संशोधित पाठ्यक्रम

NEW AND RESTRUCTURED

POST GRADUATE CURRICULA AND SYLLABUS

for

Soil Science and Agril. Chemistry

Dr. Rammanohar Lohia Avadh University, Ayodhya (U.P.)

M.Sc. (Ag.) Soil Science and Agril. Chemistry

Fourth Semester

(Semester System as per ICAR 5th Dean Committee Recommendations)

w.e.f. 2020 - 2021

Submitted by :

Dean & Conveners, Board of Studies

Faculty of Agriculture

Dr. Rammanohar Lohia Avadh University, Ayodhya (U.P.)

M.Sc. (Ag.) Soil Science and Agriculture Chemistry

Ist Semester			Evaluation Marks			
Code No.	Course Title	Credit Hours	Mid Term	End Term	Practical	Total
SSAC - 504	Soil Mineralogy, Genesis, Classification & Survey	3(2+1)	20	50	30	100
SSAC - 509	Soil , Water and Air Pollution	3(2+1)	20	50	30	100
SSAC - 511	Analytical Techniques & Instrumental Methods in Soil and Plant Analysis	2(0+2)			100	100
AS - 501	Agricultural Statistics	3(2+1)	20	50	30	100
	Total Credit	11				
IInd Semester			**Evaluation Marks**			
Code No.	**Course Title**	**Credit Hours**	**Mid Term**	**End Term**	**Practical**	**Total**
SSAC - 501	Soil Physics	3(2+1)	20	50	30	100
SSAC - 502	Soil Fertility and Fertilizer Use	4(3+1)	20	50	30	100
SSAC - 503	Soil Chemistry	3(2+1)	20	50	30	100
SSAC - 506	Soil Biology & Biochemisty	3(2+1)	20	50	30	100
	Total Credit	13				
IIIrd Semester			**Evaluation Marks**			
Code No.	**Course Title**	**Credit Hours**	**Mid Term**	**End Term**	**Practical**	**Total**
SSAC - 505	Soil Erosion and conservation	3(2+1)	20	50	30	100
SSAC - 510	Remote Sensing & GIS Techniques for Soil, Water and Crop Studies	3(2+1)	20	50	30	100
SSAC - 513	Management of Problematic Soils & Waters	3(2+1)	20	50	30	100
CA - 502	Computer Application in Agriculture	2(1+1)	20	50	30	100
PGS - 501	Library and Information Services (Non-Gradial Satisfactory/Unsatisfactory 50% Marks required for satisfactory Grade)	1(0+1)			100	100
	Total Credit	12				
IVth Semester			**Evaluation Marks**			
Code No.	**Course Title**	**Credit Hours**	**Mid Term**	**End Term**	**Practical**	**Total**
SSAC - 591	Master's Seminar	1(0+1)				100
SSAC - 599	Master Research (Thesis)	20	Satisfactory/Unsatisfactory			
OR						
Special Papers - (20 - Credit) Satisfactory/Unsatisfactory						
SSAC - 514	Advanced Organic Chemistry & Plant Biochemisty	4(3+1)	20	50	30	100
SSAC - 515	Advanced Bio-pesticides & Bio-Fertilizers	4(3+1)	20	50	30	100
SSAC - 516	Soil Physical Environment and Plant Growth	4(3+1)	20	50	30	100
SSAC - 517	Soil Testing, Water Quality and Fertilizer Recommendations	4(3+1)	20	50	30	100
SSAC - 518	Modelling Soil Plant System	4(3+1)	20	50	30	100
	Total Credit	21				
	Total Credit Hours	57				

M.Sc. (Ag.) Soil Science and Agriculture Chemistry

IVth Semester Curricula & Syllabus

S. No.	Course Code	Title of the Course	Credit
1	SSAC - 591	Master's Seminar	1(0+1)
2	SSAC - 599	Master Research (Thesis)	20
		OR	
		Five Special Papers - (20 - Credit) Satisfactory/Unsatisfactory	
1	SSAC - 514	Advanced Organic Chemistry & Plant Biochemisty	4(3+1)
2	SSAC - 515	Advanced Bio-pesticides & Bio-Fertilizers	4(3+1)
3	SSAC - 516	Soil Physical Environment and Plant Growth	4(3+1)
4	SSAC - 517	Soil Testing, Water Quality and Fertilizer Recommendations	4(3+1)
5	SSAC - 518	Modelling Soil Plant System	4(3+1)
		Total Credit Hours	**21**

M.Sc. (Ag.)-Soil Sc. & Agri. Chem.

IVth SEMESTER

SSAC - 514 Advanced Organic Chemistry & Plant Biochemisty 4 (3+1)

Characteristics of chemical bonds amd covalency, classification of organic compounds. Nomenclature and their general properties. Chemistry of functional groups, chemistry of aromatic compounds (Benzene & Phenol), Heterocyclic compounds (Purines & Pyrimidines) organic reaction substitution, elimination & addition.

General Chemistry of carbohydrates and photosynthesis of carbohydrates. General Chemistry of lipids, amino acids, nucleic acids, plant pigments, alkaloids, plant hormones their chemistry & uses. Vitamins, classification and occurrence, chemistry and deficiency symptomps. General chemistry of proteins & their biosynthesis, their classification, mechanism of their activity.

Practical :- Related with course.

SSAC - 515 Advanced Bio-pesticides & Bio-Fertilizers 4 (3+1)

Theory

History and concept of biopesticides. Importance, scope and potential of biopesticides. Definition concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses. Mass production technology of bio-pesticides. Virulence. pathogeaicity and symptoms of entomopathogenic pathogens and nematodes. Methods of application of biopesticides, methods of quality control and techniques of biopesticides.

Impediments and limitation in production and use of biopesticides.

Biofertilizers - Introduction , status and scope, structure and characteristic features of bacterial biofertilizers, *Azospirillum, azotobacter, bacillus, Pseudomonas, Rhizobium and Frankia.*

Cynobacterial biofertilizer- *Anahaena, Nostac, Hapalosiphon and funnal bioferilizers - AM mycorrhiza and ectomycorrhiza.* Nitrogen fixation - Fee living and symbiotic nitrogen fixation. Mechanism of phosphate solubiliztion and phosphate mobilization, K solubilization.

Production technology : Strain selection, sterilization growth and fermantation, mass producation of carrier based and liquid biofertilizers. FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers - storage, self life. quality control and marketing factors influencing the efficacy of biofertilizers.

Practical

Isolation and urification of important biopesticides, Trichuderma Pseudomonas, Bacillus, Metarhyzum etc. and its production. Identification of important botanicals, Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition. Quality control of biopesticides.

Isolation and purification of Azospirillum, Azotobacter; Rhizobium. P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AM fungi.- wet sieving method and sucrose gradient method, Mass producation of AM inoculants.

SSAC 516 SOIL PHYSICAL ENVIRONMENT AND PLANT GROWTH 4(3+1)

Theory

Introduction: Effect of soil physical properties on plant growth - soil water, soil air, soil temperature, mechanical impedance and tillage practices. Soil water: Soil moisture – plant water relations, available water, newer concepts of water availability, least limiting water range, soil-plant-atmosphere system as a physical continuum, plant uptake of soil moisture, evaporation, transpiration and evapotranspiration, dynamics of water in the soil- plant-atmosphere continuum. Root growth – germination and seedling emergence, hydraulic properties of roots, characterization of root growth parameters, water balance of the root zone, soil physical properties and root growth, flow of water to roots.

Soil temperature – effect of soil temperature on plant growth, soil temperature management, thermal regimes, mulching, Radiation – heat budget and energy balance in the field, radiation use efficiency, radiation exchange in the field, exchange of heat and vapour to the atmosphere.Aeration – critical oxygen concentration and factors affecting. Field water balance: Field water balance, irrigation and water use efficiency, consumptive use, plant uptake of soil moisture. Nutrients: Nutrient uptake and use by plants, managing soil physical condition for improved nutrient use efficiency, integrated nutrient management in relation to soil physical condition.

Resource conservation technologies: Bed planting and zero-tillage - types, suitability and effect on soil physical properties, other resource conservation technologies and the impact (short and long term) on soil health. Modelling: Interactions of soil, management and climatic factors on plant growth, and development of sustainability indices.

Practical

Measurement of penetration resistance and LLWR; plant water potential; field saturated hydraulic conductivity; transpiration using porometer; root length density, root diameter, root weight using root scanner; germination percentage as affected by temperature; estimation of evapo-transpiration losses under different management options; measurement/estimation of consumptive water use, production functions, field water balance components, and water uptake by plants.

SSAC 517 SOIL TESTING, WATER QUALITY AND FERTILIZER RECOMMENDATIONS 4(3+1)

Theory

Soil testing – its scope and significance in sustainable agriculture; historical background and development of soil testing in India and future challenges; SWOT analysis of soil testing service; soil, plant and water sampling and processing techniques.

Soil test methods – principles and development; soil testing for primary, secondary and micronutrients; diagnosis and amelioration of problem soils; interpretation of soil test data; soil test summaries and soil fertility maps.

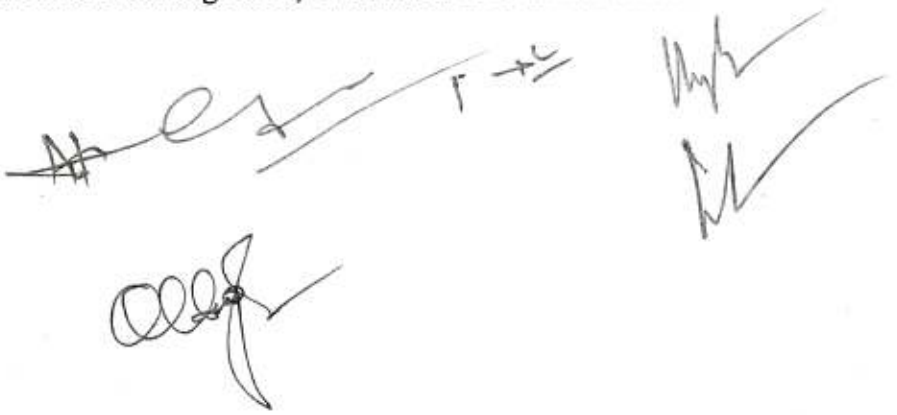
Sources of soluble salts and other impurities in water; quality of different water resources in India; interaction of ionic constituents in water with soil; leaching and salt movement through soil; water quality evaluation; factors affecting use of poor quality irrigation water for crop production; management practices for using saline-sodic waters; sewage and industrial effluents for irrigation.

Different approaches of fertilizer recommendation; critical nutrient concept; targeted yield and multiple regression techniques in soil test crop response studies; formulation of fertilizer dose for different types of crops and cropping systems including cereals, vegetables, ornamental and horticultural crops on normal and problem soils; fertilizer recommendations for rain-fed conditions, integrated plant nutrient supply systems.

Emerging concepts of fertilizer application; synchronizing nutrient supply with plant demand; site-specific nutrient management.

Practical

Collection of soil and plant samples from agricultural and horticultural crops; sample processing; handling of laboratory instruments; determination of pH, EC and organic carbon; available nutrients (N, P, K, S, B, Zn, Cu, Fe and Mn); estimation of non-exchangeable K; lime requirement of acid soils and gypsum requirement of sodic soils; assessment of irrigation water quality; use of leaf colour chart in real-time N management; calculation of fertilizer doses.



SSAC 518 MODELLING SOIL PLANT SYSTEM 4 (3+1)

Theory

Introduction, terms and definitions; classification of models; steps of modelling; Taylor series; numerical methods of differentiation and integration; convergence and stability of models. High level computer language - FORTRAN its commands and usage; testing and evaluation of model. Description of spatially homogeneous models; K transformation model; model on carbon, nitrogen and phosphorus dynamics in soil.

Spatially heterogeneous models; equation of continuity; simulation of water flow through soil; explicit and explicit-implicit method; simulation of solute movement through soil by explicit method and with variable moisture flux by explicit-implicit method. Nutrient uptake models; water uptake models; sensitivity analysis, parameter ranking and model simplification.

Practical

Testing and usage of FORTRAN commands; writing, compiling, linking and execution of FORTRAN modules on i) K transformation and equilibria in soils, ii) C, N and P transformation in soils, iii) water and salt movement in soils, and iv) nutrient uptake by plants.