

Ministry of Higher Education and Scientific research



Department of: Environmental Sciences and Health

College of: Science

University of: Salahaddin

Subject: Climate Change

Course Book: Second Stage

Lecturer's name: Dr. Nashmeel Saeed Khudhur (Assistant Professor) (Ph.D.)

Academic Year: 2023/2024

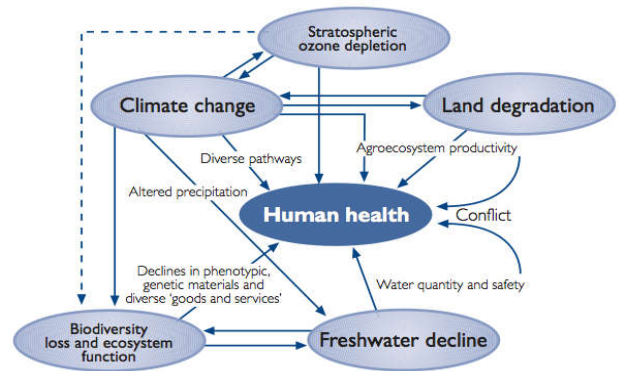
Course Book

1. Course name	Climate Change
2. Lecturer in charge	Assist Prof Dr. Nashmeel Saeed Khudhur (Ph.D.)
3. Department/ College	Department of Environmental Sciences and Health / College of Science
4. Contact	e-mail: nashmeel.khudhur@su.edu.krd
5. Time (in hours) per week	Theory: 2.
6. Office hours	
7. Course code	
8. Teacher's academic profile	<p>* Graduated in Biology Department-Microbiology (Ranked 3rd in the department and 6th in the collage) in Salahaddin University/ College of Science (2001-2002).</p> <p>* M.Sc. in Biology at Salahaddin University, (2006). Thesis title “Wastewater Treatment Using <i>Typha angustifolia</i> L. as a Biological Purifier for Irrigation Purposes”.</p> <p>* Ph.D. in in Biology Salahaddin University, (2013). Dissertation title “Effect of Some Pesticides on Soil Microorganisms in Hawler Governorate”.</p> <p>During my academic life, I thought different subjects in both Biology and Environmental Science and Health Departments including Ecology and Pollution, Sewage and Soil Microbiology, Virology, Eco-physiology, Mycology and Plant Pathology, General Biology, Microbiology, Toxicology and Quality Control, Public Health and Environmental Awareness, Toxicity and Pesticides, Climate Change, Advanced Environmental Analysis, Advanced Soil Pollution, Trace Element Pollution, ...etc. I have worked at different committees including Scientific and Higher Education, Higher Education Examination Committee, Quality Assurance and Curriculum Development, Seminar Presentation, Research Project Evaluation, Department Council, Students Affair, Objection committees and many others. I have 22 scientific articles and 14 social articles.</p> <p>I am now an academic staff in Environmental Sciences and Health Department in the College of Science, Department Head of Quality Assurance and Curriculum Development Program, and teaching courses for Bachelor, Master's students and PhD students.</p>
9. Keywords	Climate, Changes, ...

10. Course overview:

The conceptual organization of this course generally follows this diagram on the interdependence of human health on a sustainable environment.

The course create a comprehensive understanding of the various ecosystem factors that are changing due to human activities and how those changes affects human health now and in the future.



11. Course objective:

Upon completion of this course, students should be able to describe how the Earth is. Climate system works and summarize general atmosphere circulation patterns, ocean circulation patterns and climate oscillations such as the El-Niño Southern Oscillation. Students should be able to illustrate components of the Earth, carbon cycle and quantitatively describe how addition of CO₂ to the atmosphere through burning fossil fuels will influence the climate. Importantly, students will gain the scientific basis to analyse and critique policy issues related to global warming.

12. Student's obligation

In this course, the students will be evaluated through three 3 exams. The student’s obligation during the course is attendance in the class for two hours. An absence from classes should be excused according to the general regulations (i.e. sick leave) soon after coming back to college otherwise the absence is recorded as an unexcused one. The student should also be ready for a quiz at the end of each lecture.

13. Forms of teaching

For each class, we recommend the students to take the lecture handout before attending the classroom. A student is better to read the lecture before the class. In the class, the lectures were power-point present at the first hour of the class, inconspicuous points are clear on whiteboard, difficult idioms and tough words are also clear for the students, and then there will be discussions with the teacher about the theoretical aspects of the subjects.

Social media considered as another method for teaching using different platforms including Moodle, Google Meet, Zoom, Free Call Conference...etc.

14. Assessment scheme

There will be 15 classes to be completed. Student’s answer will be graded according to the following scale:

Pass = 50-100, Failed = 0-49.

Grades are break down as follow:

First exam = 40 points

Second exam = 40 points

The mean of all will take as 40%. The final examination takes 30%. So the final grade would be passed upon the following criteria:

Total of the examinations = 40%

Final examination = 60%

Final mark will be 40% + 60% =100%

15. Student learning outcome:

On completion of the course, the student should be able to:

- Understand Natural Scientific processes that include geochemical and geophysical processes such as ocean currents, the water cycle, the carbon cycle, and thermodynamics.
- Explain how these processes affects biological systems such as agriculture, infectious disease transmission and human health.
- Explain data on the effects of changing CO₂ levels on complex processes including but not limited to:
 - a) biological processes such as plant growth;
 - b) geochemical changes to ocean pH;
 - c) changing terrestrial temperatures on disease transmission;
 - d) Impacts of air pollutants on the cardio-respiratory system.
- Describe the relationship between the geological and climatic development of the Earth.
- Explain the basic physical principles of the global climate system.
- Give an account of natural climatic and environmental changes which have occurred over different time scales.
- Describe the large-scale changes which have occurred in vegetation, ecosystems, and landscape.
- Describe how the soil and water environment have changed as a result of human activity.
- Describe current energy politics and energy systems related to climate change.
- Account for the effect of climate change on society and how society works with the effects of climate change and climate adaptation.
- Present group work in an oral presentation and written report.

16. Course Reading List and References:

Required Text:

Climate Change and Human Health. Risks and Responses A.J. McMichael et al. World Health Organization (publisher)

Available online in print form for less than \$10.00 (with shipping) or download for free at:
<http://www.alnap.org/resource/7392>

Additional Resources:

In addition to the required text, additional readings will be provided to D2L from the following sources:

- The 5th Intergovernmental Panel on Climate Change Report, due out in 2014.
- Fevered: Why a Hotter Planet Will Hurt Our Health -- and how we can save ourselves, by Linda Marsa, Rodale Books (August 6, 2013).
- Changing Planet, Changing Health: How the Climate Crisis Threatens Our Health and What We Can Do about It, by Paul R. Epstein, University of California Press (June 12, 2012).
- Green Cities: Urban Growth and the Environment, by Matthew E. Kahn, Brookings Institution Press (September 1, 2006).
- Climate Change and Global Poverty: A Billion Lives in the Balance?, Lael Brainard (Editor), Brookings Institution Press; 1st edition, edition (July 16, 2009).
- Wisconsin Initiative on Climate Change Impacts:, (2011), <http://www.wicci.wisc.edu>

17. The Topics:

Lecturer's name

<p>18. Topics</p> <p>Week 1: <u>Introduction to climate change</u> - What is climate? What is the differences between weather and climate? Climate classification. Introduction to climate changes. Effects of climate changes. Causes of climate changes. Definitions of climate changes. History of climate changes.</p> <p>Week 2: <u>Greenhouse effect</u> - Introduction. Greenhouse effect definition. Greenhouse gases (GHGs). Factors affecting the impact of greenhouse gases on environment. Sources of greenhouse gases.</p> <p>Week 3: <u>Carbon dioxide (CO₂) emissions</u> - Introduction. Importance of CO₂. Carbon level in the ground. Human emissions of CO₂. CO₂ emissions by sector. Past and future carbon dioxide.</p> <p>Week 4: <u>Carbon cycle CO₂ Emissions</u> - Introduction. The carbon cycle. Photosynthesis. Respiration. Weathering. Carbonate rocks. Metamorphism of carbonates.</p> <p>Week 5: <u>Global warming</u> - Introduction. Definition. Causes of global warming. Consequences of global warming. What can we do to stop global warming? Global warming in Iraq.</p> <p>Week 6: <u>Plants & CO₂</u> - Introduction. Plant responses to future CO₂. Environmental factors and plant response to elevated CO₂. Plant functional types and response to elevated CO₂. Plant community interactions under elevated CO₂. Summer.</p> <p>Week 7: <u>Climate change and biosphere</u> - Introduction. The biosphere definition. Changing the biosphere. How other spheres influence the biosphere. Biosphere's impact on other spheres. The future of agriculture in a changing world. Biodiversity conservation in a changing climate. Climate change and water resources. Biogeochemical feedbacks and atmospheric CO₂.</p> <p>Week 8: <u>Climate sensitivity and feedback mechanisms</u> - Introduction. Definition. Feedback mechanisms. Types of feedback mechanism.</p> <p>Week 9: <u>Changing the hydrosphere</u> - Introduction. The variable hydrosphere. How is the hydrosphere changing? Five ways that climate change affects the ocean.</p> <p>Week 10: <u>The Sun-climate connection</u> - Introduction. Solar radiation and global warming. Solar cycle. Solar radiation and climate change hypotheses. Other particles and global cooling. Earth's average temperature. Solar Irradiance.</p>	<p>Assist Prof Dr. Nashmeel Saeed Khudhur 2hour per week for theoretical lecture</p>
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<p>Week 11: <u>Global ozone depletion</u> - Introduction. Ozone layer. Location of ozone in Earth's atmosphere. Ozone creation and destruction. Causes of ozone depletion. Ozone depletion and climate change. Health and environmental effects of ozone layer depletion.</p> <p>Week 12: <u>Outlook for the Future</u> - Introduction to Climate Change, Advances in Computer Modelling, Physics versus Fudge Factors.</p>	
<p>20. Extra notes: The course book lacks to the problems which affect the educational process. The absence of appropriate rooms for lecturers to develop themselves.</p>	
<p>21. Peer review Assistant Professor Dr. Nashmeel Saeed Khudhur</p>	