

# 21CPHY261 ECO - PHYSIOLOGY

Hours Per Week :

L	T	P	C
1	-	2	2

Total Hours :

L	T	P
15	-	30

## Course Description and Objectives:

This course provides knowledge about the structure and components of ecosystems and their influence on agriculture and forestry as well as the impacts of global warming on ecosystems and crop and tree productivity

## Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Knowledge about the structure and components of ecosystems and their influence on agriculture and forestry
2	Understanding the impacts of global warming on ecosystems and crop and tree productivity and hence have skills to plan for development of climate resilient agriculture and forestry systems

## SKILLS:

- ✓ *Prepare plan for climate resilient agriculture*
- ✓ *Assess the effect of Global warming on climate and crop productivity*



Source :

<https://www.plymouth.ac.uk/research/ecophysiology-and-development-research-group/plant-ecophysiology>

**ACTIVITIES:**

- o Visit different ecosystems and observe the plants in different ecosystems
- o Demonstration of morphological and anatomical adaptations of plants grown in one more different Ecological habitation
- o Conduct experiment on Morphological and anatomical adaptations of crop plants grown in for different abiotic stresses and controlled environment

**UNIT - 1**

**Introduction:** Ecophysiology, introduction, importance in agriculture and Horticulture; Biosphere and Ecosystem, structure, components, types; food chains and web, pathways of energy in the biosphere, Global climates and crop adaptive distribution, Climatic regions of the world, India and Andhra Pradesh

**UNIT - 2**

**Environment:** Definition, components, abiotic environment, biotic factors, edaphic, physiographic and pyric factors. Physiological approaches for Climate Resilient Agriculture. Competition, types, monoculture and polyculture, Navadhanya Concept – multi-storeyed cropping system

**UNIT - 3**

**Allelopathy:** Concept, mode of action, scope, sources in crops and weeds, Applications in agriculture; Phytoremediation, concept, applications in agriculture; Pollution, air, soil and water, physiological effects and management

**UNIT- 4**

**Global warming:** Global warming, greenhouse gases, CO<sub>2</sub> fertilization concept, Climate change - Effects on plant metabolism, flowering and pollination, impacts on climatic processes and agricultural productivity; Mitigation measures to reduce the impact

**UNIT - 5**

**Controlled environment :** Structural designs and types, commercial applications; Ecophysiological models for environmental management, crop growth modelling- Need, goals, advantages, Crop models available

**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS**

1. Hydrophytes - Morphological and anatomical adaptations to Excess water
2. Mesophytes - Morphological and anatomical adaptations to mesic conditions
3. Xerophytes - Morphological and anatomical adaptations to Water deficit
4. Effects of light and shade on crop growth
5. Influence of different soils on crop growth
6. Analysis of competition in crop plants
7. Measurement of microclimate in contrast crop canopies
8. Effect of dust pollution on crop growth
9. Effect of soil pollution on crop growth
10. Measurement of Biological Oxygen Demand (BOD) in polluted water
11. Effect of water pollution on crop growth
12. Effect of water stress and salt stress on plant growth and development
13. Effect of water logging on plant growth
14. Effect of temperature on plant growth
15. Effect of polyhouse on crop growth and growing plants in controlled environment (growth cabinet)

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**REFERENCES:**

1. Agarwal, A. K. and Deo, P.P. 2013. *Plant Ecology*. Agrobios (India) Jodhapur
2. Varshneya, M. C and Balakrishna Pillai, P. 2006. *Textbook of Agricultural Meteorology*. ICAR, New Delhi
3. Lenka, S., Lenka, N.K., Kundu, S and Subba Rao, A. 2013. *Climate change and Natural Resources Management*, New India Publishing Agency, India
4. Prasad and Kumar. 2010. *Green House Management for Horticulture Crops*. Agrobios, Jodhpur
5. Schulze, E.C., Beck, E and Muller-Hohenstein, K. 2005. *Plant Ecology*. Springer Science & Business Media, New York City

