### II.2.14 CLIMATE CHANGE

**A. Course description:**

**1. Credit points: 3 ECTS**

**2. Time commitment**

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| --- | --- | --- | --- | --- | --- |
| Items | Lecture | Tutorial/Exercise | Practice/Assignment | Lab-work | Total |
| No. of hours | 18 | 12 | 0 | 0 | 30 |

**3. Prerequisites**

 N/A

**4. Recommended background knowledge**

 N/A

**5. Subject description**

The climate change subject aims to provide a concise and accessible overview of climate change and its impact. Tools and methodology for assessing past, present and future climate changes at global and regional scales will be introduced. Student taking this subject will gain a fundamental knowledge about scientific basic of climate change, as well as the impact of climate change and mitigation measures.

**6. Objectives & Outcome**

* To introduce students a fundamental knowledge of climate change regarding to retrospectives about changing of climate, global warming, greenhouse gas and other human-related climate change forces.
* To introduce tools and methodology for assessing changes of certain climate elements and events such as temperature, precipitation, sea level, tropical cyclones, flood, droughts, etc..
* To update students about the climate change scenarios in global, regional and in Vietnam.
* To provide a basic knowledge on impact of climate change and mitigation measures with the introduction of climate policy, global conflict and cooperation.

**7. Assessment/ Evaluation**

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| --- | --- | --- | --- | --- | --- | --- |
| Component | Attendance | Exercises | Practical | Reports | Midterm | Final |
| Percentage % | 10 | 20 | 0 | 0 | 0 | 70 |

**8. Prescribed Textbook(s)**

**B. Course content**

I. Introduction

* Climate periods: Paleo-climate, present climate, future climate
* Climate oscillation and climate changes
* The concept of radiative forcings
* Greenhouse gas and other human-related climate forcings
* Greenhouse concentration scenarios
	+ Special Report on Emission Scenarios (SRES)
	+ Representative Concentration Pathways (RCPs)

II. Tools and methodology for assessing climate change

* Assessing paleoclimate: proxy method
* Trend analysis
* Climate models
	+ 0D-Energy balance model
	+ 1D-Energy balance model
	+ Global climate model versus regional climate model
	+ Statistical downscaling versus dynamical downscaling

III. Evidences of climate changes

* Palaeoclimate
* Current climate
	+ Changes in atmospheric constituents and the Earth’s heat balance
	+ Changes in surface climate
	+ Changes in the atmosphere
	+ Changes in snow, ice and frozen ground
	+ Changes in the oceans and sea level
	+ Changes in extreme events
* Projecting future climate change
	+ Changes at global scale
	+ Changes at regional scale
* Climate changes in Vietnam

IV. Impact of climate changes

V. Responses to climate change

* Climate policy
* International cooperation

**C. Reference Literature**

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| [1].IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. |
| [2].Rapp, Donald, 2010: Assessing Climate Change, Jointly published with Praxis Publishing, UK, 2nd ed., 410 p., ISBN: 978-3-642-01987-6.[3]. Thomas Stocker, 2011: Introduction to Climate Modelling. Advances in Geophysical and Environmental Mechanics and Mathematics. DOI 10.1007/978-3-642-00773-6. Springer, 179 pages |