Course Title	Introduction to Climate Crisis				
Course Code	DLCLIMA507				
Course Type	Compulsory				
Level	MSc (Level 2)				
Year / Semester	1st / 2nd				
Teacher's Name	Anastasia Paschalidou				
ECTS	7.5	**Lectures / week**		**Laboratories/week**	
Course Purpose	During the 4.5 billion years of Earth's existence, its climate has undergone cosmogenic changes. It is estimated that during ice age peaks, the temperature in middle latitudes decreased by up to 25 °C, while during interglacial periods, the temperature was sometimes much higher than today, possibly more than 10 °C. However, the current retreat of glaciers and the unusually high temperatures in the Arctic zone are unprecedented for (at least) the last 1450 years. Furthermore, this retreat occurs in an otherwise favorable period for glacier formation in the Northern Hemisphere. If the retreat continues at the current rates, it is estimated that by the end of the 21st century, glaciers will have shrunk to the levels they showed 8000-6000 years ago. Additionally, the temperatures recorded in the Northern Hemisphere in recent decades are likely the highest in (at least) the last 800 years. Overall, in the 20th century the average rate of atmospheric warming was 0.7 °C per 100 years. It is also worth noting that these changes occur over an extremely short period, not allowing sufficient time for ecosystems (both natural and anthropogenic) to adapt, leading the planet into a climate crisis with serious consequences for critical aspects of the natural and human environment. The purpose of the course is for students to (a) delve into the factors shaping the balance of the climate system and critically examine the natural and anthropogenic mechanisms of climate variability, (b) study global climate trends and predictions for the future, applying specialized tools and methods, and (c) explore the anticipated impacts of climate change on critical areas				

	such as food security, public health, forest ecosystems, society, and the economy, reflecting on adaptation and mitigation possibilities and comparing relevant perspectives.
Learning Outcomes	Upon successful completion of the course, students will be able to: • Enumerate the factors shaping the Earth's climate system. • Formulate the laws of radiation that govern the radiation budget and shape the climate characteristics of a location. • Describe paleoclimatic changes that have occurred on the planet and interpret their characteristics. • Differentiate between natural and anthropogenic climate variability and evaluate their contributions to the balance of the climate system. • Describe the global climate trends of the last decades. • Conduct climate studies using historical data. • Analyze climate predictions for the future based on different climate scenarios. • Identify the key pillars of the food system and explain the anticipated impacts of climate change on food security. • Distinguish the ways in which climate affects public health in direct and indirect ways. • Describe the predicted impacts of climate change on public health. • Classify the ways in which forest ecosystems shape the climate and sequester/release carbon. • Enumerate the anticipated impacts of climate change on forest ecosystems. • Describe the economic dimension of climate change. • Differentiate between the concepts of adaptation and mitigation of climate change. • Classify the available methods of adaptation to climate change for specific ecosystems. • Analyze the available methods of climate change mitigation.

Prerequisites		**Corequisites**	
Course Content	• Atmosphere, Heat and Radiation • Natural drivers of climate change • Paleoclimatic changes • Anthropogenic interventions to climate • Climate change in the Anthropocene Epoch • Climate change scenarios and predictions for the future • Climate change and public health • Climate change and food security • Climate change and forest ecosystems • Climate change cost, adaptation and mitigation		
Teaching Methodology	**Distance Learning.** The course will provide the theoretical background through synchronous and asynchronous communication methods. The set of learning activities is supported by an electronic communication and learning platform. The main learning activities of the course are as follows: 1. Study of the required course literature. 2. Presentations of content or main points or specific studies in various formats (PowerPoint, oral presentations, annotated presentations). 3. Formulation and resolution of questions in a specialized forum. 4. Questions, quizzes, exercises, position papers, and other self-assessments. 5. Preparation of course assignments. 6. Participation in six video conferences.		
Bibliography	**Textbooks** Selected chapters from: • Andrews D.G. (2000). An Introduction to Atmospheric Physics, Cambridge University Press, ISBN 9780521629584, 0521629586.		

- Atmospheric Physics: Background - Methods - Trends. Springer Berlin Heidelberg, ISBN 9783642301834, 3642301835. (pages 1-82).
- Bodri L., Cermak V. (2011) Borehole Climatology: a new method how to reconstruct climate, ELSEVIER SCIENCE, ISBN 9780080545950, 0080545955.
- Bravo F., Jandl R., LeMay V. (2008) Managing forest ecosystems: The challenge of climate change. Springer International Publishing, ISBN 9783319282503, 3319282506.
- Nicholas Herbert Stern, Great Britain Treasury (2007) The economics of climate change. The Stern review. Cambridge University Press.

Selected chapters from reports:

- Elbehri A. (2015). Climate change and food systems: Global assessments and implications for food security and trade. Food and Agriculture Organization of the United Nations, Rome, ISBN 978-92-5-108699-5.(pages 1-20, 29-47, 61-95, 107-135, 246-260, 315-331)
- IPCC (2012) Summary for Policymakers. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., Barros V., Stocker T.F., Qin D., Dokken D.J., Ebi K.L., Mastrandrea M.D., Mach K.J., Plattner G.-K., Allen S.K., Tignor M. and Midgley P.M. (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 3-21.
- 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., Qin D., Plattner G.-K., Tignor M., Allen S.K., Boschung J., Nauels A., Xia Y., Bex V. and Midgley P.M. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- IPCC (2014) Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the fifth Assessment Report of the

Intergovernmental Panel on Climate Change [Core writing team, Pachauri R.K. and Meyer L.A. (eds)]. IPCC, Geneva, Switzerland, 151 pp.

- IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3-24. https://doi.org/10.1017/9781009157940.001.

Scientific papers:

- Heaviside C., Tsangari H., Paschalidou A., Vardoulakis S., Kassomenos P., Georgiou K.E., Yamasaki E.N. (2016): Heat-related mortality in Cyprus for current and future climate scenarios. Science of the Total Environment, 569-570, 627-633.
- Paschalidou A.K., Kassomenos P.A., McGregor G.R. (2017): Analysis of the synoptic winter mortality climatology in five regions of England: Searching for evidence of weather signals. Science of the Total Environment, 598, 432-444.
- Stavi I., de Pinho J.R., Paschalidou A.K., Adamo S.B., Galvin K., de Sherbinin A., Even T., Heaviside C., van der Gees K. (2021): Food security among dryland pastoralists and agropastoralists: The climate, land-use change, and population dynamics nexus. Anthropocene Review, DOI: 0.1177/20530196211007512.
- Stavi I., Paschalidou A., Kyriazopoulos A.P., Halbac-Cotoara-Zamfir R., Siad S.M., Suska-Malawska M., Savic D., Roque de Pinho J., Thalheimer L., Williams D.S., Hashimshony-Yaffe N., van der Geest K., Cordovil C.M.d.S, Ficko A. (2021) Multidimensional Food

	Security Nexus in Drylands under the Slow Onset Effects of Climate Change. Land, 10, 1350. • Tsangari H., Paschalidou A.K., Kassomenos P.A., Vardoulakis S., Heaviside C., Georgiou K.E., Yamasaki E.N. (2016): Extreme weather and air pollution effects on cardiovascular and respiratory hospital admissions in Cyprus. Science of the Total Environment, 542, 247-253, doi: 10.1016/j.scitotenv.2015.10.106. • van Vuuren D.P, Edmonds J, Kainuma M., Riahi K., Thomson A., Hibbard K., Hurtt G.C., Kram T, Krey V., Lamarque J.-F., Masui T., Meinshausen M., Nakicenovic N., Smith S.J. and Rose S.K. (2011) The representative concentration pathways: an overview. Climate Change, 109, 5-31.
Assessment	• Final exam (50%) • 2 evaluative assignments (20% + 15% = 35%) • 2 interactive online activities (7.5% + 7.5% = 15%) All assignments (except for the final exam) are assigned and submitted on the electronic platform, where they undergo plagiarism checks using the Turnitin tool. The final exam is developed by the instructor and completed by the students on a special platform exclusively used for examinations. Students have 1 week to complete each interactive online activity (total duration 2 weeks) and 2 weeks to submit each evaluative assignment (total duration 4 weeks). It is at the discretion of the instructor to decide whether to grant an extension for assignment submission.
Language	Greek / English