https://www.youtube.com/watch?v=G4H1N_yXBiA
Outline	3.1. Fundamental Concept 3.2. Evidence of climate change and sea level rise 3.3. Scenario on climate change and sea level rise 3.4. Climate Change in Vietnam and the Mekong Delta 3.5. Current Studies
Topic 4. Impacts of Climate Change and Sea Level Rise	
Learning objectives	Understand the effects of climate change and rising water in different key sectors and industries.
Learning outcomes	Knowledge and Skills to Identify Impacts of Climate Change and Sea Level Rise globally, Vietnam & Mekong Delta.
Student deliverables	Exercise: Questions & Answers and Plenary Discussion in Class

Topic materials	Lesson [4] Lê Quang Tri, Le Anh Tuan, Nguyen Hieu Trung, Đang Kieu Nhan, Van Pham Dang Tri, Nguyen Thanh Binh, Dao Trong Tu, Lam Thi Thu Suu, Ngụy Thi Khanh, Dinh Diep Anh Tuan (2015): Managing the Risks from Climate Extremes at the Local Level. In: Viet Nam Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Tran Thuc, Koos Neefjes, Ta Thi Thanh Huong, Nguyen Van Thang, Mai Trong Nhuan, Le Quang Tri, Lê Đinh Thanh, Huynh Thi Lan Huong, Vo Thanh Son, Nguyen Thi Hien Thuan, Lê Nguyen Tuong], Viet Nam Publishing House of Natural Resources, Environment and Cartography, HaNoi, Vietnam, pp. 189-226, ISBN 978-604-904-623-0. [5] TTK & SEA START RC, 2009. Water and Climate Change in the Lower Mekong Basin: Diagnosis & recommendations for adaptation, Water and Development Research Group, Helsinky University of Technology (TTK), and Southeast Asia START Regional Center (SEA START RC), Chulalongkorn University, Water & Developmement Publications, Helsinky University of Technology, Espoo, Finland • Video: https://www.youtube.com/watch?v=lhkgmKXOM1A
Outline	4.1. Concept 4.2. Climate change impacts - Sea level rise to the ecosystem 4.3. Climate Change Impacts - Sea level rise to humans 4.4. Climate Change Impacts - Sea level rise in production 4.5. Climate Change Impacts - Sea level rise in infrastructure 4.6. Follow-up studies
Topic 5. Responding to Climate Change	
Learning objectives	Introduction of effective mitigation measures to mitigate and adapt to climate change and sea level rise, examples in Vietnam and the Mekong Delta.
Learning outcomes	Knowledge and Skills to find effective solutions to mitigate and adapt to climate change and sea level rise, examples in Vietnam and the Mekong Delta.
Student deliverables	Exercise: Questions & Answers and Plenary Discussion in Class
Topic materials	Lesson [4] Lê Quang Tri, Le Anh Tuan, Nguyen Hieu Trung, Đang Kieu Nhan, Van Pham Dang Tri, Nguyen Thanh Binh, Dao Trong Tu, Lam Thi Thu Suu, Ngụy Thi Khanh, Dinh Diep Anh Tuan (2015): Managing the Risks from Climate Extremes at the Local Level. In: Viet Nam Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Tran Thuc, Koos Neefjes, Ta Thi Thanh Huong, Nguyen Van Thang, Mai Trong Nhuan, Le Quang Tri, Lê Đinh Thanh, Huynh Thi Lan Huong, Vo Thanh Son, Nguyen Thi Hien Thuan, Lê Nguyen Tuong], Viet Nam Publishing House of Natural Resources, Environment

	and Cartography, HaNoi, Vietnam, pp. 189-226, ISBN 978-604-904-623-0. [5] TTK & SEA START RC, 2009. Water and Climate Change in the Lower Mekong Basin: Diagnosis & recommendations for adaptation, Water and Development Research Group, Helsinky University of Technology (TTK), and Southeast Asia START Regional Center (SEA START RC), Chulalongkorn University, Water & Developmement Publications, Helsinky University of Technology, Espoo, Finland • Video: https://www.youtube.com/watch?v=FO46sPwm4xk&t=67s
Outline	5.1. Concepts 5.2. Climate Change Mitigation and Adaptation 5.3. The approach 5.4. Some Experience
Topic 6. Disaster Risk Management	
Learning objectives	Knowledge of natural disaster management at the government and community level, following 3 sections before, during and after a disaster.
Learning outcomes	Knowledge and skills to implement effective disaster management solutions and obstacles under Vietnamese conditions.
Student deliverables	Exercise: Questions & Answers and Plenary Discussion in Class
Topic materials	Lesson [4] Lê Quang Tri, Le Anh Tuan, Nguyen Hieu Trung, Đang Kieu Nhan, Van Pham Dang Tri, Nguyen Thanh Binh, Dao Trong Tu, Lam Thi Thu Suu, Ngụy Thi Khanh, Dinh Diep Anh Tuan (2015): Managing the Risks from Climate Extremes at the Local Level. In: Viet Nam Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Tran Thuc, Koos Neefjes, Ta Thi Thanh Huong, Nguyen Van Thang, Mai Trong Nhuan, Le Quang Tri, Lê Đinh Thanh, Huynh Thi Lan Huong, Vo Thanh Son, Nguyen Thi Hien Thuan, Lê Nguyen Tuong], Viet Nam Publishing House of Natural Resources, Environment and Cartography, HaNoi, Vietnam, pp. 189-226, ISBN 978-604-904-623-0. • Video: https://www.youtube.com/watch?v=7YmHvh99kUQ
Outline	6.1. Concept 6.2. Human and Economic Risks from Natural Disasters 6.3. Natural Disaster Risk Management 6.4. Some Disaster Prevention Experiences

Course Assignments

Course assignments will constitute a multi-part project:

• Assignment #1 -(in-class) - Questions & Answers and Plenary discussion in class according to each situation

• Assignment #2 - Prepare on the topic of Natural disasters and climate change in each area

• Assignment #3 - Presenting individuals / groups on the topic of Natural Disaster and Climate Change in each area

Grading

The students' performance will be based on the following:

Assessment	• Progress assessment (10%): attend class and discuss plenary • Group report (30%): Participants will be divided into groups of 4-5 students and choose 1 topic and complete a group project report according to specific requirements of each topic. • Final examination (60%): Multiple choice quiz
Evaluation	A (8,5 – 10) B (7,0 – 8,4) C (5,5 - 6,9) D (4,0 – 5,4)