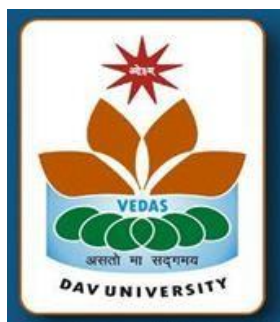


DAV UNIVERSITY JALANDHAR



FACULTY OF AGRICULTURAL SCIENCES

COURSE CURRICULUM

FOR

**M.Sc. Ag. (Agricultural Extension and
Communication)**

1st to 4th SEMESTER

Examinations 2026-2027 session onwards

Applicable for admissions in 2026

Vision of the Department:

Develop human resource to be able to cater to the needs of stakeholders in academia, industry and public/private sector for achieving livelihood security through sustainable agriculture.

Mission of the Department:

- Developing excellence in agriculture education and emerging as leader
- Imparting education to foster inter- disciplinary approach for sustainable agriculture
- Training manpower for upcoming challenges in agriculture with an aim at resource conservation and enhancing farm income

Programme Educational Objectives

- **PEO 1-** Enhance the students' understanding of plant breeding and genetics principles and enable them to apply this knowledge to solve real world problems in crop improvement.
- **PEO 2-** Develop practical and research skills in plant breeding and genetics to design and conduct experiments, analyze data and interpret results.
- **PEO 3-** Foster critical thinking, problem-solving, and decision-making abilities to develop human resource to take informed decisions in plant science context.
- **PEO 4-** Encourage interdisciplinary collaboration and professional development to make students understand the importance of ethics, sustainability and global food security in their work.
- **Instructional Methods:**
Power point presentation
Chalk and Board
Smart board
Lectures
Assignments, quiz
Group tasks, student's presentations
- **Name of the Programme:**
M. Sc. Agriculture (Agricultural Extension and Communication)

❖ Key Facts & Figures (about the Programme)

- Type: Masters
- Degree: M. Sc. Agriculture (Agricultural Extension and Communication)
- Eligibility: B.Sc. (Agriculture /Horticulture with a minimum CGPA of 6.50 in 10 point scale, 3.25 in 5 point scale or 2.60 in 4 point scale (60% marks if CGPA is not given). For SC/ST candidates, a minimum CGPA of 5.50 in 10 point scale, 2.75 in 5 point scale or 2.20 in 4 point scale (50% marks where CGPA is not given)
- Mode of study: Full-time
- Medium of Instruction: English
- Credit Points: 40 + 30

- Location: DAV University Campus
- Start date: July-August

❖ Overview of the Programme

A master's degree in Agricultural Extension Education and Communication is a two-year postgraduate programme in agriculture that focuses on agricultural technology transfer, effective communication, and rural development. The programme equips students with the knowledge and skills to improve farmers' awareness, decision-making, and adoption of innovative agricultural practices.

During the programme, students gain theoretical and practical knowledge of extension teaching methods, communication strategies, programme planning and evaluation, research methodology, and participatory rural development. They also learn modern approaches such as Information and Communication Technologies (ICTs), digital agriculture, e-extension, and Participatory Rural Appraisal (PRA). Practical training through village attachment, field visits, farmer interactions, surveys, demonstrations, and extension activities forms an integral part of the programme. Students undertake independent research, analyse data, and prepare a thesis to fulfil the requirements of the master's degree. The programme also provides opportunities to interact with agricultural scientists and development professionals, preparing graduates for careers in agricultural education, research, extension services, rural development, and agribusiness communication.

❖ The programme outline

<hr/>	
(i) Course work	
Major courses	20
Minor courses	08
Supporting course	06
Common courses	05
Seminar	01
(ii) Thesis Research	30
Total	70
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Scheme of Courses
M. Sc. Ag. (Agricultural Extension and Communication)
Semester 1

Outline of the Courses

S. No.	Paper Code	Course Title	Course Type	L	T	P	
1	AEX503	Organizational behaviour and development	Major	2	0	1	3
2	AEX504	Research methodology in extension	Major	2	0	1	3
3	AEX505	Capacity development	Major	2	0	1	3
4	CSA 559	Computer fundamentals and Programming	Supporting Course	2	0	1	3
5		Open elective or Interdisciplinary elective-I	Minor	2	0	1	3
	Total			10		5	15

L: Lectures T: Tutorial P: Practical Cr: Credits

Semester II

S. No	Paper Code	Course Title	Course Type	L	T	P	Cr
1	AEX501	Extension landscape	Major	2	0	0	2
2	AEX502	Applied behaviour change	Major	2	0	1	3
3	AEX506	ICTS for agricultural extension and advisory services	Major	2	0	1	3
4	ENG 551	Technical Writing and Communication skills	Common Course	0	1	1	1
5	AGS 503	Intellectual Property and its management in Agriculture	Common Course	1	0	0	1
6		Open elective or Interdisciplinary elective-II	Minor	2	0	1	3
7	AGS500	Masters' Research	Research	0	1	4	4
				9		4+4	13+4

L: Lectures T: Tutorial P: Practical Cr: Credits

Semester III

S. No	Paper Code	Course Title	Course Type	L	T	P	Cr
1	AEX507	Evaluation and Impact assessment	Major	2	0	1	3
2	MTH670	Statistical Methods for Applied Sciences	Supporting Course	3	0	1	4
3	AGS501	Library and Information services	Common Course	0	1	1	1
4	AGS504	Basic concepts of Laboratory Techniques	Common Course	0	1	1	1
5	AGS 505	Agricultural Research, ethics and rural developmental programmes	Common Course	1	0	0	1
6		Open elective or Interdisciplinary elective-III	Minor Course	1	0	1	2
7	AGS 560	Master's Seminar	Major Course	0	1	1	1
8	AGS500A	Master's Research	Research	0	1	8	8
				7		6+8	13+8

L: Lectures

T: Tutorial

P: Practical

Cr: Credits

Semester IV

S. No	Paper Code	Course Title	Course Type	L	T	P	Cr
1.	AGS500B	Master's Research	Research	0	0	36	18
2.	AGS500C	Thesis work	Research	0	0	10	5

L: Lectures T: Tutorial P: Practical Cr: Credits

Course Code	AEX501						
Course Title	Extension Landscape						
Hours	L:2, T:0, P:0						
Credits	2						
Type	Core Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: Students will be introduced to the new challenges before extension and how extension is evolving globally</p> <p>CO2: After this course, the students will know about communication & Innovation systems and new extension approaches</p> <p>CO3: Students will get to know about the insights from innovation studies and new extension approaches</p> <p>CO4: Students will know about the extension reforms and policy challenges in managing pluralistic extension systems</p>						
Examination Type	Theory						
Assessment Tools	WQ	SAP	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	10%	10%	25%	0	50%	0	5%
Examination Mode	Theory						
Syllabus							
Unit 1	<ul style="list-style-type: none"> Extension and Advisory Services (EAS)- Meaning (embracing pluralism and new functions) New Challenges before farmers and extension professionals: Natural Resource Management- Supporting farmers to manage the declining/deteriorating water and soil for farming; Gender Mainstreaming- How extension can enhance access to new knowledge among women farmers; Nutrition- Role of extension in supporting communities with growing nutritious crop and eating healthy food; Linking farmers to markets- Value chain extension including organizing farmers, strengthen value chain and supporting farmers to respond to new standards and regulations in agri-food systems; Adaptation to climate changes-How extension can contribute to up-scaling Climate Smart Agriculture; Supporting family farms strengthening the capacities of family farms; Migration-Advising farmers to better respond to opportunities that emerge from increasing mobility and also supporting migrants in enhancing their knowledge and skills; Attracting and Retaining Youth in Agriculture including promotion of agripreneurship and agri-tourism; Urban and peri-urban farming- How to support and address issues associated with urban and peri-urban agriculture; 						CO1

	<ul style="list-style-type: none"> Farmer distress, suicides- Supporting farmers in tackling farm distress. 	
Unit 2	<ul style="list-style-type: none"> Beyond transfer of technology: Performing new functions to deal with new challenges; Organising producers into groups-dealing with problems that need collective decision making such as Natural Resource Management (NRM) and access to markets; Mediating conflicts and building consensus to strengthen collective decision making; Facilitating access to credit, inputs and services-including development of service providers; Influencing policies to promote new knowledge at a scale Networking and partnership development including convening multi-stakeholder platforms/ innovation platforms. New Capacities needed by extension and advisory services at different levels –at the individual (lower, middle management and senior management levels), organizational and enabling environment levels; –Core competencies at the individual level; Varied mechanisms for capacity development (beyond training). Pluralism in EAS Pluralism in Extension Delivery: Role of private sector (input firms, agri-business companies, consultant firms and individual consultants)- Trends in the development of private extension and advisory services in India and other countries; challenges faced by private extension providers; Role of Non-Governmental Organizations (National/international)/ Civil Society Organizations (CSOs) in providing extension Experiences from India and other countries; Producer Organizations- Role in strengthening demand and supply of extension services; their strength and 240 Social Sciences: Agricultural Extension Education weaknesses-experiences from different sectors; Role of Media and ICT advisory service providers; global experiences with use of media and ICTs in advisory services provision. 	CO2
Unit 3	<ul style="list-style-type: none"> Diffusion of Innovations paradigm- strengths and limitations; multiple sources of innovation-farmer innovation, institutional innovation; farmer participation in technology generation and promotion; strength and limitations; Agricultural Knowledge and Information Systems (AKIS); strength and limitations; Agricultural Innovation Systems (AIS); Redefining Innovation- Role of Extension and Advisory Services in AIS-From information delivery to intermediation across multiple nodes; Role of brokering; Innovation Platforms, Innovation Management; Strength and weaknesses of AIS. Rethinking Communication in the Innovation Process – Network building, support social learning, dealing with dynamics of power and conflict. Evolution and features of extension approaches: Transfer of technology approach; 	CO3

	<ul style="list-style-type: none"> educational approach, farmer participatory extension approach, demand-driven extension, market led extension (value chain extension), extension for climate smart agriculture, gender sensitive extension, extension for entrepreneurship Extension systems in different regions: Asia-Pacific, Europe, Latin America, Australia, North America Networking for Strengthening EAS: GFRAS (Global Forum for Rural Advisory Services) and its regional networks. 	
Unit 4	<ul style="list-style-type: none"> Reduction in public funding: public withdrawal from extension provision (partial/ full); Examples/Cases; Privatization: Public funding and private delivery; cost sharing and cost recovery; Examples/Cases; Decentralisation of extension services; Examples/ Cases; Lessons from extension reforms in different countries; Extension and Sustainable Development Goals (SDGs). Pluralism: Managing pluralism and Co-ordination of pluralistic extension provision; Public private partnerships in extension (including the role of local governments/ panchayats and producer organisations); Examples, challenges in co-ordination; Achieving convergence in extension planning and delivery, Financing Extension: Mobilising resources for extension: public investments, donor support (grants/loans); Monitoring and Evaluation of Extension: Generating appropriate data for Assessment and Evaluation of pluralistic extension; Strengthening extension policy interface; generating evidence on impact of extension and policy relevant communication. 	CO4
Reference Books	<ol style="list-style-type: none"> Swanson BE. 2008. Global Review of Good Agricultural Extension and Advisory Service Practices. Food and Agriculture Organization of the United Nations. Rome. http://www.fao.org/docrep/pdf/011/i0261e/i0261e00.pdf Mittal N, Sulaiman RV and Prasad RM. 2016. Assessing capacity needs of Extension and Advisory Services: A Guide for Facilitators. Agricultural Extension in South Asia (AESA). http:// crispindia.org/wpcontent/uploads/2015/09/Facilitators-Guide-Final-LR.pdf Jennings JR, Packham RG and Woodside D. 2011. Shaping change: natural resource management, agriculture and the role of extension. Australasia Pacific Extension Network. http://www.apen.org.au/shaping-change Manfre C, Rubin D and Nordehn C. 2017. Assessing How Agricultural Technologies can Change Gender Dynamics and Food Security Outcomes. A three part toolkit. Integrating Gender and Nutrition within Agricultural Extension Services (INGENAES). http:// www.culturalpractice.com/wp-content/uploads/Introduction-to-the-Toolkit-Final-10_17.pdf Adolph B. 2011. Rural Advisory Services World wide: A Synthesis of Actors and Issues. GFRAS: Lindau, Switzerland. https://www.g-fras.org/en/knowled Bitzer V, Wennink B and de Steenhuijsen PB. 2016. The 	

	<p>personality, measuring personality (traits, locus of control, self-efficacy)</p> <ul style="list-style-type: none"> • Personal, social and moral development – meaning, concepts – self-concept, self-esteem and self-worth and theories • Motivation – foundations, approaches, theories, managing human needs and motivations • Perceiving others – impression, attitude, opinions • Emotions - foundations, types and functions, measuring emotional intelligence 	
Unit 2	<ul style="list-style-type: none"> • Sensory organs and their role cognition • Cognitive processes – Attention, perception, remembering and forgetting, knowledge and expertise – foundations and theories • Principles and processes of perception • Consciousness – meaning, types, sleep and dreams • Learning and Memory – Memory - meaning, types and mechanisms of storage and retrieval of memories in the Human brain • Complex cognitive processes - Concept formation, Thinking, Problem solving and transfer – foundations, theories and approaches • Information processing – meaning, principles • Models of information processing - Waugh and Norman model of primary and secondary memory • Atkinson and Shiffrin's stage model of memory; other models including blooms taxonomy and Sternberg's Information Processing Approach • Attention and perception – meaning, types, theories and models • Consciousness 	CO2
Unit 3	<ul style="list-style-type: none"> • Learning – foundations, approaches and theories • Cognitive approaches of learning – meaning, principles theories and models • Memory – foundations, types • Behavioural approaches of learning – foundations and theories - classical conditioning, operant conditioning, applied behaviour analysis • Social cognitive and constructivist approaches to learning – foundations and theories – social cognitive theory • Self-regulated learning; learning styles – meaning, types and applications in learning • Human judgement – meaning, nature, randomness of situations, theories and models • Choice – meaning, criteria for evaluating options; theories and models of human choice • Choice architecture • Decision-making – Meaning, problem analysis; steps and techniques of decision-making under different contexts 	CO3
Unit 4	<ul style="list-style-type: none"> • Attitudes - meaning, assumptions, types, theories and models of attitude formation; methods of changing attitudes • Relating to others - liking, attraction, helping behaviour, prejudice, discrimination and aggression • Liking/ affect – meaning, types and theories • Attraction – meaning, types and theories • Persuasion – meaning, theories and techniques 	CO4

	<ul style="list-style-type: none"> • Social influence and groups – conformity, compliance and obedience • Social judgement – meaning, frame of reference, stereotyping • The judgement of attitude models • Attribution – meaning, theories • Rational decision making • Social identify – meaning, types; assessment • Groups – meaning, types, group processes; sustainability of groups • Inter group processes and theories social learning 	
Practical	<ul style="list-style-type: none"> • Understanding perception – Attentional Blink and Repetition Blindness exercise • Understanding attention - Testing selective attention capacity and skills and processing speed ability through Stroop test • Hands-on experience in the techniques for assessing creative thinking – divergent and convergent thinking • Lab exercise in applying Maslow’s need hierarchy to assess motivation • Learning - Classical conditioning and operant conditioning • Assessing learning styles through Barsch and Kolb inventories • Practical experience in building self-esteem • Assessment of emotional intelligence 	
Reference Books	<ol style="list-style-type: none"> 1. Eiser J, Richard. 2011. Social Psychology: Attitudes, Cognition and Social Behaviour. Cambridge: Cambridge University Press.(First Edition, 1986)) 2. Eysenck MW and Keane M T. 2010. Cognitive psychology: A student’s handbook. Sixth Edition, Hove: Psychology Press. 3. Feldman RS. 2008. Essentials of understanding psychology (7th ed.). Boston: McGraw-Hill. Gilovich T, Keltner D, and Nisbett RE. 2011. Social psychology. New York: W.W. Norton & Co. Moreno R. 2010. Educational Psychology. Hoboken, NJ: John Wiley & Sons Inc. 4. Nevid JS. 2012. Essentials of psychology: Concepts and applications Belmont, CA: Wadsworth, Cengage Learning. 5. Rachlin H. 1989. Judgment, decision, and choice: A cognitive/behavioral synthesis. New York: W.H. Freeman. 	

Course Code	AEX503
Course Title	Organisational Behavior and Development
Hours	L:2, T:0, P:1
Credits	2+1
Type	Core Course
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: Student will know the basics of organization behaviour</p> <p>CO2: Student will be able to analyze productive behaviour and occupational stress</p> <p>CO3: Student will be able to understand organizational system</p> <p>CO4: Student will have an overview of organizational development and its management, analysis of analyze OD interventions and practitioners</p>

Examination Type	Theory + Practical						
Assessment Tools	WQ	SAP	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	5%		25%		40%	25%	5%
Examination Mode	Theory + Practical						
Syllabus							
Unit 1	<ul style="list-style-type: none"> • Introduction to organizations-concept and characteristics of organizations; Typology of organizations; • Theories of organizations: nature of organizational theory, Classical theories, Modern management theories, System Theory • Criticisms and lessons learnt/ analysis Concepts of Organisational Behaviour, Scope, Importance, Models of OB. • Individual Behaviour in Organizations: Introduction, Self-awareness, Perception and Attribution, Learning, • Systems approach to studying organization needs and motives – attitude, values and ethical behavior, • Personality, Motivation-Concept & Theories, Managing motivation in organizations. 						CO1
Unit 2	<ul style="list-style-type: none"> • Foundations of group, group behaviour and group dynamics, Group Development and Cohesiveness, Group Performance and Decision Making, Intergroup Relations; • Teams in Organizations-Team building experiential exercises, Interpersonal Communication and Group; • Leadership: Meaning, types, Theories and Perspectives on Effective Leadership, Power and Influence, managing Conflict and Negotiation skills, Job/ stress management, decision-making, problem-solving techniques. • Productive behaviour - Meaning, dimension; Job analysis and Job performance – meaning, dimensions, determinants and measurement; • Job satisfaction and organizational commitment - meaning, dimensions and measures roles and role clarity; • Occupational stress – meaning, sources, theories and models, effects, coping mechanism, effects and management; • Occupational stress in farming, farmer groups/ organizations, research and extension organizations. 						CO2
Unit 3	<ul style="list-style-type: none"> • Organizations Structure- Need and Types, Line & staff, functional, committee, project structure organizations, centralization & decentralization, • Different stages of growth and designing the organizational structure; • Organizational Design Parameters of Organizational Design, Organization and Environment, 						CO3

	<ul style="list-style-type: none"> • Organizational Strategy, Organization and Technology, Power and Conflicts in Organizations, • Organizational Decision-Making; Organizational Culture vs Climate; • Organizational Change; • Organizational Learning and Transformation. 	
Unit 4	<ul style="list-style-type: none"> • Overview of Organizational Development: Concept of OD, Importance and Characteristics, Objectives of OD, History and Evolution of OD, Implications of OD Values. • Managing the Organizational Development Process: Basic Component of OD Program-Diagnosis-contracting and diagnosing the problem, • Diagnostic models, open systems, individual level group level and organizational level diagnosis; • Action-collection and analysis for diagnostic information, feeding back the diagnosed information and interventions; • Program Management- entering OD relationship, contracting, diagnosis, feedback, planned change, intervention, evaluation. • Organizational Development Interventions: Meaning, Importance, Characteristics of Organization development Interventions, Classification of OD Interventions- Interpersonal interventions, Team Interventions, • Structural Interventions, Comprehensive Interventions. • Organizational Development Practitioner or Consultant: Types of OD consultants and their advantages, qualifications, • Comparison of traditional consultants Vs. OD consultants, Organizational Development process by the practitioners skills and activities.. 	CO4
Practical	<ul style="list-style-type: none"> • Case Analysis of organization in terms of process – attitudes and values, motivation, leadership. • Simulation exercises on problem-solving – study of organizational climate in different organizations. • Study of organizational structure of development departments, study of departmentalization, span of control, delegation of authority, decision-making patterns. • Study of individual and group behaviour at work in an organization. • Conflicts and their management in an organization. • Comparative study of functional and nonfunctional organizations and drawing factors for organizational effectiveness. • Exercise on OD interventions (Interpersonal, Team, Structural, Comprehensive) with its procedure to conduct in an organization. 	
Reference Books	<ol style="list-style-type: none"> 1. Bhattacharyya DK. 2011. Organizational Change and Development, Oxford University Press. 2. Hellriegel D, Slocum JW and Woodman. 2001. Organizational Behaviour. Cincinnati, Ohio: South-Western 	

	<p>College Pub.</p> <p>3. Luthans F. 2002. Organizational Behaviour. Tata McGraw-Hill, New York</p> <p>4. Newstrom JW and Davis K. 2002. Organizational Behaviour: Human behaviour at Work. TataMcGraw Hill, New Delhi. Peter MS. 1998. The Fifth Discipline: The Art and Practice of Learning Organization. Random House, London.</p> <p>5. Pradip NK. 1992. Organizational Designs for Excellence. Tata McGraw Hill, New Delhi.</p> <p>6. Shukla, Madhukar. 1996. Understanding Organizations. Prentice Hall of India, New Delhi.</p> <p>7. Stephens PR and Timothy AJ. 2006. Organizational Behaviour, 12th Edition. Prentice Hall Pub. Gupta US. (Ed.). 1978. Crop Physiology. Oxford & IBH.</p>	
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Course Code	AEX504						
Course Title	Research Methodology in Extension						
Hours	L:2, T:0, P:1						
Credits	2+1						
Type	Core Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: Student will understand the concept of behavioural research</p> <p>CO2: Student will be able to formulate research problem and review the literature</p> <p>CO3: Student will be able to analyze variables, designs and methods of research</p> <p>CO4: Student will be able to select sample and collect data, analyze and interpret the data</p>						
Examination Type	Theory + Practical						
Assessment Tools	WQ	SAP	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	5%		25%		40%	25%	5%
Examination Mode	Theory + Practical						
Syllabus							
Unit 1	<ul style="list-style-type: none"> Nature of Behavioural Research Methods of knowing; Science and scientific method; Behavioural research – Concept, aim, goals and objectives; Characteristics and Paradigms of research; Types of behavioural research based on applications, objectives and inquiry; Types of knowledge generated through research – historical, axiological, theoretical and conceptual knowledge, prior research studies, reviews and academic debate; 						CO1

	<ul style="list-style-type: none"> • Role of behavioural research in extension; Careers in behavioural research. • The Behavioural Research Process Basic steps in behavioural research – Formulating a Research Problem; Reviewing the Literature; • Identifying the variables and hypotheses; • Formulating research designs, methods and tools; • Selecting sample; Collecting data; • Analyzing and Interpreting the Data; • Reporting and Evaluating Research; • Skills needed to design and conduct research; • Writing research proposals. 	
Unit 2	<ul style="list-style-type: none"> • Steps in Behavioural Research Process: Formulating a Research Problem; • The research problem and research topic - definitions; • Importance of formulating a research problem; • Sources of research problems; • Characteristics of a good research problem; • Research problems in quantitative and qualitative research; • Steps in formulating a research problem; • Strategies for writing research problem statement; • Research purpose statement; • Research questions – Types, Criteria for selecting research questions, techniques for narrowing a problem into a research question; • Objectives - Meaning, types and criteria for judging the objectives. • Reviewing the Literature Review-meaning and importance; • Types of literature review – Context, Historical, Integrative, methodological, self-study and theoretical; • Literature review for quantitative and qualitative studies; Steps in conducting literature review – Identify key terms, locate literature, critical evaluation and selection; • Organising literature and writing literature review. • Identifying Variables and Hypotheses: Developing theoretical, conceptual, empirical frameworks; • Approaches for identifying concepts, constructs and variables; • Role of theory in behavioural research; Steps in identifying variables – Domain, Concepts, Constructs, Dimensions; • Indicators; Variables, Definitions, premises, propositions and hypotheses; • Techniques of identifying concepts, constructs and variables - Types of concepts; • Types of variables –causal relationship, the study design; and the unit of measurement; • Types of definitions-Types of propositions and hypotheses. Characteristics of good hypotheses; • Measurement – Meaning, levels of measurement – nominal, ordinal, interval and ratio; • Criteria for choosing measurement levels for variables. 	CO2

Unit 3	<ul style="list-style-type: none"> Formulating Research Designs, Methods and Tools Research designs – Definition, purpose and functions; Research Design as Variance Control - MAXMINCON Principle; Criteria for selecting a suitable Research Design; Classification of research designs: Quantitative designs - experimental, descriptive, comparative, correlational, survey, ex-post facto and secondary data analysis; Qualitative designs - ethnographic, grounded theory, phenomenological and Narrative research; Mixed method designs – Action research design; Translational research; Elements of research design - Research strategies, Extent of researcher interference, Study setting, Unit of analysis and Time horizon. Sources of errors while specifying research designs. Internal and external validity; Choosing right research design; Triangulation - Importance in behavioural research, Types of triangulation. Research methods: Designing research Instruments – questionnaires, interview schedules; tests – knowledge tests, behaviour performance tests; Scales – scales and indexes, checklists, focus groups; Steps in developing and using research methods and tools; participatory rural appraisal. Selecting Sample Sampling - population, element, sample, sampling unit, and subject; Sampling strategies for quantitative and qualitative research; Principles of sampling; Factors affecting the inferences drawn from a sample; Types of sampling, Methods of drawing a random sample, Sampling with or without replacement, Types of sampling - Probability Sampling - Simple random sampling, Cluster sampling, Systematic sampling, Stratified random sampling and Unequal probability Sampling; Non Probability Sampling - Reliance of available subjects, Purposive or judgmental sampling, accidental sampling, expert sampling, Snowball sampling, and Quota sampling; Sample size requirements for quantitative and qualitative studies. Methods for estimating sample size; Generalisation – Importance, Types of generalisations. Application of growth regulators for quality assurance, post-harvest treatments: pre cooling, heat treatments (hot water, hot air and vapor heat), fungicides & biologically safe chemicals, irradiation, curing, pulsing etc. Packing line operations, packaging of horticultural produce. Transportation- rail, road, sea, air. Codex norms for export of perishables. 	CO3
Unit 4	<ul style="list-style-type: none"> Collecting Data: The process of collecting data – Selection, training, supervision, and evaluation of field investigators; Online data collection; Errors and biases during data 	CO4

	<p>collection. Testing goodness of measures through item analysis - Reliability and validity;</p> <ul style="list-style-type: none"> • Types of validity – Content validity: Face and content validity, Criterion-related validity: concurrent and predictive validity, • Construct validity: convergent, and discriminant validity, factorial validity, and nomological validity; • Types of reliability – Test-Retest, Parallel forms, Inter-item consistency reliability, Split-half reliability. • Analyzing and Interpreting the Data: Data coding, exploration and editing; • Methods of data processing in quantitative and qualitative studies; • Quantitative data analysis - parametric and non-parametric statistical analyses; • Parametric analysis – Descriptive and inferential statistics, Hypothesis testing - Type I and Type II errors. • Concepts in hypothesis testing - Effect Size, α, β, and Power, P Value; • Multivariate data analysis – regression, factor analysis, cluster analysis, logistic regression and structural equation modelling. • Guidelines for choosing appropriate statistical analysis; Statistical packages for data analysis; • Methods of interpreting data and drawing inferences - The Ladder of Inference; • Methods of communicating and displaying analysed data. • Reporting and Evaluating: Research Writing reports and research publications; Evaluation Methodology. 	
Practical	<ul style="list-style-type: none"> • Selecting a research problem and writing problem statement, Narrowing down research problem to purpose, research questions and objectives, Choosing, evaluating and reviewing research literature, • Selection of variables through construct conceptualisation and defining variables, • Choosing research design based on research problem, Choosing right sampling method and estimating sample size, • Developing research methods and tools – questionnaires, interview schedule, check lists and focus group guides, • Writing a research proposal, Field data collection using research methods and tools, • Testing reliability and validity of research instruments, • Hands on experience in using SPSS for coding, data exploration, editing, analysis and interpretation • Formulation of secondary tables based on objectives of research, • Writing report, writing of thesis and research articles, Presentation of reports. 	

Reference Books	<ol style="list-style-type: none"> 1. Creswell JW. 2009. Research design: Qualitative, quantitative, and mixed methods approaches. Third edition. Thousand Oaks: Sage Publications. 2. Creswell JW. 2012. Educational research: Planning, conducting, and evaluating quantitative and qualitative research. Fourth edition. Boston, MA: Pearson. 3. Kerlinger FN and Lee HB. 2000. Foundations of Behavioral Research. Orlando, FL: Harcourt College Publishers. 4. Kumar R. 2014. Research Methodology: A Step- by- Step Guide for Beginners. Fourth. Edition. Thousand Oaks, California: Sage Publications. 5. Malhotra NK. 2010. Marketing research: An applied orientation. Sixth Edition. Upper Saddle River, NJ: Prentice Hall. 6. NeumanWL. 2006. Social Research Methods: Qualitative and Quantitative Approaches. Toronto: Pearson. 7. Sivakumar PS, Sontakki BS, Sulaiman RV, Saravanan R and Mittal N. (eds). 2017. Good Practices in Agricultural extension Research. Manual on Good Practices in Extension Research and Evaluation. Agricultural Extension in South Asia. Centre for Research on Innovation and Science and Policy (CRISP), Hyderabad. India. 8. Sivakumar PS and Sulaiman RV. 2015. Extension Research in India-Current Status and Future Strategies. AESA Working Paper 2. Agricultural Extension in South Asia. 	
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Course Code	EXT 505	
Course Title	Capacity Development	
Hours	L:2, T:0, P:2	
Credits	2+1	
Type	Core	
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: Understand the concepts, approaches, strategies and principles of capacity development and apply systematic steps for planning and organizing capacity development programmes.</p> <p>CO2: Analyze capacity development needs using appropriate need assessment approaches, data collection methods, task analysis and gap analysis techniques.</p> <p>CO3: Develop competencies for effective capacity development by understanding the roles of capacity developers, institutional support and project proposal formulation.</p> <p>CO4: Evaluate capacity development programmes using appropriate methods, tools, evaluation techniques and impact assessment indicators, and explain their role in human resource development.</p>	

Examination Type	Theory + Practical								
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL/ATT	Written Quiz	
Weightage	5%		25%		40%	25%	5%		
Examination Mode	Theory + Practical								
Syllabus									
Unit 1	<ul style="list-style-type: none">Capacity Development–An Overview Training, capacity buildingCapacity development and HRD-Meaning and differences; Need and principles of capacity developmentTypes and levels of capacities - Institutional capacities (include the rules, regulations and practices that set the overarching contextual environment), Organizational capacities (how various actors come together to perform given tasks), Individual capacities (technical, functional and leadership skills)Types of capacity building - Based on structure (structured, semi-structured & unstructured), Based on context (orientation, induction and refresher), and other categories (online, Webinar, distance etc.)Components of capacity developmentCapacity development cycleCapacity Development-Approaches and StrategiesCapacity Development Dilemma- Theory versus Practice, Trainee versus Task, Structured versus Unstructured, Generic and SpecificApproaches in Capacity Development -Informative approach, Participatory approach, Experimental approach/ Experiential, Performance based approachCapacity Development Strategies - Academic strategy, Laboratory strategy, Activity strategy, Action strategy, Personal development strategy, Organizational development strategyPlanning and Organization of Capacity Development ProgrammesSteps in Designing and Planning of Capacity Development- Step 1. Select the participants, Step 2. Determine the participants’ needs, Step 3. Formulate goal and objectives, Step 4. Outline the content, Step 5. Develop instructional activities, Step 6. Prepare the design, Step 7. Prepare evaluation form, Step 8. Determine follow-up activitiesOrganizing capacity development programmeOperational arrangements at different stages- Before the programme, During the programme, Middle of the programme, At the end of the programme, After the programme, Follow upStakeholders’ responsibilities								CO1
Unit 2	<ul style="list-style-type: none">Planning and Organization of Capacity Development ProgrammesConcept of Need AssessmentApproaches in Need Analysis- Performance Analysis, Task Analysis, Competency StudyNeeds Survey								CO2

	<ul style="list-style-type: none"> Capacity Development Needs Assessment Methods: Data Collection Methods in Identifying Needs - Rational Methods (Observation, Informal talks, Complaints, Comparison, Analysis of report, Opinion poll, Buzz session, Analysis of the new programme), Empirical Methods (Job analysis, Performance evaluation, Checklist or Questionnaire Method, Tests, Critical Incident Technique, Card Sort Method, Focus Group Discussion, Interview, SWOT Analysis) Information and Skills required in Need Analysis Identification of Needs through Task Analysis - Task identification, Task Analysis, Gap Analysis 	
Unit 3	<ul style="list-style-type: none"> Capacity Development Institutions Capacity Developer (Trainer): Meaning and concept Types of Capacity Developers (regular, ad-hoc, part time, guest and consultants) Roles of Capacity Developer (explainer, clarifier, supporter, confronter, role model, linker, motivator, translator/ interpreter, change agent) Good Capacity Developer – Qualities, skills and roles Qualities, Skills (Intrapersonal & Inter personal) Roles (Manager, Strategist, Task Analyst, Media Specialist, Instructional Writer, Marketer, Facilitator, Instructor, Counsellor, Transfer Agent, Evaluator) Capacity Development Centres and Locations Organisation's Role in Capacity Development Capacity Development Project Formulation: Project Proposal: Concept and Meaning Steps in Project Formulation- Review of past proposals, Consulting experts, consultants, and previous organizers, Review past project evaluation reports, Interact with the prospective beneficiaries Format for Writing Project Proposal (LFA) 	CO3
Unit 4	<ul style="list-style-type: none"> Capacity Development Methods and Tools: Capacity Development Methods –Lecture, Discussion, Syndicate, Seminars, Conference, Symposium, Role Play, Case study, Programmed Instruction, T - group/ Laboratory methods Factors Determining Selection of Methods - Capacity development objectives, subject matter, categories of participants, and the available resources like time, location, budget; Capacity Development Aids Evaluation: Capacity Development Programme Evaluation - Meaning & Importance Purpose of Evaluation Principles of Evaluation Types of Evaluation – Formative, Summative Kirkpatrick's four levels of evaluation Process of Evaluation- Evaluation at the beginning, Evaluation during the programme, Evaluation at the end Use of evaluation findings Statistical Tools for evaluation Impact Assessment Impact Assessment- Meaning, Need, Features, 	CO4

	<p>Benefits, Concepts</p> <ul style="list-style-type: none"> Indicators for Impact Assessment - Direct indicators, Indirect or proxy indicators, Quantitative indicators, Qualitative indicators, Result chain / hierarchy of indicators Methods of Impact Evaluation- Learning retention of participants (KOSA), Impact on the job performance, Impact on organizational effectiveness, Impact on stakeholder's competency Human Resource Development HRD: Meaning, Importance and Benefits Types of HRD Systems & Sub-systems Career system (Manpower planning, Recruitment, Career planning, Succession planning, Retention), Work system (Role analysis, Role efficacy, Performance plan, Performance feedback and guidance, Performance appraisal, Promotion, Job rotation, Reward) Development system (Induction, Training, Job enrichment, Self-learning mechanisms, Potential appraisal, Succession development, Counselling, Mentor system) Self-renewal system (Survey, Action research, Organisational development interventions), Culture system (Vision, mission and goals, Values, Communication, Get together and celebrations, Task force, Small groups) Components of HRD System - Performance Appraisal, Potential Appraisal, Task System, Development System, Socialisation System, Governance Functions of HRD-Organisational Development, Career Development, Capacity Development 	
Practical	<ul style="list-style-type: none"> Capacity development needs assessment exercise, Capacity development project formulation exercise, Planning organizing and conducting an extension capacity development programme Designing a programme, Writing learning objectives Developing objectives into curriculum Training plan Organizing capacity development workshop Evaluation with pre- and post-training tests Training methods – Practicing each method mentioned in contents as group exercise 	
Reference Books	<ol style="list-style-type: none"> ADB. 2009. Training Needs Assessment and Strategic Training Plan. Bentaya GM, and Hoffmann V (Eds). 2011. Rural Extension Volume 3 -Training Concepts and Tools. Margraf Publishers GmbH, Scientific books, Kanalstra Be 21; D-97990, Weikersheim, 191 pp. DFID .2003. Promoting Institutional and Organisational Development. A Source Book of Tools and Techniques, Department for International Development, United Kingdom DoPT.2014. Civil Services Competency Dictionary: Strengthening Human Resource Management of Civil Service. Department of Personnel and Training, Government of India FAO .2010. FAO Capacity Assessment Approach and Supporting Tools - Discussion Draft, Food and Agriculture Organisation of the 	

	<p>United Nations</p> <ol style="list-style-type: none"> 6. FAO .2012. Capacity Development: Learning Module 2. FAO Approaches to Capacity Development in Programming. Processes and Tools, Food and Agriculture Organisation of the United Nations. 7. ICAR 2015. Training Policy 2015, Indian Council of Agricultural Research. 8. IISD 2015. Appreciative Inquiry and Community Development. International Institute for Sustainable Development. 9. Mishra DC. 1990. New Directions in Extension Training. Directorate of Extension, Ministry of Agriculture, Govt. of India, New Delhi. 10. OECD/DAC. 2006. The Challenge of Capacity Development: Working Towards Good Practice, Organisation for Economic Cooperation and Development. 11. SIDA.2000. Capacity Development. SIDA Working Paper No. 4. Analysis of Needs for Capacity Development. 12. SIDA. 2000. Working Paper No. 4. Analysis of Needs for Capacity Development. 13. UNDP. 2009. Capacity Development: A UNDP Primer, United Nations Development Programme. 14. WAC. 2013. Assessing Capacity Needs and Strategy Development for Grassroots Rural Institutions: A Guide for Facilitators. World Agroforestry Centre (WAC). 	
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Course Code	AEX506						
Course Title	ICTs for Agricultural Extension and Advisory Services						
Hours	L:2, T:0, P:1						
Credits	3						
Type	Core Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: Students will be introduced to the importance of ICTs in EAS</p> <p>CO2: Students will understand the ICT application aspects and execute extension functions by applying ICTs</p> <p>CO3: Students will be able to engage stakeholders in knowledge management process</p> <p>CO4: Students will be able to critically evaluate ICT initiatives and smart/disruptive technologies</p>						
Examination Type	Theory+ Practical						
Assessment Tools	WQ	SAP	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	5%		25%		40%	25%	5%
Examination	Theory+ Practical						

Mode		
Syllabus		
Unit 1	<ul style="list-style-type: none"> ICTs- meaning, concepts, basics of ICTs, global and national status, types and functions of ICTs, innovations, meaning of e-Governance, e-learning, mLearning, advantages and limitations of ICTs. Knowledge management-meaning, approaches and tools. Role of ICTs in Agricultural Knowledge Management. e-Extension, overview on Global and national e-extension initiatives, Inventory of e-Extension initiatives in Agriculture and allied sectors from Central and State governments, ICAR, SAUs, private sector and NGO initiatives in India 	CO1
Unit 2	<ul style="list-style-type: none"> Knowledge centres (tele centres), digital kiosks, websites and web portals, community radio, farmers call centres, mobile phone based advisory services and mobile applications (mExtension, mLearning), Self-learning CDs on Package of practices, social media, digital videos, Market Intelligence and Information Systems- ICT enabled Supply-Chains and Value-Chains/ e-Marketing (e-NAM, Agmarknet, etc.). Expert System/ Decision Support System/ Management Information Systems, Farm Health Management & Intelligence System for Plant Health, Animal Health, Soil Health, Fishery, Water, Weather, etc. 260 Social Sciences: Agricultural Extension Education Global and regional knowledge networks, international information management systems, e-Learning platforms (MOOCS, Course CCRA, EduEx, etc), e-Governance Systems; digital networks among extension personnel, Farmer Producers Organisations (FPOs)/ SHGs/ Farmers Groups. 	CO2
Unit 3	<ul style="list-style-type: none"> Global policy/ Standards on e-Governance, National policy on e-governance, Open Data / Open Gov Standards and Open Source etc; Language Technology Applications; National e-Agriculture policy/ Strategies/ guidelines. Web standards, creating and writing for webportals, development of mobile applications, developing digital videos- story board- video recording- video editing, types of blogs and writing guidelines. Video conference, live streaming and webinars, types and functions of social media applications, guidelines for preparing social media content, engaging audience and data-analytics. Categories of seed; maintenance of nucleus, foundation and certified seed; seed certification, seed standards; seed act and law enforcement, plant quarantine and quality control. 	CO3
Unit 4	<ul style="list-style-type: none"> Open technology computing facilities, System for data analytics/ mining/ modelling/ Development of Agricultural simulations; Remote Sensing, GIS, GPS, Information Utility (AIU); disruptive technologies- Analysis; Internet of Things 	CO4

	<p>(IoTs), Drones, Artificial intelligence (AI), block chain technology, social media and Big Data analytics for extension.</p> <ul style="list-style-type: none"> • Human Centered Learning/Ergonomics/ Human Computer Interactions-Meaning; Theories of multimedia learning - Sweller's cognitive load theory, Mayer's cognitive theory of multimedia learning, Schnotz's integrative model of text and picture comprehension, van Merriënboer's four-component instructional design model for multimedia learning; • Basic Principles of Multimedia Learning - Split-attention, Modality, Redundancy, Coherence, Signaling, segmenting, pre-training, personalisation, voice embodiment; Advanced principles - Guided discovery, worked examples, Self-explanation, drawing, feedback, multiple representation, Learner control, animation, collaboration, prior knowledge, and working memory. • Designing ICT gadgets based on human interaction principles - Interactive design-Meaning, importance; Approaches of interactive design - user-centered design, activity centered design, systems design, and genius design; Methods of interactive design- Usability testing methods. 	
Practical	<ul style="list-style-type: none"> • Content and client engagement analysis • Designing extension content for ICTs • Creating and designing web portals, blogs, social media pages • Developing digital videos • Live streaming extension programmes and organising webinars • Working with Farmers call centres • Engaging with professional digital networks • Writing for digital media 	
Reference Books	<ol style="list-style-type: none"> 1. Andres D and Woodard J. 2013. Social media handbook for agricultural development practitioners. Publication by FHI360 of USAID 2. Barber J, Mangnus E and Bitzer V. 2016. Harnessing ICT for agricultural extension. KIT Working Paper 2016: 4. 3. Bheenick K and Bionyi I. 2017. Effective Tools for Knowledge Management and Learning in Agriculture and Rural Development. CTA Working paper. 4. Fafchamps M and Minten B. 2012. Impact of SMS based Agricultural Information on Indian Farmers. The World Bank Economic Review, Published by the Oxford University Press on behalf of the International Bank for Reconstruction and Development. 5. FAO 2011. E-learning methodologies a guide for designing and developing e-learning courses. Food and Agriculture Organization of the United Nations. 6. Meera SN.2013. Extension, ICTs and Knowledge Management: The 10 difficult questions. Blog 15. Agricultural Extension in South Asia. 	

	<p>7. Meera SN. 2017. Disruptive Technologies – Big Data and Internet of Things in Strengthening Extension & Advisory Services. Blog 68. Agricultural Extension in South Asia.</p> <p>8. Meera SN. 2018. A Treatise on Navigating Extension and Advisory Services through Digital Disruption. Blog 90. Agricultural Extension in South Asia.</p> <p>9. Mittal N, Surabhi, Gandhi, Sanjay and Gaurav T. 2010. Socio-Economic Impact of Mobile Phones on Indian Agriculture. ICRIER Working Paper No. 246, Indian Council for Research on International Economic Relations (ICRIER), New Delhi.</p> <p>10. Preece J, Rogers Y, & Preece, J. 2007. Interaction design: Beyond human-computer interaction. Chichester: Wiley.</p> <p>11. Saravanan R, Sulaiman RV, Davis K and Suchiradipta B. 2015. Navigating ICTs for Extension and Advisory Services. Note 11. GFRAS Good Practice Notes for Extension and Advisory Services. GFRAS: Lindau, Switzerland.</p>	
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Course Code	AEX507						
Course Title	Evaluation and Impact Assessment						
Hours	L:2, T:0, P:1						
Credits	3						
Type	Core Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: Understand the concepts, principles, types, approaches and theories of programme evaluation with emphasis on agricultural extension programmes.</p> <p>CO2: Apply systematic programme evaluation processes and management techniques such as SWOT, Gantt charts, PERT and CPM for effective programme planning and evaluation.</p> <p>CO3: Apply Bennett's Hierarchy and Logic Framework Approach (LFA) to assess programme objectives, implementation, outcomes and results.</p> <p>CO4: Assess the impacts of agricultural technologies and extension programmes using appropriate quantitative, qualitative, participatory and environmental impact assessment approaches.</p>						
Examination Type	Theory+ Practical						
Assessment Tools	WQ	SAP	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	5%		25%		40%	25%	5%
Examination Mode	Theory+ Practical						
Syllabus							

Unit 1	<ul style="list-style-type: none"> • Programme Evaluation: Introduction to Evaluation Concept of Evaluation: Meaning and concept in different contexts; • Programme planning, analyse programme effectiveness, decision making, accountability, impact assessment, policy advocacy; • Objectives, types, criteria and approaches of programme evaluation, evaluation principles; • The context of program evaluation in agricultural extension; • Role and Credibility of Evaluator: Role as educator, facilitator, consultant, interpreter, mediator and change agent. Competency and credibility of evaluator. • Evaluation Theories: Evaluation theory vs. practice – synergistic role between practice and theory in evaluation; • Evaluation theories - Three broad categories of theories that evaluators use in their works - programme theory, social science theory, and evaluation theory (other theories/ approaches - Utilization-Focused Evaluation & Utilization-Focused Evaluation (U-FE) Checklist, Values Engaged Evaluation, Empowerment Evaluation, Theory-Driven Evaluation). • Integration between theory and practice of evaluation: – evaluation forums, workshops, conferences and apprenticeship/ internship. • History of food preservation, present status and future prospectus of vegetable preservation industry in India. 	CO1
Unit 2	<ul style="list-style-type: none"> • Evaluation Process: Ten Steps in programme evaluation: (1) Identify and describe programme you want to evaluate (2) Identify the phase of the programme(design, start-up, ongoing, wrap-up, follow-up) and type of evaluation study needed (needs assessment, baseline, formative, summative, follow-up) (3) Assess the feasibility of implementing an evaluation (4) Identify and consult key stakeholders (5) Identify approaches to data collection (quantitative, qualitative, mixed) (6) Select data collection techniques (survey interviews and questionnaires with different types) (7) Identify population and select sample (sampling for evaluation, sample size, errors, sampling techniques (8) Collect, analyse and interpret data (qualitative and quantitative evaluation data analysis) (9) Communicate findings (reporting plan, evaluation report types, reporting results, reporting tips, reporting negative findings (10) Apply and use findings (programme continuation/ discontinuation, improve on-going programme, plan future programmes and inform programme stakeholders). • Spoilage of fresh and processed horticultural produce; • Biochemical changes and enzymes associated with spoilage of horticultural produce; • Principal spoilage organisms, food poisoning and their control measures. • Role of microorganisms in food preservation. • Evaluating the Evaluation Evaluating the Evaluation - 10 	CO2

	<p>Steps as above with focus on conceptual clarity, representation of programme components and stakeholders, sensitivity, representativeness of needs, sample and data, technical adequacy, methods used for data collection and analysis, costs, recommendations and reports.</p> <ul style="list-style-type: none"> • Programme Management Techniques: SWOT Analysis – Concept, origin and evolution; • SWOT As a Programme Management Tool; Conducting SWOT Analysis - Common Questions in SWOT Analysis; • Advantages and Disadvantages of SWOT; Bar Charts (Gantt Charts and Milestone Charts) - Characteristics, advantages and limitations. • Networks – Introduction, origin and widely used networks (Programme Evaluation and Review Technique (PERT) and Critical Path Method (CPM), differences between PERT and CPM, advantages and disadvantages. • Networks Terminology – Activity, Dummy activity, Event (predecessor event, successor event, burst event, merge event, critical event), Earliest Start Time (EST), • Latest Start Time (LST), Critical Path, Critical Activity, Optimistic time (To), Pessimistic time (Po), Most likely time (TM), Expected time (TE), Float or Slack, Event Slack, Lead time, Lag time, Fast tracking, Crashing critical path, Activity Table, Dangers, Normal Time. Rules for Preparation of Networks and Steps in Network Preparation with example. 	
Unit 3	<ul style="list-style-type: none"> • Bennett’s Hierarchy of Evaluation, Introduction to Bennett’s hierarchy – Background and description; • Relation between programme objectives & outcomes at 7 levels of Bennett’s hierarchy – Inputs, activities, participation, reactions, KASA changes, practice and behaviour changes, end results. Advantages and Disadvantages of Bennett’s hierarchy. • Introduction to LFA – Background and description; Variations of LFA - Goal Oriented Project Planning (GOPP) or Objectives Oriented Project Planning (OOPP); LFA Four-by-Four Grid – Rows from bottom to top (Activities, Outputs, Purpose and Goal & Columns representing types of information about the events (Narrative description, Objectively Verifiable Indicators (OVIs) of these events taking place, Means of Verification (MoV) where information will be available on the OVIs, and Assumptions). Advantages and Disadvantages of LFA. 	CO3
Unit 4	<ul style="list-style-type: none"> • Introduction to Impact Assessment, Concept of Impact Assessment: Meaning, concept and purpose in different contexts; I • Impact Assessment Framework: Meaning of inputs, outputs, outcomes, impacts and their relation with monitoring, evaluation and impact assessment. • Indicators for impact assessment – meaning and concept; 	CO4

	<p>Selecting impact indicators;</p> <ul style="list-style-type: none"> • Types of impact indicators for technology and extension advisory services - social and behavioral indicators, socio-cultural indicators, technology level indicators, environmental impact assessment indicators and institutional impact assessment indicators. • Impact assessment approaches – Quantitative, qualitative, participatory and mixed methods with their advantages and disadvantages; • Quantitative Impact Assessment Types – Based on Time of Assessment (Ex-ante and ex-post), Based on Research Design (Experimental, quasi experimental, Non-experimental). Econometric Impact Assessment: - (Partial Budgeting Technique, Net Present Value, Benefit Cost Ratio, Internal Rate of Return, Adoption Quotient, etc). Qualitative and Participatory Impact Assessment Methods. • Concept of EIA – Introduction, What it is? Who does it? Why it is conducted? How it is done?; Benefits and important aspects of EIA-risk assessment, environmental management and post product monitoring. • Environmental Components of EIA – air, noise, water, biological, land; • Composition of the expert committees and Steps in EIA process - screening, scoping, collection of baseline data, impact prediction, mitigation measures and EIA report, public hearing, decision making, monitoring and implementation of environmental management plan, assessment of alternatives, delineation of mitigation measures and EIA report; • Salient Features of 2006 Amendment to EIA Notification - Environmental Clearance/Rejection, participants of EIA; • Shortcomings of EIA and How to improve EIA process? 	
Practical	<ul style="list-style-type: none"> • Search the literature using web / printed resources and identify evaluation indicators for the following: – Utilization-Focused Evaluation – Values Engaged Evaluation – Empowerment Evaluation – Theory-Driven Evaluation, • Visit Directorate of Extension in your university and enquire about extension programmes being implemented / coordinated by Directorate. • Develop an evaluation proposal of any one programme using ‘Ten Steps in Programme Evaluation’ discussed in the theory class. • Review any comprehensive programme evaluation report from published sources. • Evaluate the report and write your observations following the ‘Evaluating the Evaluation’ approach. Identify at least four agriculture development programmes and their objectives being implemented in your state. • Write two attributes each on Strengths, Weaknesses, Opportunities and Threats related to the identified programme objectives in the SWOT grid. 	

	<ul style="list-style-type: none"> • Identify an on-going development programme and make-out 6 activities from the programme. • Draw a Gantt chart for 12 months programme activities. • Write a report on evaluation hierarchy levels and indicators as per Bennett's hierarchy of evaluation for any development programme or project. • Develop LFA four-by-four grid for any development programme or project with activities, outputs, purpose and goal and objectively verifiable indicators, means of verification & assumptions. • Visit a nearby KVKs / ATIC. Select any agriculture technology with package of practices and extension advisory services promoted by KVK / ATIC. • Identify impact assessment indicators for social and behavioral indicators, socio-cultural indicators, technology level indicators, environmental impact assessment indicators and institutional impact assessment indicators. • Refer any Environment Impact Assessment report and analyse steps in EIA. Write your observations. 	
Reference Books	<ol style="list-style-type: none"> 1. Adrienne M, Gundel S, Apenteng E and Pound B. 2011. Review of Literature on Evaluation Methods Relevant to Extension. Lindau, Switzerland: Global Forum for Rural Advisory Services, Lindau, Switzerland 2. Bagnol B. 2014. Conducting participatory monitoring and evaluation. Pages 81-85 in FAO, Decision tools for family poultry development. FAO Animal Production and Health Guidelines, No. 16. Rome, Italy: FAO. 3. Bennett CF. 1979. Analyzing impacts of extension programs. Washington, D.C., USA: U.S. Department of Agriculture. 4. Boyle R and Le Maire D. 1999. Building effective evaluation capacity: lessons from practice. New Brunswick, NJ: Transaction Publishers. Bradford RW, Duncan, P.J. and Tarcy, B. 1999. Simplified Strategic Planning: A No-nonsense Guide for Busy People Who Want Results Fast. New York: Chandler House. 5. Braverman MT and Engle M. 2009. Theory and rigor in Extension program evaluation planning. Journal of Extension 47(3). www.joe.org/joe/2009june/a1.php Chen H. 2012. Theory-driven evaluation: Conceptual framework, application and advancement. In: Strobl R., Lobermeier O., Heitmeyer W. (eds) Evaluation von Programmen und Projekten für eine demokratische Kultur. 6. Springer VS, Wiesbaden Chen, H.T. 2011. Practical program evaluation: Theory-Driven Evaluation and the Integrated Evaluation Perspective. Thousand Oaks, CA: Sage. 7. Dale R. 2004. Evaluating Development Programmes and Projects, New Delhi, India: Sage Publications. 8. Fetterman, D.M. 2012. Empowerment Evaluation: Learning to think like an evaluator. In M.C. Alkin (Ed.), Evaluation Roots (2nd edition) (pp. 304-322). 9. GFRAS. 2012. Guide to evaluating rural extension. Lindau, 	

	<p>Switzerland: Global Forum for Rural Advisory Services (GFRAS).</p> <p>10. Greene, J.C., Boyce, A., and Ahn, J. (2011). A values-engaged educative approach for evaluating education programs: A guidebook for practice. Champaign, IL: University of Illinois at Urbana-Champaign.</p> <p>11. OECD. 1998. Review of the DAC Principles for Evaluation of Development Assistance. Paris: DAC Working Party on Aid Evaluation. www.oecd.org/dataoecd/63/50/2065863.pdf (accessed 6 June 2011)</p> <p>12. Patton, M.Q. 2013. Utilization-Focused Evaluation (U-FE) Checklist. Western Michigan University Checklists.</p> <p>13. Rosanne Lim .2012. Why You Should Do a SWOT Analysis for Project Management.</p> <p>14. Suvedi, M and Morford S. 2003. Conducting Program and Project Evaluations: A Primer for Natural Resource Program Managers in British Columbia. Forrex-Forest Research Extension Partnership, Kamloops, B.C. Forrex Series 6.</p> <p>15. USAID .2011. Evaluation policy. Washington, D.C., USA: Bureau for Policy and Planning.</p> <p>16. Venkateswarlu, K and Raman, K.V. 1993. Project Management Techniques for R&D in Agriculture. Sterling Publishers Pvt.Ltd., New Delhi.</p>	
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Course Code	EXT 508							
Course Title	Managing Extension Organizations							
Hours	L:2, T:0, P:2							
Credits	2+1							
Type	Elective							
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: Explain the concepts, principles, functions, theories and approaches of management and apply management skills in extension organizations.</p> <p>CO2: Analyze the structure, functions and management practices of different public, private and other extension organizations and identify key management challenges.</p> <p>CO3: Apply decision-making, human resource management, leadership, delegation, coordination and performance appraisal techniques for effective management of extension organizations.</p> <p>CO4: Apply motivation, organizational communication, teamwork, supervision, control and management information systems for improving the effectiveness of extension organizations.</p>							
Examination Type	Theory + Practical							
Assessment	Writte	Assignment/Proje	MSE	MSP	ESE	ESP	ABL/PBL/AT	Writte

Tools	n Quiz	ct Work				T	n Quiz
Weightage	5%		25%		40 %	25 %	5%
Examination Mode	Theory + Practical						
Syllabus							
Unit 1	<ul style="list-style-type: none"> • Basics of Management: Management- An Over view Management and Extension management – Meaning, concept, nature and importance; and theories of management • Management, administration and supervision - meaning, definition and scope • Approaches to management, Principles, functions and levels of management • Qualities and skills of a manager • Interpersonal relations in the organization • Reporting and budgeting 						CO1
Unit 2	<ul style="list-style-type: none"> • Management in different types of Extension Organizations: Extension Management in public, private sector and other sectors • Extension management (POSDCORB) in public sector, Department of Agriculture, Agricultural Technology Management Agency (ATMA), Krishi Vigyan Kendra (KVK), SAUs, ICAR Institutes • Private sector, Cooperatives, NGOs, FPOs etc. • Organizational Structure, Relations between different units-Challenges in management. 						CO2
Unit 3	<ul style="list-style-type: none"> • Concepts in Management Decision making – Concept, Types of decisions, Styles and techniques of decision making, Steps in DM Process, Guidelines for making effective decisions • Human Resource Management: Manpower planning, Recruitment, Selection, Placement and Orientation, Training and Development • Dealing with fund and staff shortages in different extension organizations (KVK, ATMA etc.) • Leadership – Concept, Characteristics, Functions, Approaches to leadership, Leadership styles • Authority and responsibility, Delegation and decentralization, line and staff relations • Challenges of co-ordination in extension organizations • Managing interdepartmental coordination and convergence between KVK, ATMA and line departments • Coordinating pluralism in extension services • Challenges in managing public-private partnerships (PPPs) at different levels in agricultural development in general and extension in particular • Performance appraisal – Meaning, Concept, Methods. 						CO3
Unit 4	<ul style="list-style-type: none"> • Motivation and Organizational Communication: Motivation and Communication Managing work motivation – Concept, Motivation and Performance, Approaches to motivation, team building 						CO4

	<ul style="list-style-type: none"> Organizational Communication – Concept, Process, Types, Networks, Barriers to Communication Mentoring, Time management, Team work and team-building strategies; Modernization of information handling Supervision and Control: Supervision – Meaning, Responsibilities, Qualities and functions of supervision, Essentials of effective supervision Managerial Control – Nature, Process, Types, Techniques of Control, Observation PERT and CPM Management Information Systems (MIS): Concept, tools and techniques, MIS in extension organizations. 	
Practical	<ul style="list-style-type: none"> Simulated exercises on techniques of decision making Study the structure and function of agro-enterprises, Designing organizational structure/ organograms Group activity on leadership development skills Simulated exercise to understand management processes Field visit to extension organizations (ATARI, KVKs, NGOs), FPOs, dairy cooperatives to understand the functions of management Practical exercises on PERT & CPM Group exercise on development of short term and long term plans for agro-enterprises Developing model agriculture-based projects including feasibility study, financial planning and cost-benefit analysis. 	
Reference Books	<ol style="list-style-type: none"> Chand S. 2017. Modern Management Theory: Quantitative, System and Contingency Approaches to Management. Daniel RG, James AFS, Freeman RE.2003. Management (6th Edition). Pearson India. GFRAS 2017. Module 3: Agricultural Extension Programme Management, The New Extensionist Learning Kit, Global Forum for Rural Advisory Services (GFRAS) Gupta CB. 2001. Management Theory and Practice. Sultan Chand & Sons. New Delhi MANAGE. 2008. Project Management in Agricultural Extension, AEM-203, Post Graduate Diploma in Agricultural Extension Management (PGDAEM), National Institute of Agricultural Extension Management, Hyderabad. 	

Course Code	EXT 509
Course Title	Enabling Innovation
Hours	L:1, T:0, P:2
Credits	1+1
Type	Elective

Course Outcomes	On the completion of the course, the student will gain the following knowledge and skills: CO1: Explain the concepts, elements and evolution of Agricultural Innovation Systems and analyze the role of actors, interactions and knowledge flows in agricultural innovation. CO2: Analyze the role of communication, extension, policies and institutions in creating an enabling environment for agricultural innovation. CO3: Apply innovation platforms, innovation brokerage and AIS diagnostic approaches to assess extension services and strengthen capacities for innovation. CO4: Apply scaling-up approaches, pathways and tools to facilitate the wider adoption of agricultural innovations and strengthen innovation management in extension and advisory services.								
Examination Type	Theory + Practical								
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL/AT	Written Quiz	
Weightage	5	5	0	0	20	40	30	0	
Examination Mode	Theory + Practical								
Syllabus									
Unit 1	<ul style="list-style-type: none">Agricultural Innovation Systems: Concepts and Elements Origins of the innovation systems concept-Innovation vs InventionAgricultural Innovation System (AIS) -ToT, FSR, AKIS and AIS compared, Key insights from AIS: How Innovation takes placeRole of different actors in AISImportance of interaction and knowledge flows among different actors.								CO1
Unit 2	<ul style="list-style-type: none">Role of Communication in Innovation ProcessRole of Extension in AIS, Different views to analyze AIS: structural view, functional view, process view and capacity viewEnabling Innovation Role of enabling environment: Policies and institutions in enabling innovationRole of Government-Innovation Policy: Achieving coordination and policy coherence								CO2
Unit 3	<ul style="list-style-type: none">Innovation PlatformsRole of Innovation Brokers, Methodologies for AIS Diagnosis: Typologies of existing methodologies-strengths and limitationsAssessing Extension and Advisory Services within AISCapacity Development in AIS: Strengthening capacities to innovate								CO3
Unit 4	<ul style="list-style-type: none">Scaling Up: Tools, Approaches and Pathways Scaling Up: DefinitionsChanging views on scaling up: Approaches to Scaling Up: Push, pull, plant, probe: Scaling up pathways: Drivers and spaces for scaling upFramework and Tools for Scaling up: Planning and implementing a								CO4

	scaling up pathways <ul style="list-style-type: none"> • Scalability assessment tools • Role of policies in scaling up: Influencing policies for scaling up • Innovation Management for scaling up knowledge and implications for Extension and Advisory Services 	
Practical	<ul style="list-style-type: none"> • Identify one crop/commodity sector and use AIS framework to diagnose actors and their roles, patterns of interaction, institutions determining interaction and the enabling policy environment and develop a AIS Diagnosis Report (Review and Key informant interviews) • Undertake a case study on a successful case of scaling up knowledge and identify factors that contributed to its success • Identify one specific knowledge (a technology, an approach) that has been recently introduced and develop an Up scaling Strategy. 	
Reference Books	<ol style="list-style-type: none"> 1. Alex K. 2012. Facilitating Agricultural Innovation Systems: a critical realist approach. Studies in Agricultural Economics. 114: 64-70. 2. Cooley L and Ved R. 2012. Scaling Up-From Vision to Large-Scale Change: A Management Framework for Practitioners. Management Systems International. 3. IFAD 2011. Section XXI: Guidelines for Scaling Up. Updated Guidelines and Source Book for Preparation and Implementation of a Results-Based Country Strategic Opportunities Programme (RB-COSOP). Volume 1: Guidelines, International Fund for Agricultural Development. 4. ILRI. 2014. Innovation Platform practice briefs. International Livestock Research Institute. 5. OECD. 2012. Innovation for Development. A Discussion of the Issues and an Overview of Work of the OECD Directorate for Science, Technology and Industry. 6. OECD. 2013. Agricultural Innovation Systems: A Framework for Analysing the Role of the Government, OECD Publishing, Paris, https://doi.org/10.1787/9789264200593-en. 7. WHO and ExpandNet. 2010. Nine steps for developing a scaling-up strategy. World Health Organization. 8. World Bank. 2006. Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems. Washington, DC: World Bank. © World Bank. 9. World Bank. 2012. Agricultural Innovation Systems: An Investment Sourcebook. Washington DC, World Bank. 	

Course Code	EXT 510
Course Title	Gender Mainstreaming
Hours	L:2, T:0, P:2
Credits	2+1

Type	Elective								
Course Outcomes	On the completion of the course, the student will gain the following knowledge and skills: CO1: Explain the evolution, concepts and importance of gender and analyze key gender issues, challenges and empowerment needs in agriculture and rural development. CO2: Analyze gender concepts, divides, roles and inequalities and apply gender analysis tools to address gender concerns in agricultural research, extension and technology adoption. CO3: Apply gender mainstreaming and women empowerment approaches to address gender concerns in agriculture, rural development, value chains, health, nutrition and climate change. CO4: Evaluate global best practices, policies and frameworks for gender mainstreaming and develop an understanding of entrepreneurship opportunities and support systems for women in agriculture and agro-processing.								
Examination Type	Theory + Practical								
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL/AT T	Written Quiz	
Weightage	5		25	0	40	25	5		
Examination Mode	Theory + Practical								
Syllabus									
Unit 1	<ul style="list-style-type: none">Historical Perspective of Gender: Historical perspective of genderFeminism and emergence of gender as a concept, Scope of gender studies in agriculture and rural developmentAgrarian Importance of Gender: Agrarian Importance of Gender: Understanding the importance of gender in national and global agriculture-Key gender issues and challenges in agriculture - Gender and value chain- Global actions to address gender-needs and strategies to address gender and women empowerment								CO1
Unit 2	<ul style="list-style-type: none">Gender Related Concepts and Divides: Gender related concepts and dividesUnderstanding of the concepts of gender, gender equality and equity, gender balance, gender blindness, gender relations, gender neutrality, gender bias and discrimination, gender rights, gender roles and responsibilitiesGender budgeting, Gender divides and their implications such as gender digital divide, gender access to resources and inputs divide, gender mobility divide, gender wage divide, Gender needs: practical and strategicGender Analysis: Gender analysis: Importance, usage, prerequisites, techniques of gender analysisTools for gender analysisGender and Technology: Gender and technology: How gender and technology impact each other, Gender neutral technology, Gender								CO2

	<p>sensitive technology</p> <ul style="list-style-type: none"> Gender supportive assistance in technology adoption-Gender in agricultural research and extension. 	
Unit 3	<ul style="list-style-type: none"> Gender Mainstreaming: Importance of gender mainstreaming in agriculture, Extension strategies to address gender issues such as gender and health, nutrition, gender in agricultural value chains, gender and climate change adaptation, gender and globalization& liberalization for mainstreaming gender concerns into the national programmes and policies. Women Empowerment: Importance of women empowerment, Current national women empowerment and gender indices Women empowerment approaches (technological, organizational, political, financial, social, legal and psychological) Case studies based on experiences and learning from various development and rural development programmes 	CO3
Unit 4	<ul style="list-style-type: none"> Global Best Practices, Policies and Frameworks: Global best practices, women empowerment and gender mainstreaming models and frameworks for addressing gender concerns in agriculture, approaches of various organizations Gender mainstreaming and special women focused programmes in agriculture and rural development Entrepreneurship development for women: Women entrepreneurship development in agriculture and agro processing Current status, women led enterprises, supporting organizations and schemes, Govt. policies, entrepreneurship development programme and process for women in agriculture 	CO4
Practical	<ul style="list-style-type: none"> Visit to a village for understanding rural gender roles and responsibilities as groups, followed by class presentation by groups Exercise for capturing shifts in gender roles and responsibilities, Conducting gender analysis in a village using gender analysis techniques Visit to agencies supporting women empowerment followed by report presentation Each student to visit a different organization such as State Rural Livelihood Mission, Women Development Corporation, Department of Agriculture, Important NGOs working for women empowerment Exercise for identification and prioritization of issues affecting/needs for women empowerment Interaction with a successful women entrepreneur/ SHG. 	
Reference Books	<ol style="list-style-type: none"> AGRIPROFOCUS 2014. Gender in value chains Practical toolkit to integrate a gender perspective in agricultural value chain development Christine J, Nafisa F and Taylor DS. 2014. Gender and Inclusion Toolbox: Participatory Research in Climate Change and Agriculture. Global Forum for Rural Advisory Services, Switzerland. Colverson KE. 2015. Gender into Rural Advisory Services. Global Forum for Rural Advisory Services, Switzerland. 	

	<ol style="list-style-type: none"> 4. FAO. 2011. Gender and agricultural value chains A review of current knowledge and practice and their policy implications. ESA Working Paper No. 11-05 (March 2011). 5. GFRAS. 2018. Nutrition-Sensitive Extension. Module 16, GFRAS New Extensionist Learning Kit (NELK). Global Forum for Rural Advisory Services. 6. Jaiswal S. 2013. Research Methodology in Gender Studies. Maxford Dynamic Series: 1-296. 7. Raj MK. 1998. Gender Population and Development. Oxford Univ. Press. 8. Raj MK. 1998. Gender Population and Development. Oxford Univ. Press. 9. Rhoda MM and Kabisa M.2016. Analysis of Indicators and Management Tools Used in Zambia to assess impact of Agricultural Extension Programmes on Gender Equity and Nutrition Outcomes. 10. Sahoo RK and Tripathy SN. 2006. SHG and Women Empowerment. Anmol Publ. Sinha K. 2000. Empowerment of Women in South Asia. Association of Management Development Institute in South Asia, Hyderabad. 	
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Course Code	AGS501						
Course Title	Library and Information Services						
Hours	24 L:0, T:1, P:2						
Credits	1						
Type	Multi-Disciplinary Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: To study about library, its role, classification and organization. CO2: To study about source of information, intricacies of abstracting and indexing services CO3: To study about tracing information from reference sources CO4: To study about use of Internet including search engines and its resources; e-resources access methods</p>						
Examination Type	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	0	20%	0	30%	0	50%	0
Examination Mode	Theory/ Practical/ Theory + Practical						
Syllabus	Unit 1: (4 hours) <ul style="list-style-type: none"> Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library 						CO1

	Unit 2: (6 hours) <ul style="list-style-type: none"> Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.) 	CO2
	Unit 3: (8 hours) <ul style="list-style-type: none"> Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services 	CO3
	Unit 4: (6 hours) <ul style="list-style-type: none"> Use of Internet including search engines and its resources; e-resources access methods. 	CO4

Suggested Readings:

1. Wu Diana Yuhfen and Liu Mengxiong. 2001. Academic librarianship: changing roles in the digital age. Available at [http://www.sssu.edu/ridwu/academic librarianship P&F](http://www.sssu.edu/ridwu/academic%20librarianship%20P&F). Accessed March 10, 2008
2. Library.2004. Encyclopedia Britannica premium service
[http://www.britannica.com/eb/ article eu=09616](http://www.britannica.com/eb/article%20eu=09616). Accessed March 10, 2008
3. Young, P.V. (1984). Scientific social survey and research. Rev. 4th Ed. Prentice Hall, New Delhi.
4. <https://guides.library.manoa.hawaii.edu/PlantPath/Books>
5. <https://unl.libguides.com/c.php?g=51695&p=334113>
6. <https://libraries.unl.edu/citation-tools>

Course Code	AGS503						
Course Title	Intellectual Property and its Management in Agriculture						
Hours	12 L: 12, T: 0, P: 0						
Credits	1						
Type	Multi-Disciplinary Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following Knowledge and skills:</p> <p>CO1: Understand the concept and historical aspects of IPRs</p> <p>CO2: Learn the legislation for protection of intellectual properties in India context</p> <p>CO3: Learn about the protection of biological materials</p> <p>CO4: Aware of international treaties and licensing agreements</p>						
Examination Type	Theory + Practical						
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	10%	0	0	20%	35%	30%	5%
Examination Mode	Theory + Practical						

Syllabus	Unit 1: (3 hours) Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs;	CO1
	Unit 2: (3 hours) Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and bio- diversity protection.	CO2
	Unit 3: (3 hours) Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity.	CO3
	Unit 4: (3 hours) International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer Agreements, Research collaboration Agreement, License	CO4
	Agreement.	

Reference Books:

1. Erbis FH & Maredia K.1998. Intellectual Property Rights in Agricultural Biotechnology. CABI.
2. Ganguli P. 2001. Intellectual Property Rights: Unleashing Knowledge Economy. McGraw Hill.
3. Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC & Aesthetic Technologies.
4. Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol. V. echnology Generation and IPR Issues. Academic Foundation.
5. Rothschild M & Scott N. (Ed.). 2003. Intellectual Property Rights in Animal Breeding and Genetics. CABI.
6. Saha R. (Ed.). 2006. Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies. Daya Publ. House.
7. The Indian Acts - Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and amendments; Layout Design Act, 2000; PPV and FR Act 2001, and Rules 2003; National Biological Diversity Act, 2003.

Course Code	AGS504						
Course Title	Basic Concepts in Laboratory Techniques						
Hours	24 L:0, T:1, P:2						
Credits	2						
Type	Multi-Disciplinary Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: To teach students about safety measures in lab, handling of chemical substances</p> <p>CO2: To teach students about handling, weighing and preparation of solution</p> <p>CO3: To teach students about use and handling of lab equipment</p> <p>CO4: To teach students about preparation of media and methods of sterilization, seed viability testing</p>						
Examination Type	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	0	20%	0	30%	0	50%	0
Examination Mode	Theory/ Practical/ Theory + Practical						
Syllabus	Unit 1: (6 hours) <ul style="list-style-type: none"> Safety measures while in Lab; Handling of chemical substances; Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes, washing, drying and sterilization of glassware. 						CO1
	Unit 2: (6 hours) <ul style="list-style-type: none"> Drying of solvents/chemicals. Weighing and preparation of solutions of different strengths and their dilution Handling techniques of solutions; Preparation of different agro-chemical doses in field and pot applications 						CO2
	Unit 3: (6 hours) <ul style="list-style-type: none"> Preparation of solutions of acids; Neutralization of acid and bases; preparation of buffers of different strengths and pH values. Use and handling of microscope, laminar flow, vacuum pumps, viscometer, thermometer, magnetic stirrer, micro-ovens, incubators, sand bath, water bath, oil bath; Electric wiring and earthing. 						CO3
	Unit 4: (6 hours) <ul style="list-style-type: none"> Preparation of media and methods of sterilization; Seed viability testing, testing of pollen viability; Tissue culture of crop plants; Description of flowering plants in botanical terms in relation to taxonomy 						CO4

Suggested Readings

1. Furr AK. 2000. CRC Hand Book of Laboratory Safety. CRC Press.
2. Gabb MH and Latchem WE. 1968. A Handbook of Laboratory Solutions. Chemical Publ. Co.

Course Code	AGS505						
Course Title	Agricultural Research, Ethics and Rural Developmental Programmes						
Hours	12 L: 12, T: 0, P: 0						
Credits	1						
Type	Multi-Disciplinary Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following Knowledge and skills:</p> <p>CO1: Understand the role of global agricultural research system CO2: Learn the role of International Agricultural Research Centre CO3: Learn about rural development policies and programmes CO4: Illustrate the constraints in implementation of rural development policies and programmes</p>						
Examination Type	Theory + Practical						
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	10%	0	0	20%	35%	30%	5%
Examination Mode	Theory + Practical						
Syllabus	<p>Unit 1: (3 hours) History of Agriculture in brief; Global Agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR)</p>						CO1
	<p>Unit 2: (3 hours) International Agricultural Research Centres (IARC), partnership with NARS, role as a partner in the global Agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility. Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.</p>						CO2

	Unit 3: (3 hours) Concept and connotations of rural development, rural development policies and strategies. Rural development programs: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme, Integrated Rural Development	CO3
	Programme (IRDP),	
	Unit 4: (3 hours) Panchayati Raj Institutions, Co-operatives, Voluntary Agencies/Non-Governmental Organisations, Critical evaluation of rural development policies and programs. Constraints in implementation of rural policies and programs.	CO4

Reference Books:

1. Bhalla GS & Singh G. 2001. Indian Agriculture - Four Decades of Development. Sage Publ.
2. Punia MS. Manual on International Research and Research Ethics. CCS, Haryana Agricultural University, Hisar.
3. Rao BSV. 2007. Rural Development Strategies and Role of Institutions - Issues, Innovations and Initiatives. Mittal Publ.
4. Singh K. 1998. Rural Development - Principles, Policies and Management. Sage Publ.

Course Code	ENG551						
Course Title	Technical Writing and Communications Skills						
Hours	24 L:0, T:0, P:2						
Credits	1						
Type	Multi-Disciplinary Course						
Course Outcomes	On the completion of the course, the student will gain the following knowledge and skills: CO1: To teach students about technical writing and various parts of thesis and communication. CO2: To teach students about writing of abstracts, summaries, précis, citations etc. CO3: To teach students about writing of a review article. Communication Skills - Grammar CO4: To teach students about accentual pattern						
Examination Type	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	0	20%	0	30%	0	50	0
Examination Mode	Practical						

Syllabus	Unit 1: (6 hours) <ul style="list-style-type: none"> Technical Writing - Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research communications (title page, authorship, contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); 	CO1
	Unit 2: (6 hours) <ul style="list-style-type: none"> Writing of abstracts, summaries, précis, citations etc.; commonly used abbreviations in the thesis and research communications; Illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; 	CO2
	Unit 3: (6 hours) <ul style="list-style-type: none"> Writing of a review article. Communication Skills - Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors); Concord; Collocation; Phonetic symbols and transcription; 	CO3
	Unit 4: (6 hours)	CO4
	<ul style="list-style-type: none"> Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers. 	

Suggested Readings:

1. Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India.
2. Collins' Cobuild English Dictionary. 1995. Harper Collins.
3. Gordon HM & Walter JA. 1970. Technical Writing. 3rd Ed. Holt, Rinehart & Winston.
4. Gupta RH. 2010. Essentials of Communication. 7th Ed. Pragati Prakashan. Hornby AS. Comp. Oxford Advanced Learner's Dictionary of Current English. 6th Ed. Oxford University Press.
5. James HS. 1994. Handbook for Technical Writing. NTC Business Books.
6. Joseph G. 2000. MLA Handbook for Writers of Research Papers. 5th Ed. Affiliated East West Press.
7. Mohan K. 2005. Speaking English Effectively. MacMillan India.
8. Richard WS. 1969. Technical Writing. Barnes & Noble.
9. Robert C. (Ed.). 2005. Spoken English: Flourish Your Language. Abhishek.
10. Sethi J & Dhamija PV. 2004. Course in Phonetics and Spoken English. 2nd Ed. Prentice Hall of India

Course Code	MTH670						
Course Title	Statistical Methods for Applied Sciences						
Hours	60 L:3, T:0, P:1						
Credits	4						
Type	Multi-Disciplinary Course						
Course Outcomes	<p>On the completion of the course, the student will gain the following knowledge and skills:</p> <p>CO1: To teach students about different statistical methods and classifications</p> <p>CO2: To teach students about measures of central tendency and measure of dispersion</p> <p>CO3: To teach students about theory of probability</p> <p>CO4: To teach students about different distributions, their applications and statistical tests</p>						
Examination Type	Theory/ Practical/ Theory + Practical						
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ABL/PBL
Weightage	10%	0	25%	0	35%	25%	5%
Examination Mode	Theory/ Practical/ Theory + Practical						
Syllabus	Unit 1: (9 hours) <ul style="list-style-type: none"> Classification, tabulation and graphical, representation of data. Box-plot, Descriptive statistics. Exploratory data analysis 						CO1
	Unit 2: (9 hours) <ul style="list-style-type: none"> Measures of central tendency- Mean, Median, Mode, Geometric mean, Harmonic mean. Measures of Dispersion- Range, Quartile deviation, Mean deviation, Standard deviation 						CO2
	Unit 3: (9 hours) <ul style="list-style-type: none"> Theory of probability. Random variable and mathematical expectation. Discrete and continuous probability distributions. Correlation and regression 						CO3
	Unit 4: (9 hours) <ul style="list-style-type: none"> Binomial, Poisson, Negative Binomial, Normal distribution, Beta and Gamma distributions and their applications. Concept of sampling distribution: chi-square, t and F distributions. Tests of significance based on Normal, chi-square, t and F distributions. 						CO4

	Practical (24 hours) Exploratory data analysis, Box-Cox plots; Fitting of distributions ~ Binomial, Poisson, Negative Binomial, Normal; Large sample tests, testing of hypothesis based on exact sampling distributions-chi square, t and F; Confidence interval estimation and point estimation of parameters of binomial, Poisson and Normal distribution; Correlation and regression analysis, fitting of orthogonal polynomial regression; applications of dimensionality reduction and discriminant function analysis; Nonparametric tests.	
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Suggested Readings

1. Anderson TW. 1958. An Introduction to Multivariate Statistical Analysis. John Wiley.
2. Goon AM, Gupta MK & Dasgupta B. 1977. An Outline of Statistical Theory. Vol. I
3. Goon AM, Gupta MK & Dasgupta B. 1983. Fundamentals of Statistics. Vol. I.
4. Hoel PG. 1971. Introduction to Mathematical Statistics. John Wiley.