Course Title: Introduction to Climate Change and Sustainability

An 'Interdisciplinary' holistic introduction to climate change and environmental sustainability.

Course Description:

This course provides a foundational overview based on the multi-disciplinary relationship between climate change, sustainability and development, offering a set of critical approaches for climate-resilient development pathways, introducing tools and concepts that policymakers use to evaluate and address climate change. Students will learn about climate change processes, scenarios, vulnerabilities and policy responses (national and international). Broader aspects of the course will be dealing with climate-related financing, policy mechanisms, multilateral arrangements, community-related adaptation and mitigation practices, whilst critically reviewing dominant discourses on the climate change-development nexus and its impact on geopolitics and the global economy. It identifies avenues and opportunities for climate-resilient development based on indigenous knowledge and cultural practices. We study the origins of sustainable development discourses, exploring the challenges of major global environmental and social changes, including debates on resource and energy use, urban growth, technology, industry, agriculture, transport, water, energy etc. It will study the sociological, economic and historic causes of climate change and the resulting climate crisis, whilst examining the natural, physical and human impacts on the planet from a cross-cutting multi-sectoral lense. The integrated approach shall be inclusive, understanding the overlapping dynamics and synergies between the natural and social sciences – history, sociology, politics geography, engineering physics, and biology. The interdependent synergies will inspire 'Innovative Cross Overs' creating hypotheses based on critical independent thinking. Discourses on breaking myths, conditioning and perceptions leading to an understanding of the dynamics of 'Social Change', leading to effective cross sectorial participative discourses. This course is designed to introduce students to natural and environmental resource economics, emphasis is placed on understanding economic concepts such as resource scarcity, externalities, property rights, opportunity cost, sustainability, and valuation, empowering change and a renewed focus on sustainability leadership. Throughout the year, we explore the relationship between human lives and the environment, debate what human 'development' and 'sustainability' mean, and discuss how to understand these complex and flexible concepts together to create effective solutions.

Time Frame: This is a 3 credit hour course expanding to a period of 16 weeks with 8 modules (32 classes) with 2 classes per week according to the university schedule. The duration of each module is specified below

Grade Breakdown and Assessment Modules:

Class Participation - 15 marks

Reflection paper - 40 marks (8 reflection papers – 5 marks each)

Midterm - 20 mark

Final - 25 marks

Semester 1

Module 1: What is Climate Change & why Sustainable Development

Duration: Week 1 and 2

Course Description: This module will focus on research/benchmarking trends and global shifts in climate change and sustainable development which are essential for addressing urgent global challenges, identifying gaps in knowledge, informing policy decisions, and promoting collaboration within the academic and research community.

Readings:

1. Climate Change: What Everyone Needs to Know" by Joseph Romm – Ch. 1, 2 and 5
2. The Science of Climate Change Explained: Facts, Evidence and Proof Definitive answers to the big questions – Article – New York Times

Assessment: Reflection Paper on the assigned readings

Course Outcomes: Throughout this module, students will gain a deep understanding of the fundamental concepts surrounding climate change and its far-reaching implications. They will delve into the intricate relationship between climate change, environmental degradation, and socio-economic factors, analyzing how these elements intersect to shape global challenges. By exploring case studies and real-world examples, students will critically evaluate the importance of sustainable development as a holistic framework for addressing climate change issues. Through discussions and assignments, they will develop the analytical skills necessary to assess various strategies and approaches aimed at mitigating and adapting to climate change impacts.

Module 2: SDGs – Global Agreements and Data

Duration: Week 3 and 4

Course Description: This module is designed to balance the three dimensions of sustainable development: the economic, social and environmental. How to use ‘Open Data’ to help achieve the SDGs by providing critical information on natural resources, government operations, public services, and

population demographics. These insights can inform national priorities and help determine the most effective paths for action on national issues. Understanding the dynamics of these goals can help strengthen healthcare systems; promote education; and improve food security on both a large and small scale, playing a critical role in improving governance by preventing mismanagement, which also helps ensure environmental sustainability to help reduce pollution, conserve natural resources and build resilience to climate change.

Readings:

1. The Age of Sustainable Development" by Jeffrey D. Sachs – Introduction and Ch. 1
2. The 2030 Agenda for Sustainable Development" by United Nations

Assessment: Reflection Paper on the assigned readings

Course Outcomes: In this module, students will explore the United Nations Sustainable Development Goals (SDGs) and their role as a global framework for addressing pressing socio-economic and environmental challenges. They will delve into the intricacies of key global agreements related to sustainable development, examining their objectives, implementation mechanisms, and significance in shaping international policy agendas. Through hands-on activities and data analysis exercises, students will learn to interpret and utilize data and indicators to monitor progress towards achieving the SDGs. By critically evaluating case studies and engaging in discussions, they will develop a nuanced understanding of the complexities surrounding international cooperation and partnerships in advancing sustainable development initiatives.

Module 3: Carbon Footprints – Net Zero - CFCs and Fossil Fuels / Transport

Duration: Week 5 and 6

Description: Students will delve into the complex relationships between human activities, waste generation, ecological systems, and biodiversity loss, while examining the imperative for decarbonizing the global economy. This course provides key definitions, whilst introducing the global policy landscape on climate change and climate transition pathways to net zero carbon.

Readings:

1. Corporate Carbon Footprints: A New Perspective on the Climate Crisis" by the Carbon Disclosure Project (CDP)
2. **"The Future of Fossil Fuels: From 'King Coal' to 'Unburnable Carbon'"** by Richard G. Newell and Daniel Raimi

Documentary:

1. **"The True Cost" (2015) - directed by Andrew Morgan**

Assessment: Reflection Paper on the assigned readings

Outcome: This module will equip students with a comprehensive understanding of carbon footprints and their significance in assessing greenhouse gas emissions and climate change mitigation efforts. Through interactive lectures students will explore the concept of net zero emissions and its implications for transitioning to a low-carbon economy. They will critically analyze the environmental impact of CFCs

(chlorofluorocarbons) and fossil fuels on climate change and ozone depletion, examining the role of transportation systems in contributing to carbon emissions. By engaging in practical exercises and group discussions, students will develop practical solutions for reducing carbon footprints, promoting renewable energy sources, and transitioning to sustainable transportation systems.

Module 4: Agriculture and Food Security

Duration: Week 7 and 8

Description: Explore the critical intersection of agriculture and food security, uncovering strategies to promote sustainable farming practices and enhance global food resilience.

Readings:

1. Who Really Feeds the World? by Vandana Shiva
2. Silent Spring" by Rachel Carson

Assessment : Assignment 1: Q1) What are some techniques found within Indigenous agricultural practices that could contribute to promoting organic farming that should be revived? You can refer to any time period.

Outcomes: In this module, students will explore the intricate relationship between agriculture, food security, and climate change impacts. They will examine the challenges facing global food security, including environmental degradation, water scarcity, and extreme weather events, and evaluate the role of sustainable agricultural practices in addressing these challenges. Through case studies students will gain insights into innovative technologies and approaches for enhancing food production while minimizing environmental impacts. By engaging in group projects and discussions, they will develop strategies for achieving food security goals in the context of climate change adaptation and sustainable development.

Module 5: Energy & Water Nexus

Duration: Week 9 and 10

Description: This module explores the intricate relationship between energy and water systems, emphasizing the critical importance of managing this nexus sustainably to promote environmental stewardship, economic efficiency, and social equity. Students will delve into the interconnected challenges and opportunities of the energy-water nexus and gain insights into innovative strategies for enhancing sustainability and resilience in both sectors.

Readings:

1. Energy, Society, and Environment: Technology for a Sustainable Future" by David Elliott – Ch 4 and 6

Assessment: Reflection Paper on the assigned readings

Outcomes: Throughout this module, students will delve into the complex interconnections between energy and water resources and their critical role in sustainable development. They will examine the

challenges associated with the energy-water nexus, including resource competition, environmental degradation, and climate change impacts. Through interactive workshops and simulation exercises, students will explore integrated water and energy management approaches aimed at enhancing resource efficiency and resilience. By analyzing case studies and engaging in debates, students will develop innovative solutions for addressing energy-water nexus challenges and advancing sustainable development goals.

Module 6: Waste – Ecology - Biodiversity – Global De-carbonization

Duration: Week 11 and 12

Description: Students will delve into the complex relationships between human activities, waste generation, ecological systems, and biodiversity loss, whilst examining the imperative for decarbonizing the global economy.

Readings:

1. The Sixth Extinction: An Unnatural History" by Elizabeth Kolbert

Documentary:

1. Our Planent – David Attenborough – EP 3 – The Jungle

Assessment: Reflection Paper on the assigned readings

Outcome: In this module, students will explore the multifaceted issues surrounding waste management, ecology, biodiversity, and global decarbonization efforts. They will examine the environmental and ecological impacts of waste generation and mismanagement on biodiversity and ecosystem health, analyzing the interconnectedness between waste management practices and carbon emissions. Students will further explore innovative strategies for promoting circular economy principles and reducing waste through recycling, reuse, and sustainable consumption patterns. By engaging in debates students will develop actionable measures for advancing global decarbonization efforts and promoting sustainable resource management practices.

Module 7: Environmental Laws - Existing National and Global Legislation

Duration: Week 13 and 14

Reading:

1. Environmental Law in Pakistan: Governing Natural Resources and Sustainable Development" by Afzal Rehman

Assessment: Reflection Paper on the assigned readings

Description: This module explores the mechanisms for implementing, monitoring, and enforcing climate change laws and regulations at both national and international levels and develop insights into the role

of legal mechanisms in driving transformative action towards a sustainable and resilient future in the face of climate change.

Throughout this module, students will gain a comprehensive understanding of environmental laws and regulations at both national and global levels. They will examine key international environmental treaties and conventions and their objectives in addressing pressing environmental issues. Through case studies students will explore the role of government agencies, non-governmental organizations (NGOs), and civil society in implementing and enforcing environmental laws. By critically evaluating the effectiveness of existing environmental legislation, students will develop insights into opportunities and challenges in promoting sustainability through legal frameworks and governance mechanisms.

Module 8: Climate Justice and the Social Contract

Duration: Week 15 and 16

Readings:

1. Climate Justice: Hope, Resilience, and the Fight for a Sustainable Future" by Mary Robinson
2. "The Environmental Landscape of Pakistan: Concerns and Challenges" by Bushra Riaz

Documentary:

1. "An Inconvenient Truth" (2006) - Directed by Davis Guggenheim and featuring former Vice President Al Gore

Assessment: Reflection Paper on the assigned readings

Description: Students will explore the concept of the social contract as it applies to climate change, analyzing the roles and responsibilities of individuals, communities, governments, and international institutions in addressing the disproportionate impacts of climate change on vulnerable populations

In this module, students will delve into the concept of climate justice and its implications for social equity, fairness, and intergenerational responsibility. They will examine the disproportionate impacts of climate change on vulnerable populations, including marginalized communities, indigenous peoples, and low-income groups. Through case studies and interactive discussions, students will analyze the intersectionality of climate change with social issues such as poverty, inequality, and human rights. By engaging with the course material, students will develop strategies for promoting climate justice through inclusive decision-making processes, participatory planning, and equitable resource allocation.

Semester 2:

Introduction II: Climate Change and Sustainability

Module 1: Urban Rural Migrations/Cities

Duration: Week 1 and 2

Readings:

1. "Planet of Slums" by Mike Davis
2. Climate Refugees: Global, Local and Critical Approaches" edited by Giovanni Bettini

Documentary:

1. **Changing Climate: Moving People (UNESCO India Documentary):**

   https://www.youtube.com/watch?v=G24bkiT55v4

Assessment: Reflection Paper on the assigned readings

Description: This module will examine the relationship between climate change and human migration, with a focus on the drivers and impacts of rural-urban migrations. They will explore how environmental stressors, such as extreme weather events, water scarcity, and land degradation, influence migration decisions and population movements, particularly in vulnerable regions.

Outcomes: This module delves into the complex dynamics of urban and rural migrations, emphasizing the challenges and opportunities presented by rapid urbanization. Students will explore the socio-economic impacts of migration on both urban and rural areas, analyzing factors such as employment, infrastructure development, and social cohesion. By the end of the course, students will be able to critically assess urban planning policies and propose strategies to address issues related to housing, transportation, and resource management in both urban and rural setting

Module 2: Mitigation and Climate Adaptation Strategies – Renewables

Duration: Week 3 and 4

Readings:

1. Community-Based Adaptation to Climate Change: Scaling it up" by Hannah Reid, Terry Cannon, Russell Kerby, and Victor Opondo – Article
2. Building Resilience to Climate Change: Ecosystem-Based Adaptation and Lessons from the Field" by the International Union for Conservation of Nature (IUCN) – Report

Assessment: Reflection Paper on the assigned readings

Description: This module focuses on how mitigation strategies aim to reduce greenhouse gas emissions to limit global warming, while adaptation strategies seek to minimize the impacts of climate change and build resilience to its effects , it further explores the potential of renewable energy technologies to decarbonize the energy sector, reduce reliance on fossil fuels, and mitigate greenhouse gas emission

Outcomes: This module focuses on the development and implementation of mitigation and adaptation strategies to combat climate change, with a specific emphasis on renewable energy sources. Students will gain an understanding of the technological, economic, and policy aspects of renewable energy deployment, and they will learn to evaluate the effectiveness of different strategies in reducing greenhouse gas emissions and building resilience to climate impacts. By the end of the course, students will be equipped to design and advocate for sustainable energy policies that promote the widespread adoption of renewable energy technologies.

Module 3: An introduction to Natural Resources and Environmental Economics

Duration: Week 5 and 6

Description: This module explores the fundamental principles of environmental economics and how economic incentives and mechanisms influence human behavior and decision-making in the context of natural resource use and environmental protection

Readings:

1. "Natural Resource Economics: An Introduction" by Barry C. Field and Martha K. Field
2. "Economic Approaches to Natural Resources and Environment" edited by David W. Pearce and R. Kerry Turner - Essay 1 "Valuing the Environment: Theory and Practice" by David W. Pearce

Assessment: Reflection Paper on the assigned readings

Outcomes: This module introduces students to the principles of natural resource economics and environmental economics, providing a framework for analyzing the allocation and management of finite resources in a sustainable manner. Students will learn to apply economic concepts such as cost-benefit analysis, market failures, and property rights to environmental issues, with a focus on developing policies that promote conservation, efficiency, and equity. By the end of the course, students will be able to assess the economic implications of environmental degradation and propose policy interventions to address environmental challenges while promoting economic development

Module 4: Markets, Sustainability, Public Policy and Climate Finance

Duration: Week 7 and 8

Description: This module will explore market -based approaches to climate change mitigation and promote market-driven solutions to promote sustainable development, it further aims to understand the role of public policy in shaping climate finance flows and mobilizing investment for climate action**.**

Readings:

1. Climate Finance: Theory and Practice" by Richard J.T. Klein and Barbara Buchner

Assessment: Reflection Paper on the assigned readings

Outcomes: This module explores the intersection of markets, sustainability, public policy, and climate finance, emphasizing the role of financial mechanisms in driving the transition to a low-carbon economy. Students will examine various market-based instruments such as carbon pricing, green bonds, and carbon markets, and they will analyze the effectiveness of these instruments in incentivizing emission reductions and mobilizing climate finance. By the end of the course, students will be able to evaluate the design and implementation of climate policies and financial instruments and propose innovative solutions to accelerate the transition towards a sustainable, climate-resilient future.

Module 5: Pollution control: targets Climate legislation and implementation

Duration: Week 9 and 10

Description: This module explores explore the regulatory frameworks and targets established to address pollution and mitigate climate change, examining the effectiveness of legislation in driving emissions reductions and promoting environmental stewardship.

Readings:

1. "Designing Effective Climate Policy: A Review of the Effectiveness of Climate Policies in Different Sectors" by Nives Dolšak and Aseem Prakash

Assessment: Assignment Q1) Develop a framework inspired from previous Climate Policies that could apply as a possible solutions to the subcontinents sustainable future.

Outcomes: This module focuses on the regulatory frameworks and policy tools for pollution control and climate legislation, with an emphasis on setting ambitious targets and ensuring effective implementation. Students will study the principles of environmental law and governance, examining international agreements, national legislation, and regulatory mechanisms aimed at reducing pollution and mitigating climate change. By the end of the course, students will be able to analyze the strengths and weaknesses of existing regulatory approaches and propose strategies for strengthening enforcement, enhancing compliance, and achieving environmental objectives.

Module 6: The Green Energy Transition: Sustainable Solutions – Road Maps

Duration: Week 11 and 12

Description: This module provides a comprehensive exploration of the green energy transition, focusing on sustainable solutions and roadmaps for achieving a low-carbon future. Students will examine the latest innovations and technologies in renewable energy, energy efficiency, and clean transportation, while also exploring the policy frameworks and strategic roadmaps guiding the transition.

Readings:

1. "Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming" edited by Paul Hawken

Assessment: Reflection Paper on the assigned readings

Outcomes: This module provides students with a comprehensive understanding of the green energy transition, exploring the technological, economic, and social dimensions of transitioning to a sustainable energy system. Students will examine case studies of successful energy transitions, analyzing the factors that have facilitated or hindered progress towards decarbonization and energy sustainability. By the end of the course, students will be able to develop roadmaps for transitioning to renewable energy sources, integrating considerations such as policy support, technological innovation, infrastructure development, and stakeholder engagement.

Module 7: Climate Entrepreneurship - Exploring the Intersection of Public Policy, Business Sustainability and Government Frameworks

Duration: Week 13 and 14

Description: This module delves into the dynamic intersection of climate entrepreneurship, public policy, and business sustainability, exploring how innovative ventures can drive positive environmental change while navigating governmental and private sector frameworks.

Readings:

1. This Changes Everything: Capitalism vs. The Climate" by Naomi Klein
2. "Climate Change and the Green Economy: Opportunities and Threats" edited by Beatriz Plaza and Eneko Garmendia

Assessment: Reflection Paper on the assigned readings

Outcomes: This module examines the role of entrepreneurship in driving climate action and sustainability, focusing on the intersection of public policy, business innovation, and government frameworks. Students will learn about entrepreneurial opportunities in sectors such as clean energy, sustainable agriculture, and circular economy, and they will explore strategies for navigating regulatory challenges, accessing financing, and scaling up sustainable business ventures. By the end of the course, students will be equipped to identify and evaluate entrepreneurial opportunities that contribute to climate mitigation, adaptation, and sustainable development goals.

Module 8: The Future of Sustainable Living – Development and the Environment

Duration: Week 15 and 16

Class Activity: Visit to the Miyawaki urban forest Lahore

Documentary:

1. **Living the Change: Inspiring Stories for a Sustainable Future :** https://www.youtube.com/watch?v=gq9sg397ee8

Description : This concluding module presents a sum of the ultimate goal sustainable developmen proposes , to examine how development practices intersect with enviornmental conservation aand delve into innovative approaches to urbanization and its impact on our ecosystems. The course activities are meant to strengthen and expand sustainability in education and encourage students to become sustainability literate, helping integrate aspects of sustainable living with a focus on pollution, personal consumption, fast fashion, food waste, and eco-footprint. Scientific research and current world climate change conditions have made it clear that humankind's current economic development based on fossil resources and linear growth leads to higher emissions, accelerated biodiversity loss, and increased conflicts over resources. The transition to a sustainable future requires new types of knowledge and education. During this course, we will explore alternatives through engaging in on-site/real time activities and projects, complemented by digital tools on climate action.

Outcomes: This module explores the future of sustainable living in the context of global development and environmental challenges, emphasizing the need for integrated approaches that promote social equity, economic prosperity, and environmental stewardship. Students will examine sustainable development goals, indicators, and strategies for achieving a more equitable and sustainable world, considering factors such as population growth, consumption patterns, technological innovation, and governance structures. By the end of the course, students will be able to envision and advocate for transformative pathways towards sustainable living that balance the needs of present and future generations while safeguarding the integrity of the environment.

Assessment Modules:

Tasks:

1. Reflection Papers every week of the module to be completed, these tasks will allow students to engage with the assigned reading and to offer their opinion and engage in critical thinking regarding the text.
2. Assignments require students to research for sustainable solutions for countering global issues though local solutions.
3. Class Participation : To ensure students engage with the course outline and actively participate with question and answers
4. Midterm: Examination for Mid- semester evaluation
5. Final Exam: Examination for Final semester evaluation

Assessment Tool:

1. Google classroom (GCR): For organizing student assignments and submissions , categorizing assigned readings and course material
2. Turnitin: For plagiarism checking on student's submission.

Assessment Criteria:

1. Class Participation - 15 marks
2. Reflection paper - 40 marks (8 reflection papers – 5 marks each)
3. Midterm - 20 mark
4. Final - 25 marks