



"Investing in Africa's future"

COLLEGE OF HEALTH AGRICULTURE AND NATURAL SCIENCES

**COURSE CODE: NESN307 CLIMATE CHANGE IMPACTS, RESPONSE AND
MITIGATION STRATEGIES**

END OF SECOND SEMESTER EXAMINATION

APRIL 2026

LECTURER: MR. NYAMONGO N. ABIUD

DURATION: 3 HRS

INSTRUCTIONS

Answer **all** questions in Section A and any **three** from Section B

Section A carries **40 marks** and each question in section B carries **20 marks**

SECTION A: Answer all questions from this section.

Question 1

- a) Define climate change and clearly distinguish it from weather variability. [6]
- b) Identify two major greenhouse gases and state their primary sources. [4]
- c) Explain the scientific meaning of temperature anomalies in climate studies. [4]
- d) State four causes of urban Heat Effect. [4]
- e) Outline four major impacts of climate change on agricultural systems in Southern Africa. [4]
- f) State four renewable and two non-renewable zero carbon energy sources. [6]

g) Illustrate how climate change influences human and animal health. [6]

h) Below is the planetary energy-balance surface temperature equation. This greenhouse layer model in climate science is based on Stefan-Boltzmann law.

$$T_s = \left(\frac{(n+1)s(1-\alpha)}{4\sigma} \right)^{\left(\frac{1}{4}\right)}$$

It tells us climate is determined by three factors: Discuss the three factors.
[6]

SECTION B: Answer any three (3) questions from this section.

Question 2

Evaluate the effectiveness of current climate change mitigation strategies in reducing global greenhouse gas emissions across energy, agriculture and land-use sectors. [20]

Question 3

a) Explain how climate models are used to predict future climate scenarios [10]

b) Discuss what is carbon tax, marginal cost of reduction, externalities and, cap and trade in climate change. [10]

Question 4

(a) Using examples, discuss climate change adaptation strategies employed by rural farming communities in Zimbabwe. [12]

(b) Suggest innovative approaches that could strengthen climate resilience in the agricultural sector. [8]

Question 5

(a) The sun shines 1360 Watts of energy onto the earth, given the Earth's albedo, how many joules of energy are transferred to a square meter on earth's surface over 1 hour.

Use power energy relationship: $E = P \times t$, Earth's albedo = 0.3 [6]

(b) Illustrate a climate model with a 1 layer atmosphere and 2 layer atmosphere using :

$$S = 1360 \text{ W/m}^2 \quad \alpha = 0.3$$

$$E_{in} = S(1-\alpha)/4$$
 [14]

Question 6

a) Discuss the role of international climate institutions in shaping global climate action, highlighting successes and limitations. [10]

b) Discuss three categories for what we can do about climate change. [10]

END OF QUESTION PAPER!