School of Interdisciplinary Engineering & Sciences (SINES)
National University of Sciences & Technology

Course Title: Innovative Technologies for Climate Change Resilience
Course Code CCSD-802

Course Description:
The course facilitates students to analyze emerging innovative technologies and practices comprehensively, how to assess their climate change and health impacts, recommendations to facilitate their implementation, and how to use green and social financial instruments to foster equitable social development while decreasing community vulnerabilities and increasing climate change resilience.

Course Objectives: Major objective includes: to understand the mechanisms of how climate change is disrupting the global hydrological cycle, increased associated health risks, issues of community change vulnerability, climate change mitigation and adaptation, conceptualize and design community climate change preparedness, sustainable transportation, green energy, water and wastewater management, geo-engineering, manage the supply chain for components and assemblies of innovative technologies for climate change resilience, etc.

Course Outcomes:
On completion of this course, students should be able to: learn how to analyze emerging innovative technologies and practices comprehensively assess their climate change and health impacts, recommendations to facilitate their implementation, and how to use green and social financial instruments to foster equitable social development while decreasing community vulnerabilities and increasing climate change resilience.

Detailed Contents:

- Introduction to Innovative Technologies and Practices for Climate Change Resilience,
- Relationship between energy, land-use change, and human activities to climate change.
- Basics of climate change and changes in the hydrological cycle.
- Damages to biodiversity and adverse health effects caused by climate change.
- Concepts of community vulnerability, resiliency, and climate change preparedness, climate change mitigation and adaptation and their relationship to reductions in community vulnerabilities and increases in resilience.
- Financial mechanisms for climate change preparedness.
- Advanced green building technologies: smart thermostats, energy management systems using Artificial Intelligence, and intelligent appliances, advanced green insulation, biodegradable building materials.
- Technologies to enhance low carbon transportation.
- New resilience technologies for water management and wastewater treatment
- Modern resilience technologies food production and storage, sustainable landscaping and protection of biodiversity and natural ecosystems, infrastructure.
- Community engagement for climate change preparedness.

Text/Ref Books:

i. Innovation in climate change adaptation, 2016, ISBN : 978-3-319-25812-6, Springer Nature.
ii. Handbook of Climate Change Resilience, 2020, Springer.
iii. Climate Change, Community Response and Resilience: Insight for Socio-Ecological Sustainability, 2023, ISBN: 9780443187070, Elsevier.
iv. Resilience: The Science of Adaptation to Climate Change, 2018, ISBN: 9780128118924, Elsevier.
v. Innovative approaches in the breeding of climate-resilient crops, 2022, ISBN: 9781119789789, John Wiley & Sons Ltd.