

M.SC. ICT (AGRICULTURE)
SEMESTER WISE COURSE CURRICULUM (70 CREDITS)

S.N.	Code	Titles	Credits
Semester – I			
1.	ICTA-511*	Introduction and Role of ICT in Agriculture	03(3+0)
2.	ICTA-512*	ICT Infrastructure & Management	03(2+1)
3.	ICTA-513*	Essentials of Agriculture	03(3+0)
4.	ICTA-514*	Business Mathematics	03(3+0)
5.	ICTA-515*	Marketing Management	03(3+0)
6.	ICTA-516*	Dynamics of Communication Skills& Report Writing	03(2+1)
Semester – II			
1.	ICTA-521*	Database Management Systems	03(2+1)
2.	ICTA-522*	Programming Language Using C	03(2+1)
3.	ICTA-523*	Agricultural Finance & Project Management	03(3+0)
4.	ICTA-524*	Quantitative Techniques	03(3+0)
5.	ICTA-525*	Research Methodology	03(2+1)
6.	ICTA-526*	Sustainable Agriculture	03(3+0)
Semester – III			
1.	ICTA-531*	Remote Sensing, GIS, GPS and its applications	03(2+1)
2.	ICTA-532*	E-Commerce	03(2+1)
3.	ICTA-533*	Bioinformatics	03(2+1)
Group I (Any One) **			
1.	ICTA-534a	Web Development	03(2+1)
2.	ICTA-534b	Object Oriented Programming Using Java	03(2+1)
3.	ICTA-534c	Cyber and Information Security	03(2+1)
4.	ICTA-534d	E-Agriculture	03(2+1)
Group II (Any One) **			
1.	ICTA-535a	Commercial Entomology	03(2+1)
2.	ICTA-535b	Horticultural Opportunities for Entrepreneurship	03(2+1)
3.	ICTA-535c	Dairy and Poultry Farm Management	03(2+1)
Semester - IV			
1.	ICTA-541	Seminar	02(2+0)
2.	ICTA-542	Comprehensive	02(2+0)
3.	ICTA-543	Thesis based on Industry/Research Internship	15

*Core Courses

** Courses related to specialized field

INTRODUCTION AND ROLE OF ICT IN AGRICULTURE

ICTA-511

3(3+0)

Objective

To acquaint the students with scope of Ict in agriculture, networking and communication media.

UNIT-I

Introduction & scope of ICT in Agriculture, Need for ICT in Agricultural Extension. National Policies on ICT in Agricultural Extension.

Role of communications in ICT: Concept, elements & their characteristics. Message: meaning, dimensions of a message characteristics of a good message, message treatment and effectiveness, distortion of message. Methods of communication: meaning and function. Forms of communication. Role of Mass Media in dissemination of farm technology. Modern communication media: electronic video, tele text, tele conference, computer assisted instruction.

UNIT-II

Telephone/Mobile Technology: Farmer Call Centre, SMS Broadcast Service, m-krisi. ICT initiatives of NGOs and Private Companies. ICT initiatives by ICAR and SAUs, Value Added Services, Fisher Friend Project, SMS Services to farmers by Department of Agriculture.

UNIT-III

Practices of ICT for Agricultural Extension: aAQUA, Digital Green, e-Agrik (e-Agriculture), e-Sagu (e-cultivation), KISSAN (Karshaka Information Systems Service and Networking), Solutions through Information, VASAT-Virtual Academy for the Semi-Arid Tropics, Touch Screen Kiosk, e-Extension (e-Soil Health Card Program). Village

UNIT-IV

Village Knowledge Centre (VRC/VRC/CIC): Introduction, concept, process for setting VRC. Warana Wired Village Project, Web Portals: AGRISNET, DACNET, InDG, DEAL, i-KISAN, e-Krisi, ASHA, IFFCO- Agri-Portal, Agriwatch Portal, i-Shakti. ICTs for market information and Agri-Business: AGMARKNET, e-KRISHI VIPNAN, ICT-e-CHOPAL, EID Garry-Indiagriline.

SUGGESTED READINGS

1. G.L. Ray, 2006. Extension communication and management. Kalyani Publ.
2. A.S. Sandhu, 2004. Text book on Agricultural communication process and methods. Oxford & TBH.
3. R Saravanan, C Kathiresan & T Indra Devi, 2011. Information & communication technology for agriculture and rural development. New India Publ. Agency.
4. R Saravanan 2010. ICTs for agricultural extension, New India Publ. Agency.
5. B Jirli, Deepak De & GCKendadamth 2005. Information and communication technology (ICT) and sustainable development, Ganga Kaveri Publ. House, Varanasi.
6. Shaik N Meera, 2008. ICTs in agricultural extension tactical to practical. Ganga Kaveri Publ. House, Varanasi.

ICT INFRASTRUCTURE: IMPLEMENTATION AND APPLICATIONS

ICTA-512

3(2+1)

Objective

This course intends to include infrastructure required for ICT, implementing ICT techniques and understanding networking paradigms like LAN, MAN, WAN, Transmission media and internet.

THEORY

UNIT-I

Introduction to Networking, advantages of networking; Basic Features, Network Types: LAN, MAN and WAN; simple PC Based Network: Intranet and Internet; Servers and Clients, Introduction to Network Media, line configuration, transmission modes, topology and protocol.

UNIT-II

Layered Architectures (OSI, TCP/IP), Network performance measures e.g. bandwidth, latency, Delay/bandwidth product. Data Communication Concepts: Analog and Digital Signals, Analog versus Digital, transmission impairment

UNIT III

Transmission Media: Guided Media (twisted pair cable, Coaxial Cable, fiber optic cable), Unguided media (radio waves, microwaves, infrared), Topology. Hardware building Blocks of a network e.g. switches, routers, gateways etc. Circuit switched, packet switched and message switching networks.

UNIT IV

World Wide Web: Introduction of IP address, World Wide Web: Architecture, HTTP, usage of POP, IMAP and SMTP in electronic mail.

Internet & Emailing: connecting to internet, ISP, dialup, broadband, leased lines, DSL, Concept of Internet, applications of Internet, searching, email accounts, sending and receiving mails, attachments, searching.

PRACTICAL

Lab related to Theory part.

SUGGESTED READINGS

1. Peterson & Davie, Computer Networks, 4th Ed. ELSEVIER.
2. Andrew S. Tannenbaum, Computer Networks, Pearson Education, 2003.
3. Stallings, Data & Computer Communication, 8th Ed., Pearson.
4. Kurose, Computer Networking, Pearson.

ESSENTIALS OF AGRICULTURE

ICTA-513

3(3+0)

Objective

This paper is designed to impart very basic knowledge of agriculture to the students, keeping in mind that the student may not have sufficient background of agriculture.

UNIT-I

History of agriculture and agronomy, cropping system and pattern, classification of crops, weeds, and crop production of important crops, Wheat, Rice, Maize, Jowar, Bajra, Cotton and pulses, introduction to national and international research institutes in agriculture, agro climatic zones.

UNIT-II

Cell and cell organelle, cell division, chromosome and morphology, mode of reproduction, breeding methods in brief, PBR and release of variety.

Introduction and important terms, classification and principles of plant disease control, types of resistance and susceptibility, eradication of pathogens, types of disease and examples chemicals used in disease control.

UNIT-III

Importance, introduction and scope of horticulture. Classification of fruits according to climate. Propagation methods of fruits and vegetable crops, Package of practices for the cultivation of major fruits, vegetables and flowers, mango, banana, citrus, tomato, rose. Introduction general morphology of insets with different appendages.

UNIT-IV

Importance of dairying, important milch breeds of cattle and buffalo, exotic cattle breeds, common diseases of cattle, composition of milk, important breeds of sheep and goat, swine. Poultry, gestation period of animals and product related revolution.

SUGGESTED READINGS

1. D.S. Yadav, 1992. Pulse Crops, Kalyani Publishers, New Delhi.
2. Diseases of Vegetable and Oilseed Crops. Prentice Hall, Englewood Cliffs, New Jersey.
3. J. Parker, 2008. Molecular Aspects of Plant Diseases resistance. Blackwell Publ.
4. J.S. Arora, 2006. Introductory Ornamental horticulture. Kalyani.
5. B.D.Singh, 2005. genetics. Kalyani Publishers, Ludhiana.
6. G. Datta, 1994. Care and Management of Dairy Cattle and Buffaloes. 3rd Ed. ICAR sd

BUSINESS MATHEMATICS

ICTA-514

3(3+0)

Objective

This course aims at providing the students with the basic mathematics knowledge necessary for making analytical evaluation of business situations and to develop solutions to it. The students would be exposed to elementary mathematics.

UNIT-I

Theory of Sets – definition, elements, types, equality of sets. union, intersection, compliment & difference of sets; Venn diagrams, applications of Venn diagrams; Cartesian product of two sets; relations and functions.

UNIT-II

Matrices, Operations – addition, multiplication, transpose and inverse of matrix; determinants, minor and cofactor, solution of simultaneous Linear Equations for economic analysis. Cramer’s rule.

UNIT-III

Derivatives as rate of change. Differentiation: linearity property, formulas for differentiation of elementary functions, product rule and quotient rule for differentiation, differentiation of function of functions, differentiation of parametric equations, successive differentiation. Application of derivatives in agricultural research.
Application of differentiation: Maxima and Minima.

UNIT-IV

Integration as reverse process of differentiation, integration by substitution, integration by parts.
Definite integrals, application of definite integrals in finding areas under curves.

SUGGESTED READINGS

1. D.C. Sancheti, A.M. Malhotra & V.K. Kapoor, Business Mathematics, Sultan Chand & Sons, New Delhi.
2. Qazi Zameerudini, V.K. Khanna & S.K. Bhambri, Business Mathematics, Vikas Publishing House Pvt. Ltd, New Delhi.
3. R. Jaya Prakash Reddy & Y. Mallikarjuna Reddy, A Text Book of Business Mathematics, Ashish Publishing House, New Delhi.
4. V. Prakash, S. Ramachandran, S.T. Padmanabhan, S. Raman, Amali Raja, M. Malini, Business Mathematics, Tamilnadu Textbook Corporation, Chennai.

MARKETING MANAGEMENT

ICTA-515

3(3+0)

Objective

This course is designed to serve as an introduction to the theory and practices of marketing. The course will help to improve ability to assess market opportunities and develop effective marketing strategies.

UNIT-I

Nature and Scope of Marketing, Core Marketing Concepts (Market, Needs, Wants and Demand, Value and Satisfaction, Consumer and Customer, Goods and Services, Competition, Company orientation towards marketplace), The Marketing Environment (External and Internal)

Consumer buying decision process and Basics of Market Research, Levels of marketing planning, Segmentation, Targeting and Positioning, Marketing Mix of Goods and Services

UNIT-II

Developing products (Introduction to product, Product levels, Product Classification, Product life cycle, Product Line and Mix, Packaging and Labeling, Product Quality) Concept and Role of Brands, Pricing Decisions (Introduction to price, Process of pricing, Methods of pricing)

UNIT-III

Value Chain Model, Market Channels (Importance, Levels, Functions and Flow, Service Sector channels, Channel Design, Management and Integration, E-Commerce channels) Retailing and Wholesaling, Marketing Communications (Role, Process, Mix, Measuring results, and integrated marketing communications)

UNIT-IV

Marketing Evaluation and Control, Fundamentals of Agricultural Marketing, Relationship Marketing, Digital Marketing, Not-for-profit marketing, Retail Marketing, Rural Marketing, Industrial Marketing, Sustainability and Ethics in marketing.

Case Studies with emphasis on Agricultural Marketing.

SUGGESTED READINGS

1. Kotler, Keller, Koshy, Jha, 2014. Marketing Management – 14e, Pearson Publication.
2. Baines, Fill, Page, 2013. Marketing – Asian Edition, Oxford University Press.
3. Ramaswamy and Namakumari, Marketing Management, McMillan Business Books.
4. William J. Stanton, Micheal J. Etzel, Bruce J, Walkner, “Fundamentals of Marketing, Mc Graw Hill

DYNAMICS OF COMMUNICATION SKILLS & REPORT WRITING

ICTA-516

3(2+1)

Objective

This course ensures that the students are exposed to effective communication and writing, it introduces the student to the range of communication methods and forms in a dynamic business environment and provides the students with the opportunity to develop strong communication skills.

THEORY

UNIT-I

Mechanics of Language:-Parts of speech, word, phrase, clause

Syntactical patterns: SV, SVO, SVOO, SVC, SVOC

Voice and narration

UNIT-II

Oral Communication: Pronunciation, intonation, pragmatics (listening, speaking, reading, writing), group discussion, PPT, and interview skills.

Telephonic communication

Unit-III

Written communication: Reports, letters, notices, minutes, memoranda, proposals, brochures, job applications, emailing, conference calls and major types of persuasive prose.

UNIT-IV

Creative writing for interpersonal and business purposes: Art of writing scripts or messages for radio, TV, mobile phone etc. public speaking.

PRACTICAL

Group Discussions: Topic based and case based group discussions, Prerequisites of a Group Discussion, Do's and Don't in group discussion

Presentations: podium panic, speaking and skills, importance of body language, visual aids

Mock Interviews: Body Language, Gestures, Postures, Facial Expressions, Dress codes

SUGGESTED READINGS

1. Koneru Aruna, Professional Communication McGraw Hill Pub. 1998, New Delhi
2. Murphy Herta, Herbert W Hilderbrandt, Jane P Thomas Effective, 1997. Business Communication, McGraw Hill.

3. Petit Lesikkar, Business Communication, 1994. McGraw Hill.
4. Willey, Communication Skills Handbook, Summers WilleyPub. India
5. Rai and Rai, Business Communication, 1999. HimalayaPublishing House, Mumbai.
6. R.C. Sharma and Krishna Mohan, Business Correspondenceand Report Writing, 1994,Tata McGraw Hill, Delhi.
7. HanegaveSatyawar, Business Communication, 2008. Rishabh Publishing House, Mumbai.
8. English usage-Michael Swan

DATABASE MANAGEMENT SYSTEMS

ICTA-521

3(2+1)

Objective

This course is intended to provide the student with an understanding data independence, integrity, security, recovery, performance, database design principles and database administration/design of agriculture engineering/sciences database with integrity, security, efficiency and backup/recovery.

THEORY

UNIT-I

Introduction: Introduction to database, role of database in agriculture, Overview and History of DBMS, File System vs DBMS, Purpose of Database, Overall System Structure, Entity Relationship Model, Mapping Constraints - Keys - E-R Diagrams.

UNIT-II

Data Base Design: Conceptual data base design, primitive and Composite data types, concept of physical and logical databases, data abstraction and data independence, data aggregation, Relational Calculus, DDL and DML, Relational Algebra. Relational Database Design: Pitfalls, Normalization Using Functional, Dependencies, First Normal Form, Second Normal Form, Third Normal Form and BCNF.

UNIT-III

RDBMS-SQL: Relational Data Structure, Database Design, Characteristics and advantages of SQL, SQL data types and Literals, SQL Operators, types of SQL commands, Tables, Indexes, Views, Nulls, Aggregate functions, Select Statement, Sub queries, Insert, Update and delete operations, Join, Unions, Data Security, Integrity and concurrency, PL SQL.

UNIT-IV

Introduction to Transaction Processing: ACID Properties, Concurrency Control, Recovery Management.

PRACTICAL

Databases and Tools: MS-Access, SQL Server, ORACLE [Wherever required these tools should be used].

SUGGESTED READINGS

1. H. F. Korth and Silberschatz: Database Systems Concepts, McGraw Hill.
2. Elmasri and S.B. Navathe: Fundamentals of Database Systems,
3. C.J. Date: Data Base Design, Addison Wesley.
4. Hansen and Hansen: DBM and Design, PHI.
5. Elmasri R and Navathe SB, 2000. Fundamentals of Database Systems, 3rd Edition, Addison Wesley.
6. Connolly T, Begg C and Strachan A, Database Systems, 2nd Edition, Addison Wesley, 1999
7. CeriPelagatti , Distributed Database: Principles and System - (McGraw Hill)
8. Simon AR, Strategic Database Technology: Management for the Year 2000, Morgan Kaufmann,1995

PROGRAMMING LANGUAGE USING C

ICTA-522

3(2+1)

Objective

To develop programming skills and logic.

THEORY

UNIT-I

Language evolution criterion and language categories, requisites for programming, Describing Syntax and Semantics, A Structure of C program, Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation.

UNIT-II

Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, programming examples.

UNIT-III

Designing structured programs, Functions, basics, parameter passing, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, example c programs.

UNIT-IV

Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two-dimensional and multi-dimensional arrays, applications of arrays. String and String functions.

Derived types- structures- declaration, definition, Pointers- concepts

PRACTICAL

Exercises related to theory portion.

SUGGESTED READINGS

1. Ritchie & Kernighan, The C Programming language, ANSI C Version 2nd Ed., PHI.
2. Ashok Kamthane, Programming in C, 2nd Ed., Pearson 2011
3. Schildt, C- The Complete Reference, 4th Ed., TMH 2000
4. E. Balaguruswamy, Programming in ANSI C, 6th Ed., TMH 2012
5. Concepts of Programming Language by Robert W. Sebesta, Addison Wesley, pearson Education Asia, 1999.
6. How to Program C by Deitel and Deitel, Addison Wesley, Pearson Education Asia.

7. Introduction to Computer Science by Ramon A. Mata-Toledo and Pauline K. Cushman, Mc Graw Hill International Edition.
8. Programming Languages by D. Appleby and JJ VandeKopple, Tata McGraw Hill, India.
9. C Programming a Modern Approach by KN King, WW Norton & Co.
10. Programming in C by YashwantKanetkar, B.P.B Publications.

AGRICULTURAL FINANCE & PROJECT MANAGEMENT

ICTA-523

3(3+0)

Objective

The Course Objective of the course is to impart knowledge on issues related to lending to priority sector credit management and financial risk management.

UNIT-I

Role and Importance of Agricultural Finance. Financial Institutions and credit flow to rural/priority sector. Agricultural lending - Direct and Indirect Financing - Financing through Co-operatives, NABARD and Commercial Banks and RRBs. District Credit Plan and lending to agriculture/priority sector. Micro-Financing and Role of MFI's - NGO's, and SHG's.

UNIT-II

Lending to farmers - The concept of 3 C's, 7P's and 3 R's of credit. Estimation of Technical feasibility, Economic viability and repaying capacity of borrowers and appraisal of credit proposals.

UNIT-III

Preparation of financial statements - Balance Sheet, cash Flow Statement and profit and Loss Account. Ratio Analysis and assessing the performance of farm/firm.

UNIT-IV

Identification, preparation, appraisal, financing and implementation of project. Project Appraisal techniques - undiscounted measures. Time value of money - use of discounted measures - B-C ratio, NPV and IRR. Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment projects. Net work Techniques - PERT and CPM.

SUGGESTED READINGS

1. Dhubashi P.R. 1986. Policy and Performance - Agriculture and Rural Development in Post Independent India. Sage Publ.
2. Gittinger J.P 1982. Economic Analysis of Agricultural Project. The Johns Hopkins Univ. Press.
3. Gupta S.C. 1987. Development banking for Rural Development. Deep & Deep Publ.
4. Little I.M.D & Mirlees J.A. 1947. Project Appraisal and Planning for Developing Countries. Oxford & IBH Publ.
5. Muniraj R. 1987. Farm finance for Development. Oxford & IBH Publ.

QUANTITATIVE TECHNIQUES

ICTA4524

3(3+0)

Objective

This course enables the students to know the scientific approach to decision making when solving business problems.

UNIT-I

Introduction to linear programming, linear programming problems (LPP) - Problem formulation, graphical solution.

UNIT-II

Simplex method for LPP- solving profit maximization and cost minimizations problems; Formulation of farms and non-farm problems as linear programming models and solutions.

UNIT-III

Transportation problems; initial basic feasible solution, optimal solution; assignment problems, Hungarian method for assignment problems, unbalanced assignment problems.

UNIT IV

Game Theory- Concepts of game theory, two person zero sum game, saddle point, solution through mixed strategies, the rectangular game as linear program.

SUGGESTED READINGS

1. Hamdy A. Taha, Operations Research: An Introduction, 6th Ed. Pearson Education Asia Pte Ltd., Singapore, 2001 .
2. Barry Render and M. Stair Jr. Ralph Quantitative Analysis for Management, 7th Ed., Prentice Hall, New Jersey, 2000
3. David R. Anderson, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, 9th Ed., South Western College Publishing, Cincinnati, Ohio, 2003.

RESEARCH METHODOLOGY

ICTA-525

3(2+1)

Objective

To expose the students to research methodology used in agriculture analysis, the focus will be on providing knowledge related to research process and statistical techniques used in agriculture science.

THEORY

UNIT-I

Importance & scope of research in agriculture. Research prioritization, research process, data collection, classification & tabulation of data.

UNIT-II

Theory of probability, Random variable and mathematical expectation. Discrete and continuous probability distributions. Theory of estimation. Test of significance based in normal, chi-square, t and f distributions.

UNIT-III

Concept of sampling, kinds of sampling: SRS, Stratified sampling, Systematic sampling, Cluster sampling and multistage sampling: ANOVA

UNIT-IV

Correlation and regression analysis of two variables and test of significance based upon them.

PRACTICAL

Preparation of schedule, classification of data, fitting of BD, PD and normal distribution, large and small sample sets. Use of random number tables. Estimation of mean and variance with SRS and stratified sampling. One way and two way analysis of variance, calculation of correlations and regression coefficients and test of significance of them.

SUGGESTED READINGS

1. Hoel PG. 1971. Introduction to Mathematical Statistics. John Wiley.
2. Electronic Statistics Text book: <http://www.statsoft.com/textbook/stathome.html>.
3. Dean AM & Voss D. 1999. Design and Analysis of experiments. Springer.
4. Dhondyal S.P. 1997. Research Methodology in Social Science and Essentials of Thesis Writing. Amman Publ. House, New Delhi.
5. Singh D, Singh P and Kumar P, 1982. Hand book on sampling methods IASRI Publ.

SUSTAINABLE AGRICULTURE

ICTA-526

3(3+0)

Objective

To acquaint the students with sustainable agriculture and practices to improve productivity.

UNIT-I

Philosophy and concept of sustainable development, sustainable Agriculture – Definition and current concept, Factors affecting ecological balance and ameliorative measures, Land degradation – A brief introduction, Conservation of natural resources – Soil and water, Irrigation problems – Quality of irrigation water and management practices for efficient utilization, Waste lands and their development, Acid soils – Causes and amelioration, Salt affected soils and their amelioration, Integrated diseases and pest management, Integrated nutrient management, Integrated weed management.

UNIT-II

Watershed management– Definition, objectives, problems, approach and components, Development of cropping system for watershed areas, Planning and operation of project for watershed management, Crop diversification – Principles, types and needs.

Conservation Agriculture – Definition, and principles, Conservation Agriculture – Present status and future prospects, Machinery for Conservation Agriculture– Progress and Needs, Conservation Agriculture in RainfedSemi Arid Tropics, Conservation Agriculture for climate change mitigation and adaptation,Resource Conservation Technologies,Biochar and carbon sequestration.

UNIT-III

Organic farming – Definition, principles and relevance in present context, Components of Organic farming, Quality considerations of organic produce, Certification of organic produce and accreditation, Recycling and crop residue management, Biofertilizers, Biopesticides.

UNIT-IV

Farming systems – Definition and principles, Components of farming systems – Introduction, Poultry, piggery, fisheries and duck farming, Alternate land use systems, Sericulture, apiculture and sheep and goat rearing, IFS (Intergrated farming systems) for wetland, dryland and irrigated situations.

SUGGESTED READINGS

1. Panda, S.C. 2004. Cropping Systems and Farming Systems, Agrobios (India), Jodhpur.

2. Sharma, Arun K. 2002. A Handbook of Organic Farming, Agrobios (India) Ltd., Jodhpur.
3. Balasubramanian, P. and Palaniappan, S.P. 2004. Principles and Practices of Agronomy, Agrobios (India) ,Jodhpur.
4. Shukla, Rajeev K. 2004. Sustainable Agriculture, Surbhee Publications, Jaipur.
5. Reddy, S.R. 2004. Principles of Agronomy, Kalyani Publishers, Ludhiana.
6. Dahama, A.K. 1999. Organic Farming, Agro Botanic, Bikaner.
7. Sharma, Arun K. 2002. A Handbook of Organic Farming ,Agrobios (India) , Jodhpur.
8. Palaniappan, S.P. and Anandurai, K. 1999. Organic Farming- Theory and Practice, Scientific Pub. Jodhpur.
9. Thapa, U and Tripathy, P. 2006. Organic farming In India: Problems and Prospects, Agrotech, Publishning Academy, Udaipur.
10. K.N. Singh and R.P. Singh (Eds), 1990. Agronomic Research Towards Sustainable Agriculture, Indian Society of Agronomy, New Delhi.
11. R.P. Singh, 1990. Sustainable Agriculture: Issues,Perspectives and Prospects in Semi Arid Tropics. Vol I & II Indian Society of Agronomy, New Delhi.
12. V.V. Dhurva Narayan, R.P. Singh, S.P. Bhardwaj, M., Sharma, A.K. Sikka, K.P.R. Vittal and S.K. Das. 1987. Watershed Management for Drought Mitigation, ICAR Publication, New Delhi.
13. R.P. Singh 1995. Sustainable Development of Dryland Agriculture in India, Scientific Publishers, Jodhpur.
14. Sharma, A. R. & U. Behra 2011. Resource Conserving Techniques in Crop Production. Scientific Publishers, Jodhpur.

REMOTE SENSING, GIS, GPS AND ITS APPLICATIONS

ICTA531

3(2+1)

UNIT-I

INTRODUCCION: Remote Sensing – history & development, definition, concept and principles, Manual v/s automated GIS, Platforms and Sensors, Fundamentals of Geographic Information System, Surveying and GPS, Satellites and their characteristics – Geo-stationary and sun-synchronous

UNIT-II

DIGITAL IMAGE PROCESSING: Satellite Data, Raster and Vector formats, advantages and disadvantages of various data structures and data formats. Data pre-processing, methods of data capture, digitization and scanning methods, platforms and sensors, image enhancement techniques

UNIT-III

GEOGRAPHIC INFORMATION SYSTEM: Introduction, Maps, Definitions, Map projections, types of map projections, map analysis, GIS definition, basic components of GIS, Standard GIS softwares, Data types, Spatial and non-spatial (attribute) data, measurement scales.

UNIT-IV

REMOTE SENSING: Introduction of Remote Sensing - Electro Magnetic Spectrum, Physics of Remote Sensing- Effects of Atmosphere- Scattering – Different types –Absorption-Atmospheric window- Energy interaction with surface features – Spectral reflectance of vegetation, soil ,and water –atmospheric influence on spectral response patterns- multi concept in Remote sensing

Suggested Readings:

1. Geographical Information System for Geoscientists by Bonham-Carter G.F., Pergamon Press, Tarrytown, New York.
2. Principles of Geographical Information System for Land Resources Assessment by Burrough, P.A., Clarendon, Press, Oxford.
3. Geographical Information System by Fraser Taylor, D.R., The Microcomputer and Modem Cartography, Pergamon Press.
4. Mathematical Geography by Jameson, A.H. and Mormsby, M.t. Mormsby., Vol I and II, Sir Issac Pitman and Sons Ltd. London.
5. Cartographical Design and Production by Keates, J.S., London, Longman group.
6. Campbell, J.B.: Introduction to Remote Sensing. Taylor Publications
7. Drury, S.A.: Image Interpretation in Geology. Allen and Unwin
8. Gupta, R.P.: Remote Sensing Geology. Springer Verlag

E-COMMERCE

ICTA532

3(2+1)

UNIT-I

Overview of e-commerce

Meaning, Framework, Architecture, importance of e-commerce in the context of today's business, Benefits and impact of e-commerce (as compared with traditional system of e-commerce), E-commerce and e-business, e-commerce in India, E-Advertising & Marketing

UNIT-II

Business Models for E-Commerce

Business to consumer model- basic idea, major activities, major challenges, Value chain model, Manufacturer model, Advertising Model, Subscription model, business to business e-marketplace and its types, business to government, consumer to consumer, consumer to business

UNIT-III

Electronic Payment Systems

Introduction to Payment Systems, Types of E-Payment: Payment card (Credit card and Debit Card), Electronic or digital cash, Electronic or digital wallet, Stored value card (Smart card.)
Basic idea of online banking,

UNIT-IV

E-commerce in agriculture

Introduction to E-agriculture, use of IT in agriculture, development, strategy, and market implications, advantages of e-agriculture, agribusiness and the internet, E-market place, E-distribution sites, E-procurement sites, benefits of e-commerce adoption in agriculture, forces fueling e-commerce, Future of E Commerce in agriculture, E-governance applications of the internet

Suggested Readings

1. David Whitley, 'E-Commerce', 1st edition, Tata McGraw Hill.
2. Dave Chaffey, 'E-Business and E-Commerce Management', 5th Edition, Pearson.
3. Judy Strauss and Raymond Frost, 'E- Marketing', 6th Edition, PHI.
4. Chan, Lee, Dilon and Chang, 'E-Commerce: Fundamentals and Applications', Wiley India.
5. Elias M. Awad, 'Electronic Commerce', 2nd Edition, PHI.
6. Kamlesh K Bajaj and Debjani Nagi, 'E-Commerce', 2nd Edition, Tata McGraw Hill.
7. Richard L Brandt, 'One Click', Penguin Books.

BIOINFORMATICS

ICTA533

3(2+1)

UNIT I

Introduction, Importance of Bioinformatics, Biological Sequence Structure, Genome projects, Sequence analysis, Homology and analogy.

UNIT II

Microarray technology and its application, Biological database: primary sequence databases: (protein and DNA database), secondary databases, composite databases, online international database access- EMBNET, NCBI.

UNIT III

Sequence alignment and databases searching: evolutionary basis of sequence alignment, optimal alignment methods, Dot-plot, Dynamic programming. Database similarity searching: algorithms of FASTA and BLAST. Statistical significance of alignment, substitution scores and gap penalties. Multiple sequence alignment: CLUSTAL, Phylogenetic analysis, UPGMA, N-J methods. EMBOSS.

UNIT IV

Genome Information Resources – DNA Sequence data base - specialized genomic resources. DNA sequence analysis: Gene structure, features of DNA sequence analysis, Issues in the interpretation and EST search, Approach of gene hunting, cDNA library and Expressed Sequence Tags (ESTs), Approaches to EST analysis, Effect of EST data on DNA data base.

Suggested Readings:

1. T. K. Attwood, D. J. Parry-Smith, Introduction to Bioinformatics, Pearson Education Asia.
2. Dan E. Krane, Michale L. Raymer, Fundamental Concepts of Bioinformatics, Pearson Education Asia.
3. Introduction of Bioinformatics: Parrysmith and Attwood
4. Internet of Molecular Biologist: Swindell
5. A Textbook of Bioinformatics: Sharma, Munjal and Shanker, Rastogi publication, Meerut
6. Principles and Applications of Bioinformatics: T. R. Sharma

WEB DEVELOPMENT

ICTA-534a

3(2+1)

UNIT-I

Introduction to Internet, Understanding Browsers, Starting with HTML, HTML Page Structure, Defining Web Layout (Head & Body), Head Tags, Body tag with Bgcolor, background with image and text color.

UNIT-II

Text formatting, Text attributes, Importance of heading tags (H1–H6), Marquee text with or without background, Blink the text attributes, Divide section using <HR> line with width, align, size, Knowing Images format for web, Working with images, Images attributes, Working with tables, table attributes, colspan, rowspan, table Border, align, valign, Table background image, color to cell, Nesting tables, Using list, Ordered list, Unordered list, Bullets (disc, square, circle). Upper alphabets, lower alphabet, roman upper or lower.

UNIT-III

Working with Links-Internal, External, anchor, Email. Linking with text, Links with images, working with forms, knowing get and post action, Radio button, Check box, Text box, Drop-down list, Use attribute Size, Max-length, Name attributes, Add Submit and Reset Button

UNIT-IV

Cascading Style Sheet (CSS)-Common properties, directory structure, some common tags
Client Side scripting language: Java Script-JavaScript Overview, JavaScript Syntax, Type of JavaScript, Embedding Script in HTML File

Suggested Readings:

1. Beginning HTML, XHTML, CSS, and Javascript, Jon Duckett,Wiley India Private Limited.
2. Website Development Using HTML & CSS: A Practical Step-by-Step Guide to Develop e-Commerce Store (English) (Paperback) by Mehra, Navneet|Author;Mehra.
3. HTML & CSS (English) (Paperback) by Jon Duckett, Duckett.
4. Learning Web Design,4/Ed A Beginner's Guide To Html, Css, Javascript,And Web Graphics By Robbins.
5. Web Enabled Commercial Application Development Using HTML, Javascript, DHTML (With CD) and PHP (English) 4th Edition (Paperback) by Ivan Bayross.

OBJECT ORIENTED PROGRAMMING USING JAVA

ICTA-534b

3(2+1)

UNIT-I

Introduction: Object oriented programming, Two paradigms, abstraction, byte code, OOP principles, Data types, variables and arrays:-Integers, floating-point types, characters, Boolean, Iterates, Variable, Data types and casting, automatic type promotion in expressions arrays.

Operators: -Arithmetic operators, bit wise operators, relational operators, Boolean logical assignment operators, the '?' Operator, operator precedence
Control statements: -Java's selection statements, iteration statements, jump statements

UNIT-II

Classes & Objects: Class fundamentals, declaring object reference variable, Introducing methods, constructors, the key word, garbage collection, the finalize() method. Overloading methods, using objects as parameters, classes, using exceptions.

UNIT-III

Inheritance and polymorphism: super class and subclass, protected members, Relationship between super and sub class. Inheritance hierarchy, abstract classes and methods, final methods and classes, nested classes, Type wrappers.

UNIT-IV

String handling: The string constructor, string length, special string operator character extraction, string comparison, searching string, modifying string, data conversion, changing the case of characters, string buffer.

Suggested Readings:

1. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi
2. Deitel: How to Program JAVA, PHI
3. U.K. Chakraborty and D.G. Dastidar: Software and Systems – An Introduction, Wheeler Publishing, Delhi.
4. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.

CYBER AND INFORMATION SECURITY

ICTA-534c

3(2+1)

UNIT-I

Information Security Concepts: Background and current scenario, types of threats and attacks, Goals for Security, Security triad: Confidential, Integrity, Availability, Security management, e-commerce Security, Computer Forensics

UNIT-II

Security Threats and Vulnerabilities: Overview of Security threats, Weak / Strong Passwords and Password Cracking, Insecure Network connections, Malicious Code, Programming Bugs, Cybercrime and Cyber terrorism, Information Warfare and Surveillance

UNIT-III

Cryptography: Introduction, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication and Hash functions, Digital Signatures, Public Key Infrastructure(PKI), Applications of Cryptography

UNIT-IV

Cyber Security Management Practices, Laws and Standards: Overview of Security Management, Information Classification Process, Security Policy, Risk Management, Security Procedures and Guidelines, Business Continuity and Disaster Recovery, Security Laws and Standards, Security Assurance, Security Laws, International Standards

Suggested Readings:

1. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning
2. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics", Tata McGraw -Hill
3. Network Security and Cryptography, William Stallings, Pearson
4. Network Security and Cryptography, Atul Kahate, Tata McGraw -Hill
5. Bernadette H Schell, Clemens Martin, "Cybercrime", ABC – CLIO Inc, California.

COMMERCIAL ENTOMOLOGY

ICTA-535a

3(2+1)

UNIT I

Agrochemicals, definition and classification, basic know-how, status of agrochemical industry in India, Pesticides-introduction and classification, mode of entry, mode of action, chemical structure, formulations, insecticidal poisoning, biomagnifications of pesticides and pesticidal residue and pollution, antidotes

UNIT II

Development of Agrochemicals, Insecticide Acts, DPPQS, Concept of IPM, Biopesticides

UNIT III

Bee keeping- General colony management during different seasons. Seasonal management. Managing colonies for honey production and pollination. Pests and diseases of honey bees. Bee poisoning. Establishment and maintenance of apiaries. Study of different species of silkworms, characteristic features, moriculture, silkworms and its uses, pests and diseases of silkworms, rearing and management of silkworms. Lac insect- natural enemies and their management.

UNIT IV

Principles and methods of pest management in residential buildings, insecticides for domestic use and their safety, pre- and post-construction termite proofing of buildings, appliances for domestic pest control. Rodent Management.

Suggested Readings:

1. Aruga H. Principles of Sericulture. Oxford & IBH, New Delhi.
2. Atwal AS. The World of the Honey Bee. Kalyani Publ., New Delhi.
3. Ganga G. Comprehensive Sericulture. Vol. II. Silkworm Rearing and Silk Reeling. Oxford & IBH, New Delhi.
4. Jain P.C. and Bhargava, M.C. Entomology: Novel Approaches, New India Publishing Agency, New Delhi.
5. Partiban S & David BV. Management of Household Pests and Public Health Pests. Namratha Publ., Chennai.
6. Singh S. Beekeeping in India. ICAR, New Delhi.
7. Bhargava, M.C. and Kumawat, K.C. Pests of Stored Grains and Their Management, New India Publishing Agency, New Delhi.

HORTICULTURAL OPPORTUNITIES FOR ENTREPRENEURSHIP

ICTA-535b

3(2+1)

UNIT-I

Principles and practices of propagation and Nursery management for healthy propagule production. Planning, Layout & components of nursery. Preparation of project report for a Model nursery.

UNIT-II

Orchard establishment- Planning & layout, irrigation and fertilizer management, training and pruning in fruit crops.

UNIT-III

Hi-tech horticulture- Introduction to Protected cultivation, Construction of poly house, shade net house etc. Cultivation of important crops like Tomato, Cucumber, Capsicum, Gerbera, Rose and Strawberry under Protection. Preparation of project report for a model unit.

UNIT-IV

Introduction to PHM of fruits & Vegetables. Principles & methods of fruits and vegetables preservation. Preparation of value added products viz Jam, Jelly, Pickles, Sauces etc. Food safety standards. Project preparation.

Suggested Readings:

1. Chadha, K L & Pareek O P. Advances in Horticulture Volume II-IV
2. Singh H P, Singh G, Samuel J C and Pathak R K. Precision Farming in Horticulture
3. Hartman H T and Kester D E. Plant Propagation- Principles and Practices.
4. Prasad S and Kumar U. Green House Management for Horticultural Crops.
5. Reddy S, Jankiram B, Balaji T, Kulkarni S and Mishra R L. Hi-tech Floriculture, Indian Society of Ornamental Horticulture, N Delhi.
6. Sudheer K P and Indira V. Post Harvest Techniques of Horticultural Crops. New India publication Agency.

DAIRY AND POULTRY FARM MANAGEMENT

ICTA-535c

3(2+1)

UNIT-I

Introduction. Present status and future prospects of livestock development in India. Development of dairy industry in India and world. Scope of commercial dairy farming in India. Government policies and constraints.

Unit-II

Important breeds of cattle, buffalo, sheep, goat and poultry. Trait of economic importance and their inter-relationship. Reproductive behaviours like puberty, oestrus, pregnancy and parturition. Role of management in improving the reproduction efficiency in farm animals. Housing principles, space requirement for different species of livestock. Disease control measures, sanitation and care.

Unit-III:

Breeding management. Selection and culling. Economic traits. Methods of breeding. Feeding and management of different categories of livestock. Care of neonate and young ones. Age at first calving and calving interval in cattle and buffaloes. Management of labour. Milking management. Methods of milking. Livestock marketing. Transportation of animals. Health management. Management of farm animals under adverse environmental conditions. Farm records and their importance.

Unit-IV:

Scope of commercial poultry farming in India. System of housing. Incubation, hatching and brooding. Vaccination and prevention of diseases. Feeding management in poultry. Preservation and marketing of eggs, its economics and keeping quality. Management of poultry under adverse environmental conditions. Production and management of broiler.

Suggested Readings:

1. A text book of Animal Husbandry. Banerjee, G C. Eight Ed. Oxford & IBH Pub. Ltd. New Delhi.
2. Dairy Bovine Production. Thomas, C K and Sastry, N S R. Kalyani Publication.
3. Poultry Production. Singh, R A. Kalyani Publication.
4. Hand Book of Animal Husbandry. 3rd Ed. ICAR Publication.
5. Care and Management of Dairy Cattle and Buffaloes. Datta G. 3rd Ed. ICAR Publication.
6. Feeding of Dairy Cattle and Buffaloes. Arora SP. Kalyani Publisher.

e- Agriculture

ICTA-534d

3(2+1)

Unit I

ICTs projects, case studies in India and developing world. ICT use in field of extension- Expert systems on selected crops and enterprises; Self learning CDs on package of practices, diseases and pest management, Agricultural web sites and portals related to crop production and marketing etc.

Unit II

Community Radio, Web, Tele, and Video conferencing. Computer Aided Extension. Knowledge management, Information kiosks, Multimedia. Online and Offline Extension. Tools for Mobile technologies, learning concepts.

Unit III

ICT Extension approaches-pre-requisites, precision farming, Human resource information. Basic e-extension training issues, ICT enabled extension pluralism, emerging issues in ICT.

Unit IV

Cloud based extension approaches, Blog extension practices, voice enabled extension services, SWOT analysis of ICT based agriculture projects.

Suggested Readings

1. Batnakar S & Schware R. Information and Communication Technology in Development- Cases from India. Sage Publ.
2. Meera SN. ICTs in Agricultural Extension: Tactical to Practical.
3. Ganga-Kaveri Publ. House. JangamWadiMath, Varanasi.
4. Willem Zip. Improving the Transfer and Use of Agricultural Information - A Guide to Information Technology. The World Bank, Washington.