

**Course Title with Credit Load Ph.D.
in Agronomy**

Course	Course Title	Credit
Agron 601*	Current trends in Agronomy	3+0
Agron 602	Recent trends in crop growth and	2+1
Agron 603	Irrigation management	2+1
Agron 604	Recent trends in weed management	2+0
Agron 605	Integrated farming systems for sustainable	2+0
Agron 606	Soil Conservation and Watershed	2+1
Agron 607	Stress Crop Production	2+1
Agron 608*	Research and Publication ethics	2+0
Agron-691	Doctoral Seminar	1+0
Agron 692	Doctoral Seminar	1+0
Agron 699	Doctoral Research	75

*Indicates Core course for Ph.D.

Course Curriculum of Ph.D Programme

(Major, Minor, Supporting and Non-credit courses)

SEMESTER-I



**SHRI VAISHNAV INSTITUTE OF AGRICULTURE,
INDORE**

**SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA,
INDORE**



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Agriculture
Ph.D. (Ag.) Agronomy

Course Code	Course Name	TEACHING & EVALUATION SCHEME							
		Theory			Practical		Credits		
		END SEM University Exam	Mid term exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	P	Total
PHDA101	Research Methodology	60	00	40	00	00	3	0	3

A.1. Research Methodology (PHDA101)

Course Overview: The course has been designed to enable the students irrespective of their discipline in developing the most appropriate methodology for their research studies and to make them familiar with the art of using different research methods and techniques.

Examination Scheme:

The faculty member will award internal marks out of 40 based on the assignments and minor project. The end semester examination will be worth 60 marks. There will be 8 questions out of which students will have to answer 5 questions.

Course contents

Module 1: Introduction to Research Methods: Role and objectives of business research, types of research and various research design (exploratory, descriptive, experimental and diagnostic research), research process: Overview, Problems encountered by researcher. Experimental research design will comprise of Completely Randomized Design, Latin Square Design and Factorial Design. Limitations of RM: Ethics in Research, Philosophical issues in Research.

Module 2: Data and their Collection: Collection, Organization, Presentation, Analysis and Interrelation of Primary and Secondary Data. Measurement in research, measurement scales, sources of errors in measurement, Techniques of developing measurement tools, classification and testing (reliability, verification and validity) scales, Designing questionnaires and interviews Sampling, Sampling Methods, Sampling Plans, Sampling Error, Sampling Distributions : Theory and Design of Sample Survey, Census Vs Sample Enumerations, Objectives and Principles of Sampling, Types of Sampling, Sampling and Non-Sampling Errors.

Module 3: Review of statistical tools/methods for business research – for univariate and bivariate analysis. Significance of correlation coefficient, significance of regression coefficient. Simple Concept of Probability and Theoretical Frequency Distribution, (Binomial, Normal & Poisson). Hypothesis and Hypothesis testing Parametric & non-parametric tests, introduction to sample tests for univariate and bivariate analysis using normal distribution, f-test, t-test, z-test, , chi-square test. Interpretations and Report Writing: Meaning of interpretation, techniques of Interpretation, precautions in interpretation, significance of report writing, steps in report writing, layout of report and precautions in writing research reports.

Reference Books:

- Bryman, Allan and Bell Emma (2003). **Business Research Methods**. Noida: Oxford.
- Kerlinger Fred. N.(2002). **Foundations of Behavioral Research**. USA: Holt and Rinehalt.

- Kothari, C. R. (2004). **Research Methodology: Methods and Techniques**. New Delhi: New Age International
- Murthy, S. N. and Bhojanna, U. (2008). **Business Research Methods**. New Delhi: Excel
- Sekaran, Uma (2006). **Research Methods for Business: A Skill Building Approach**. New Delhi: John Wiley & Sons.



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PHDA102	Review of Literature	60	00	40	00	00	2	0	2

A.2. Review of Literature (PHDA102)

Course Overview: The objective of this course is to help the candidate to comprehend his/her broad field of research and be academically sound to carry out his research work. Understand the basic philosophical assumptions underlying research literature reviews for different purposes, including what, why, when, for whom, and how? Be able to manage the process of conducting a literature review, including reading, note taking strategies, coding/reference management, synthesizing and writing literature results. Be able to write a quality literature review with variations in references

Examination Scheme:

The candidate is required to write a Review paper based on the review of literature on his/her area of research in consultation with his supervisor. The paper has to be evaluated and approved by the panel constituted by Faculty of Doctoral studies and Research besides the assignments.

Course Content

Module 1: Understanding Review of literature: Relevance, Approach and Applications; Developing an outline for the literature review; Formulate key questions for a review. Organizing a literature search: Identify which literature bases to search; Developing the theoretical basis for the Research Question; Searching for, locating and organizing relevant professional literature

Module 2: Conducting the Review: Abstract relevant information from appropriate studies in a systematic manner; critically reviewing the literature; Rate the scientific quality of each study and the level of evidence for each question;

Module 3: Synthesizing the Review: Create evidence tables and summary tables; interpret the pattern of evidence in terms of strength and consistency; Summarize the studies' findings. Writing the review: Writing a first draft; Writing references and citations; Obtaining, giving, and making productive use of feedback; the redrafting process; Professional formatting.



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PHDA103	Computer Applications	60	00	40	00	00	2	0	2

A.3.Computer Applications (PHDA103)

Course Overview: *The candidate should gain sufficient practical knowledge for use of computer and computer software for use in research work.*

Examination Scheme:

The faculty member will award internal marks out of 40 based on the assignments and minor project. The end semester examination will be 60 marks with weightage of (online exams 40% + practical 60%)

Contents

Module 1: Basic knowledge of application software's in MS- Office with focus on MS-Word- its features and applications related to presentation of text in decent format and saving the same for further use. The practical knowledge of this software should enable the candidate to type and prepare the thesis in a presentable format. MS-Excel- construction of worksheet and inserting data according to its characteristics, use of statistical tools and their presentation in the form of charts and graphs.

Module 2: Use of Internet for research work and exploring various websites and search engines for collecting quality literature review and secondary data etc. related to thesis work.

Module 3: MS- Power point – create power point presentation on a topic related to the theme of thesis and use of different presentation techniques. Use of SPSS – method of preparing data sheet and entering data according to its characteristics , use of various statistical tools on SPSS.



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AGRON 601	Current trends in Agronomy	60	00	40	00	00	3	0	3

1. Legends: L - Lecture; P – Practical

2. *Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class.

Objective

To acquaint the students about recent advances in agricultural production.

Theory

UNIT I

Agro-physiological basis of variation in yield, recent advances in soilplant-water relationship.

UNIT II

Globalization of agriculture and WTO, precision agriculture, contract farming, organic farming, marketing and export potential of organic products, certification, labeling and accreditation procedures and ITK in organic farming.

UNIT III

Crop residue management in multiple cropping systems; latest developments in plant management. Mechanization in crop production: modern agricultural precision tools and technologies, weed management, cropping systems, grassland management, agro-forestry, allelopathy.

UNIT IV

GIS, GPS and remote sensing for crop management, global warming, GM crops, seed production technology; seed certification, seed multiplication, hybrid seed production etc.

UNIT V

Concepts of system agriculture; holistic approach of farming systems, dryland farming, sustainable agriculture and research methodology in Agronomy. Conservation agriculture, principles, prospects and importance, potential benefits of CA under climate change scenario, policy issues.

Suggested Readings

1. Agarwal RL. 1995. Seed Technology. Oxford & IBH.
2. Dahiya BS and Rai KN. 1997. Seed Technology. Kalyani.
3. Govardhan V. 2000. Remote Sensing and Water Management in Command Areas: Agroecological Prospectives. IBDC.
4. ICAR. 2006. Hand Book of Agriculture. ICAR.
5. Narasaiah ML. 2004. World Trade Organization and Agriculture. Sonali Publ.
6. Palaniappan SP and Annadurai K. 2006. Organic Farming - Theory and Practice. Scientific Publ.
7. Sen S and Ghosh N. 1999. Seed Science and Technology. Kalyani.

8. Tarafdar JC, Tripathi KP and Kumar M. 2007. Organic Agriculture Scientific Publ.
9. Kumar, R, Swarnkar KS, Singh KS and Narayan S. 2016. A Text Book of Seed Technology. Kalyani Publication.
10. Reddy SR and Prabhakara G. 2015. Dryland Agriculture. Kalyani Publishers.
11. Gururajan B, Balasubhramanian R and Swaminath V. 2013. Recent Strategies on Crop Production. Kalyani Publishers.
- 12.** Venkateswarlu B and Shanker Arun K. 2009. Climate change and agriculture: Adaptation and mitigation strategies. Indian Journal of Agronomy 54(2): 226-230.



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AGRON 608	Research and Publication Ethics	60	00	40	00	00	2	0	2

1. Legends: L - Lecture; P – Practical

2. *Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class.

Objective

To study the physiology of vegetative and reproductive growth in relation to productivity of different crops in various environments.

Theory

UNIT I

Introduction to philosophy: definition, nature and scope, concept, branches. Ethics: definition, moral philosophy, nature of moral judgements and reactions. Scientific conduct: Ethics with respect to science and research, intellectual honesty and research integrity, Scientific misconducts- falsifications, fabrications and plagiarism (FFP): Redundant publications: duplicate and overlapping publications, salami slicing; selective reporting and misrepresentation of data.

UNIT II

Publication ethics: Definition, introduction and importance. Best practices/standard setting initiatives and guidelines: COPE, WAME, etc., conflicts of interest. Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, type, violation of publication ethics, authorship and contributor ship, Identification of publication misconduct, complaints and appeals, predatory publishers and journals

UNIT III

Open access publishing: open access publication and initiatives: SHERPA, RoMEO online resource to check publisher copy right and self archiving policies; software tool to identify predatory publications developed by SPPU, Journal finder/journal suggestions tools viz., JANE, Elsevier Journal Finder, Springer Journal Suggester.

UNIT IV

Publication misconduct: Group discussions- subject specific ethical issues, FFP, authorship, conflicts of interest, complaints and appeals examples and fraud from India and abroad. Software tools: Use of plagiarism software like Turnitin, Urkund and other open source software tools

UNIT V

Database and Research metrics: Indexing data base, citation database, web of science, scopus, etc. Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite Score; Metrics: h-index, g-index, i10-index altmetrics.



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SOIL 601	Recent Trends in Soil Physics	60	00	40	00	00	2	0	2

1. Legends: L - Lecture; P – Practical

2. *Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class.

Objective

To provide knowledge of modern concept sin soil physics.

Theory

UNIT I

Soil-water interactions, soil water potential, free energy and thermodynamic basis of potential concept, chemical potential of soil water and entropy of the system, soil-plant-atmospheric continuum (SPAC).

UNIT II

Fundamentals of fluid flow, Poiseuilles law, Laplace's equation, Darcy's law in saturated and unsaturated flows; development of differential equations in saturated and unsaturated waterflow, capillary conductivity and diffusivity; limitations of Darcy's law; numerical solution for one dimensional waterflow.

UNIT III

Theories of horizontal and vertical infiltration under different boundary conditions. Movement of salts in soils, models for miscible-immiscible displacement, diffusion, mass flow and dispersion of solutes and their solutions through differential equations; break-through curves. Soil air and aeration, mass flow and diffusion processes; thermal properties of soil, heat transfer in soils, differential equation of heat flow, measurement of thermal conductivity of soil; Soil, Plant, Water relations- Plant uptake of soil moisture, Water balance and energy balance in the field; irrigation and water use efficiency.

UNIT IV

Soil crust and clod formation; structural management of puddled rice soils; soil conditioning-concept, soils conditioners-types, characteristics, working principles, significance in agriculture.

UNIT V

Solar and terrestrial radiation measurement, dissipation and distribution in soil crop systems; prediction of evapotranspiration using aerodynamic and canopy temperature-based models; canopy temperature and leaf diffusion resistance in relation to plant water deficit; evaluation of soil and plant water status using infrared thermometer.

Suggested Readings

1. Baver LD, Gardner WH and Gardner WR. 1972. Soil Physics. John Wiley & Sons.

2. Hanks and Ascherof. 1980. Applied Soil Physics. Springer Verlag.
3. Hillel D. 1980. Applications of Soil Physics. Academic Press.
4. Hillel D. 1980. Environmental Soil Physics. Academic Press.
5. Indian Society of Soil Science 2002. Fundamentals of Soil Science. ISSS, New Delhi.
6. Kirkham D and Powers WL. 1972. Advanced Soil Physics. Wiley Interscience.
7. Lal R and Shukla MK. 2004. Principles of Soil Physics. Marcel Dekker.
8. Oswal MC. 1994. Soil Physics. Oxford & IBH.



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SOIL 602	Modern Concept in Soil Fertility.	60	00	40	00	00	2	0	2

1. Legends: L - Lecture; P – Practical

2. *Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class.

Objective

To provide knowledge of modern concepts of soil fertility and nutrient use in crop production.

Theory

UNIT I

Nutrient availability-concept and relationships, modern concepts of nutrient s availability; soil colloids and nutrient availability; soil amendments and availability maintenance of nutrients, soil solution and plant growth; nutrient response functions and availability indices.

UNIT II

Nutrient movement in soils; nutrient absorption by plants; mechanistic approach to nutrient supply and uptake by plants; models for transformation and movement of major micronutrients in soils. Chemical equilibria (including solid-solution equilibria) involving nutrient ions in soils, particularly in submerged soils; Kinetic studies of nutrients in soils.

UNIT III

Modern concepts of fertilizer evaluation, nutrient use efficiency and nutrient budgeting.

Modern concepts in fertilizer application; soil fertility evaluation techniques; role of soil tests in fertilizer use recommendations; site-specific nutrient management for precision agriculture.

UNIT IV

Monitoring physical, chemical and biological changes in soils; permanent manurial trials and long-term fertilizer experiments; soil productivity under long-term intensive cropping; direct, residual and cumulative effect of fertilizer use.

UNIT V

Carbon– a nutrient central to soil fertility; carbon cycle in nature, stocks, pools and fluxes; greenhouse effect and climate change; carbon sequestration vis-à-vis sustenance of soil quality and crop productivity.

Suggested Readings

1. Barber SA. 1995. Soil Nutrient Bioavailability. John Wiley & Sons.
2. Barker V Allen and Pilbeam David J. 2007. Handbook of Plant Nutrition. CRC / Taylor & Francis.
3. Brady NC and Weil RR. 2002. The Nature and Properties of Soils. 13th Ed. Pearson

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4. Cooke GW. 1979. The Control of Soil Fertility. Crossby Lockwood & Sons.
5. Epstein E. 1987. Mineral Nutrition of Plants - Principles and Perspectives. International Potash Institute, Switzerland.
6. Kabata- Pendias Alina 2001. Trace Elements in Soils and Plants. CRC / Taylor & Francis.
7. Kannaiyan S, Kumar K and Govindarajan K. 2004. Biofertilizers Technology. Scientific Publ.
8. Mortvedt JJ, Shuman LM, Cox FR and Welch RM. (Eds.). 1991. Micronutrients in Agriculture. 2nd Ed. Soil Science Society of America, Madison.
9. Prasad R and Power JF. 1997. Soil Fertility Management for Sustainable Agriculture. CRC Press.
10. Stevenson FJ and Cole MA. 1999. Cycles of Soil: Carbon, Nitrogen, Phosphorus, Sulphur, Micronutrients. John Wiley & Sons.
11. Stevenson FJ. (Ed.). 1982. Nitrogen in Agricultural Soils. Soil Science Society of America, Madison.
12. Tisdale SL, Nelson WL, Beaton JD and Havlin JL. 1990. Soil Fertility and Fertilizers. 5th Ed. Macmillan Publ.
- 13.** Wild A. (Ed.). 1988. Russell's Soil Conditions and Plant Growth. 11th Ed. Longman.