21AGRO301 GEOINFORMATICS AND NANO TECHNOLOGY FOR PRECISION FARMING

Hours Per Week :

L	T	P	C
1	-	2	2

Total Hours :

L	T	P
15	-	30

COURSE DESCRIPTION AND OBJECTIVES:

The course provides exposure to the concept of precision farming and skills in the application of Geo-informatics and nanotechnology in agriculture

COURSE OUTCOMES:

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

COs	Course Outcomes
1	Acquire knowledge about usefulness of GIS and remote sensing including drones and their use in mapping and monitoring crop variability and their performance
2	Able to know the Precision agriculture: concepts and techniques
3	Understand and promote precision farming, Nanotechnology and targeted use of water, fertilizer, agrochemicals and other inputs for more efficient and profitable agriculture

SKILLS:

- ✓ *Land use mapping – digital image processing*
- ✓ *Visual interpretation of satellite imagery*
- ✓ *Use GIS software for precision agriculture*

UNIT - 1

Introduction: Precision agriculture: concepts and techniques - Issues and concerns for Indian agriculture. Principles and practices of precision agriculture. Geo-informatics- definition, concepts, tools and techniques and their use in Precision Agriculture. Crop discrimination and yield monitoring techniques.

UNIT - 2

Geodesy: Geodesy and its basic principles. Spatial data and their management in GIS. Global Positioning System (GPS) – Components and its application in agriculture

UNIT - 3

Cartography: Cartography, units of cartography, map scale, various symbols used in cartography, Soil mapping techniques. Image processing and interpretation - geo referencing - supervised and unsupervised classification of RS images. STCR approach for precision agriculture - principles and computations

UNIT - 4

Remote Sensing: Remote sensing- concepts, Spectral reflectance of various earth features, atmospheric windows. Applications of remote sensing techniques in the field of agriculture and allied sciences including drones. Spatial variability of soil fertility, its determination, fertilizer recommendation using geospatial technologies in precision farming

UNIT - 5

Nano Technology: Nanotechnology, definition, concepts and techniques – Nano scale – definition – Nano-particles, materials - occurrence – properties. Characterization of nano-materials - structural characterization – Nanosensors. Nano-fertilizers, nano-pesticides - importance and advantages – synthesis – strategies. Application of nanotechnology in agriculture - tillage, seed, water, fertilizers, plant protection for scaling-up farm productivity

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS

1. GIS software, spatial data creation and editing
2. Image processing software
3. Visual and digital interpretation of remote sensing images
4. Generation of spectral profiles of different objects
5. Supervised and unsupervised classification and acreage estimation
6. Multispectral remote sensing for soil mapping
7. Creation of thematic layers of soil fertility based on GIS
8. Creation of productivity and management zones
9. Fertilizers recommendations based of VRT and STCR techniques

10. Crop stress (biotic / abiotic) monitoring using geospatial technology. Use of drones for assessing crop damage

11. Conduct of agricultural survey using GPS

12. Use of GPS for watershed management and crop yield estimation

13. Formulation, characterization of nanoparticles

14. Applications of nanoparticles in agriculture

15. Projects formulation and execution related to precision farming

REFERENCES:

1. Pradeep. T. 2007. NANO: The Essentials: Understanding Nanoscience and Nanotechnolgy. Tata McGraw-Hill Publishing Company Limited, New Delhi

2. Lillesand, T.M. and Kiefer, R. W. 1994. Remote sensing and image interpretation. (3rd edition), John Wiley and Sons.

3. Anji Reddy, M. 2006. Text book of Remote sensing and Geographical Information Systems,(3rd edition), B.S. Publications, Hyderabad