Fisheries Extension, Economics and Statistics				
Courses Offered (V Dean)				
Sr.	**Semester**	**Course No.**	**Title**	**Credits**
1.	**I**	**FEES.111**	**Statistical Methods**	**2+1=3**
	Lecture	***THEORY :***		
	1	Definition of Statistics, Concepts of population, Sample.		
	2	Census and sample survey.		
	3	Classification of data.		
	4	Frequency and cumulative frequency table.		
	5	Diagrammatic and graphical representation of data		
	6	Bar diagrams, Pie-diagram		
	7	Histogram, frequency polygon, frequency curve.		
	8	Ogive curves.		
	9	Important measures of central tendency - arithmetic mean, Relative merits and demerits of these measures.		
	10	Important measures of central tendency - median and mode. Relative merits and demerits of these measures.		
	11	Important measures of dispersion - Range, Mean Deviation, Relative merits and demerits of these measures.		
	12	Important measures of dispersion - Variance and Standard Deviation. Relative merits and demerits of these measures.		
	13	Coefficient of variation; Normal Curve		
	14	Concepts of Skewness and kurtosis.		
	15	Definitions of probability, mutually exclusive and independent events, conditional probability,		
	16	Addition and multiplication theorems.		
	17	Random variable, concepts of theoretical distribution; Binomial distributions and their use in fisheries.		
	18	Concepts of theoretical distribution; Poisson distributions and their use in fisheries.		
	19	Concepts of theoretical distribution; Normal distributions and their use in fisheries		
	20	Basic concept of sampling distribution; standard error and central limit theorem.		
	21	Introduction to statistical inference, general principles of testing of hypothesis.		
	22	Types of errors.		
	23	Tests of significance based on Normal distributions.		
	24	Tests of significance based on t distributions.		
	25	Tests of significance based on Chi-square distributions.		
	26	Bivariate data, scatter diagram.		
	27	Simple linear correlation, measure and properties		

	28	Linear regression, Equation and fitting		
	29	Relation between correlation and regression		
	30	Length weight relationship in fishes		
	31	Applications of linear regression in fisheries.		
	32	Methodology for estimation of marine fish landings in India and problems encountered.		
	Practical	***PRACTICAL:***		
	1	Construction of questionnaires and schedules.		
	2	Diagrams		
	3	Frequency graphs		
	4	Calculation of arithmetic mean.		
	5	Calculation of median.		
	6	Calculation of mode.		
	7	Calculation of range, mean deviation.		
	8	Calculation of variance, standard deviation.		
	9	Exercises on probability		
	10	Exercises on Binomial and Poisson distributions,		
	11	Area of normal curve, confidence interval for population mean		
	12	Test of hypothesis based on normal distributions		
	13	Test of hypothesis based on t distributions		
	14	Test of hypothesis based on chi-square distributions		
	15	Computation of Simple correlation and regression		
	16	Fitting of length - weight relationship in fishes.		
2.	**II**	**FEES.122**	**Information And Communication Technology**	**1+1=2**
	Lecture	***THEORY :***		
	1	IT and its importance, IT tools, IT-enabled services and their impact on society.		
	2	Computer fundamentals; hardware and software; input and output devices.		
	3	Word and character representation;		
	4	Features of machine language, assembly language, high-level language and their advantages and disadvantages.		
	5	Principles of programming- algorithms and flowcharts.		
	6	Operating systems (OS) - definition, basic concepts		
	7	Introduction to WINDOWS and LINUX Operating Systems		
	8	Local area network (LAN), Wide area network(WAN)		
	9	Internet, World Wide Web		
	10	HTML and IP		
	11	Introduction to MS Office - Word		
	12	MS -Excel, MS -Power Point.		
	13	Audio visual aids - definition, advantages, classification and choice of A.V aids		

	14	Cone of experience and criteria for selection and evaluation of A.V. aids; video conferencing.		
	15	Communication process, Berlo's model		
	16	Feedback and barriers to communication.		
	Practical	***PRACTICAL:***		
	1	Exercises on binary number system		
	2	Algorithm and flow chart		
	3-4	MS Word;		
	5	MS Excel		
	6	MS Power Point		
	7	Internet applications		
	8	Web browsing, Creation and operation of E-Mail account;		
	9-10	Analysis of fisheries data using MS Excel.		
	11	Handling of audio visual equipments.,		
	12-13	Planning, preparation, presentation of posters, charts		
	14	Overhead transparencies and slides.		
	15-16	Organization of an audio visual programme		
3.	**III**	**FEES.213**	**Fisheries Economics**	**2+1=3**
	Lecture	***THEORY :***		
	1	Introduction to fisheries economics.		
	2	Basic economic terminologies - micro and macro-economics, positive and normative economics.		
	3	Environmental economics, resource, scarcity, farm-firm relationships, production etc.		
	4	Contribution of fisheries sector to the economic development of country		
	5	Micro-economics: theories of demand, supply.		
	6	Market - equilibrium price, consumption, utility, consumer's surplus.		
	7	Elasticity -price, income, cross,		
	8	Application of elasticity in fisheries managerial decision.		
	9	Farm production economics - production functions in capture fisheries.		
	10	Farm production economics - production functions in culture fisheries.		
	11	Costs and returns.		
	12	Breakeven analysis of fish production system.		
	13	Concepts of externalities.		
	14	Concepts of social cost.		
	15	Factors of production, marginal cost and return.		
	16	Law of diminishing marginal return, returns to scale.		
	17	Economies of scale and scope.		
	18	Revenue, profit maximization, measurement of technological change.		
	19	Farm planning and budgeting. Significance or importance of marginal cost.		
	20	Macro-economics: Introduction to national income, accounting.		
	21	Measurement and determinants of national income.		

	22	Contribution of fisheries to GNP.		
	23	Contribution of fisheries to employment.		
	24	Balance of payments.		
	25	Economic growth and sustainable development.		
	26	Globalisation: dimensions and driving Forces. Introduction to GATT and WTO.		
	27	WTO Framework - Key Subjects - Agreement on Sanitary and Phytosanitary Measures (SPS), Seafood Export Regulations, Non-Tariff Barriers (NTBs) and Agreement on Anti-Dumping Procedures.		
	28	Fisheries Subsidies and WTO. Fisheries Trade and Environment; protests against globalisation and WTO.		
	29	Intellectual Property Rights (IPR) and different forms.		
	30	Patents and patenting process, Agreement on TRIPS. Bio-piracy.		
	31	GMOs in fisheries.		
	32	Salient features of Indian Patent (Amendment) Act 2005. Overview of Patents in Indian fisheries sector.		
	Practical	***PRACTICAL:***		
	1	Demand functions of fish market - determination of equilibrium price for fish and fisheries products.		
	2	Supply functions of fish market - determination of equilibrium price for fish and fisheries products.		
	3	Calculation of price elasticities.		
	4	Calculation of income elasticities.		
	5	Calculation of cross elasticities.		
	6-7	Production function - production with one or two variable inputs.		
	8	Shifting demand and surplus curve and its important in fish price.		
	9-10	Economic analysis on cost, return and break even of fish farm		
	11-12	Economic analysis on cost, return and break even of shrimp farm		
	13-14	Economic analysis on cost, return and break even of seed production unit		
	15-16	Economic analysis on cost, return and break even of Export unit.		
4.	**IV**	**FEES.224**	**Fisheries Extension Education**	**1+1=2**
	Lecture	***THEORY :***		
	1	Introduction to extension education and fisheries extension- Concepts, objectives and principles		
	2	Extension education, formal and informal education		
	3	History and role of fisheries extension in fisheries development.		
	4	Fisheries extension methods- individual, group and mass contact methods and their effectiveness		
	5	Factors influencing selection and use of Fisheries extension methods		
	6	Characteristics of technology, transfer of technology process, Important TOT programs in fisheries;		
	7	Role of NGOs and SHGs in fisheries		

	8	Fisheries co-management		
	9	Adoption and diffusion of innovations, Adoption and diffusion process		
	10	Adopter categories and barriers in diffusion of fisheries innovations		
	11	Extension program planning and evaluation - steps and importance;.		
	12	Participatory planning process		
	13	Basic concepts in rural sociology and psychology and their relevance in fisheries extension		
	14	Social change, social control, social problems and conflicts in fisheries		
	15	Gender issues in fisheries		
	16	Theories of learning, learning experience, learning situation		
	Practical	**PRACTICAL:**		
	1-2	Collection of socio-economic data from fishing villages;		
	3	Study of social issues/problems through participatory and rapid rural appraisal techniques,		
	4	Study of social issues/problems through stake holders analysis		
	5	Study of social issues/problems through needs assessment		
	6	Assessment of development needs of community and role of formal and non – governmental organizations through stakeholder analysis;		
	7-9	Case studies on social/gender issues and social conflicts in fisheries.		
	10-11	Case studies on extension programs and Success stories.		
	12-13	Practical exercises on conducting fish farmers meet.		
	14	Case study on fish seed hatchery/fish farm		
	15	Case study on fishermen co-operative society		
	16	Formulation of fisheries extension programme		
5.	**IV**	**FEES.225**	**Communication Skills and Personality Development**	**0+1=1**
	Practical	***PRACTICAL:***		
	1	Structural and functional grammar;		
	2	Meaning and process of communication,		
	3	Verbal and non-verbal communication;		
	4	Listening and note taking, writing skills, oral presentation skills;		
	5	Field diary and lab record;		
	6	Indexing, footnote and bibliographic procedures.		
	7	Reading and comprehension of general and technical articles		
	8	Précis writing, summarizing, abstracting		
	9	Personality development- concepts, dimensions and significance		
	10	Concept of success and failure, attitude and motivation, Self esteem		
	11	Interpersonal relationship, goal setting		
	12	Individual and group presentations		
	13	Impromptu presentation		
	14	Public speaking		
	15	Group discussion		

	16	Organizing seminars and conferences		
6.	**V**	**FEES.316**	**Fisheries Co-Operatives and Marketing**	**1+1=2**
	Lectures	***THEORY :***		
	1	Principles and objectives of co-operation, co-operative movement in fisheries in India		
	2	Structure, functions, status and problems of fisheries co-operatives management in relation to resources, production and marketing.		
	3	Role of credit for fisheries development, credit requirements of fishers, source and type of credit/finance, micro-credit, indigenous and institutional finance, structure of institutional finance in fisheries;		
	4	Returns, risk bearing ability and recovery in fisheries sector;		
	5	Role of NABARD in fisheries development; role of insurance in fish and shrimp farming and industry.		
	6	Basic accounting procedures, profit and loss account		
	7	Introduction to marketing management		
	8	Core marketing concepts: market structure, functions and types, marketing channels and supply chain,		
	9	Marketing margins, marketing environment, marketing strategies,		
	10	Product development and product mix, consumer behavior and marketing research.		
	11	Fish markets and marketing in India, demand and supply of fish, market structure and price formation in marine and inland fish markets		
	12	Cold storage and other marketing infrastructure in India; export markets and marketing of fish and fishery products;		
	13	Trade liberalization and fisheries markets. Integrated marketing approach in fisheries.		
	14	Sea food export case study on product and market diversification- export and import policies (fisheries).		
	15	New product development and market segmentation		
	16	Export and import policies relevant to fisheries sector.		
	Practical	**PRACTICAL:**		
	1	Developing questionnaire and conducting market surveys		
	2	Analysis of primary and secondary market data.		
	3	Exercises on equilibrium price for fish and fishery products;		
	4	Estimation of demand using simple regression.		
	5	Estimation of supply using simple regression.		
	6	Analysis of credit schemes of banks and the government.		
	7	Case studies of cooperatives.		
	8	Visit to co-operative societies.		
	9	Visit to commercial banks.		
	10	Visit to fish markets		
	11	Visit to organizations dealing with marketing of fish and fishery products.		

	12	Pattern and Performance of India's Seafood Exports		
	13-14	Case studies on product and market diversification.		
	15-16	Case studies on competitiveness of Indian fish and fish products.		
7.	**VI**	**FEES.327**	**Fisheries Policy and Law**	**1+0=1**
	Lecture	***THEORY :***		
	1	Introduction to public administration, principles of organization and management of public enterprise.		
	2	Central and State responsibilities for fisheries development, organizational set up of fisheries administration at the Centre and state levels.		
	3	Present relevance of past fisheries policies and recent policies in fisheries sector.		
	4	Functions and powers of functionaries of department of fisheries, corporations and cooperatives.		
	5	Different central and state level fisheries institutions.		
	6	Role of Central and State Government in the regulatory activities of Aquaculture and fisheries; Implementation of community based resource management plans.		
	7	Historical review of fisheries development and management in India and world.		
	8	International agencies / organizations for promotion of fisheries worldwide.		
	9	Fisheries legislation: Overview of fisheries and aquaculture legislations in India.		
	10	Indian Fisheries Act, 1897;		
	11	Environmental legislations- Water Act, Air Act and Environmental (Protection) Act in India; International environmental legislation and its impact on fisheries.		
	12	Laws relating to conservation and management of fishery resources in marine and inland sectors.		
	13	Recent changes in land reforms. Land reforms legislation as applicable to aquaculture. Judicial judgments relating to Aquaculture.		
	14	Objectives, functions and authority of fishery regulatory agencies like coastal regulatory zone (CRZ) and Aquaculture Authority of India		
	15	Brackishwater Aquaculture Act, Marine Fisheries Policy, Laws related to fish products and marketing		
	16	International Law of the Seas and international commissions on fisheries and their impact.		
8.	**VI**	**FEES.328**	**Fisheries Business Management and Entrepreneurship Development**	**1+0=1**
	Lecture	***THEORY :***		
	1	Concept of entrepreneurship; entrepreneurial and managerial characteristics; managing an enterprise		
	2	Motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up;		

	3	Managing competition; entrepreneurship development programs; Generation, incubation and commercialization of ideas and innovations.
	4	Government schemes and incentives for promotion of entrepreneurship.
	5	Preparation of enterprise budget for integrated fish farming; Infrastructural and other financial requirement for fishery entrepreneurship
	6	Fiscal and monitory policies and its impact on entrepreneurship.
	7	Government policy on Small and Medium Enterprises (SMEs) / SSIs.
	8	Venture capital; Contract farming and joint ventures; public-private partnerships
	9	Overview of fisheries inputs industry. Characteristics of Indian fisheries processing and export industry.
	10	Introduction to fish business management- Concept of management, management process (planning, organising, staffing, leading and controlling)
	11	Organizational behavior; human resource planning; new dimensions in fish business environment and policies.
	12	Accounting procedures of fish business entity. Emerging trends in fish production, processing, marketing and exports.
	13	Assessing overall business environment in the Indian economy.
	14	Overview of Indian social, political and economic systems and their decision making by individual entrepreneurs.
	15	Globalisation and the emerging business /entrepreneurial environment.
	16	Social Responsibility of Business.

Fisheries Extension, Economics & Statistics				
Courses Offered (VI Dean)				
Sr	**Semester**	**Course No.**	**Title**	**Credits**
1.	**I**	**BSC.112**	**FARMING BASED LIVELIHOOD SYSTEM**	**2+1=3**
	Lecture	***THEORY :***		
	1	Status of agriculture in India and different states,		
	2	Income of farmers and rural people in India		
	3	Livelihood-Definition, concept and livelihood pattern in urban and rural areas,		
	4	Different indicators to study livelihood systems.		
	5	Agricultural livelihood systems (ALS): Meaning, approach, approaches and framework,		
	6	Definition of farming systems and farming based livelihood systems		
	7	Prevalent Farming systems in India contributing to livelihood.		
	8	Types of traditional farming systems.		
	9	Types of modern farming systems.		
	10	Components of farming system/ farming-based livelihood systems- Crops and cropping systems,		
	11	Components of farming system/ farming-based livelihood systems- Livestock, (Dairy, Piggery, Goatry, Poultry, Duckry etc.)		
	12	Components of farming system/ farming-based livelihood systems- Horticultural crops		
	13	Components of farming system/ farming-based livelihood systems- Agro—forestry systems,		
	14	Components of farming system/ farming-based livelihood systems- Aqua culture Duck/Poultry cum Fish		
	15	Components of farming system/ farming-based livelihood systems- Dairy cum Fish		
	16	Components of farming system/ farming-based livelihood systems- Piggery cum Fish etc		
	17	Small, medium and large enterprises including value chains		
	18	Secondary enterprises as livelihood components for farmers		
	19	Factors affecting the integration of various enterprises of farming for livelihood.		
	20	Feasibility of different farming systems for different agro-climatic zones,		
	16	Components of farming system/ farming-based livelihood systems- Piggery cum Fish etc		
	17	Small, medium and large enterprises including value chains		
	18	Secondary enterprises as livelihood components for farmers		
	19	Factors affecting the integration of various enterprises of farming for livelihood.		

	20	Feasibility of different farming systems for different agro-climatic zones,
	21	Commercial farming-based livelihood models by NABARD
	22	Commercial farming-based livelihood models by ICAR
	23	Commercial farming-based livelihood models by other organizations across the country,
	24	Case studies on different livelihood enterprises associated with farming
	25	Risk and success factors in farming-based livelihood
		systems
	26	Schemes and programs by Central and State Government organizations involved in promotion of farming-based livelihood opportunities.
	27	Public and Private organizations involved in promotion of farming-based livelihood opportunities.
	28	Role of farming-based livelihood enterprises in 21st Century in view of circular economy
	29	Role of farming-based livelihood enterprises in 21st Century in view of green economy
	30	Role of farming-based livelihood enterprises in 21st Century in view of climate change
	31	Role of farming-based livelihood enterprises in 21st Century in view of digitalization
	32	Role of farming-based livelihood enterprises in 21st Century in view of changing life style.
		PRACTICAL
	1-2	Survey of farming systems and agriculturally based livelihood enterprises,
	2-4	Study of components of important farming-based livelihood models/ systems in different agro-climatic zones
	4-7	Study of production and profitability of crop-based, livestock-based, processing-based and integrated farming-based livelihood models,
	8	Field visit of innovative farming system models.
	9-11	Visit of Agri-based enterprises and their functional aspects for integration of production, processing and distribution sectors
	12-13	Study of agri-enterprises involved in industry and service sectors (Value Chain Models)
	1-2	Survey of farming systems and agriculturally based livelihood enterprises,
	2-4	Study of components of important farming-based livelihood models/ systems in different agro-climatic zones
	4-7	Study of production and profitability of crop-based, livestock-based, processing-based and integrated farming-based livelihood models,
	8	Field visit of innovative farming system models.

	9-11	Visit of Agri-based enterprises and their functional aspects for integration of production, processing and distribution sectors		
	12-13	Study of agri-enterprises involved in industry and service sectors (Value Chain Models)		
	14-15	Learning about the concept of project formulation on farming-based livelihood systems along with cost and profit analysis,		
	16	Case study of Start-Ups in agri-sectors.		
2.	**I**	**BSC.113**	**COMMUNICATION SKILLS**	**1+1=2**
	Lecture	***THEORY :***		
	1	Communication Process: The magic of effective communication		
	2	Building self-esteem and overcoming fears		
	3	Concept, nature and significance of communication process		
	4	Meaning, types and models of communication		
	5	Verbal and non-verbal communication		
	6	Linguistic and non-linguistic barriers to communication		
	7	Reasons behind communication gap/ miscommunication		
	8	Basic Communication Skills: Listening, Speaking, Reading		
	9	Basic Communication Skills: Writing Skills, Precis writing/ Abstracting/Summarizing;		
	10	Style of technical communication Curriculum vitae/resume writing;		
	11	Innovative methods to enhance vocabulary, analogy questions.		
	12	Structural and Functional Grammar: Sentence structure, modifiers, connecting words and verbals; phrases and clauses;		
	13	Case: subjective case, possessive case; objective case;		
	14	Correct usage of nouns, pronouns and antecedents, adjectives, adverbs and articles;		
	15	Agreement of verb with the subject: tense, mood, voice;		
	16	Writing effective sentences; Basic sentence faults.		
	PRACTICAL			
	1	Listening and note taking		
	2-4	Writing skills: precis writing, summarizing and abstracting		
	5-6	Reading and comprehension (written and oral) of general and technical articles		
	7-8	Micro-presentations and Impromptu Presentations: Feedback on presentations		
	9-11	Stage manners: grooming, body language, voice modulation, speed		
	12	Group discussions		
	13	Public speaking exercises		
	14	Vocabulary building exercises		
	15	Interview Techniques		
	16	organization of events.		

3.	**II**	**BSC.125**	**ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS MANAGEMENT**	**2+1=3**
	Lecture	***THEORY :***		
	1-2	Development of entrepreneurship, motivational factors, social factors, environmental factors, characteristics of entrepreneurs, entrepreneurial attributes/competencies.		
	3	Concept, need and importance of entrepreneurial development.		
	4	Evolution of entrepreneurship & objectives of entrepreneurial activities		
	5-6	Types of entrepreneurs, functions of entrepreneurs, importance of entrepreneurial development, and process of entrepreneurship development.		
	7-9	Environment scanning and opportunity identification need for scanning–spotting of opportunity-scanning of environment–identification of product/service – starting a project; factors influencing sensing the opportunities.		
	10-12	Infrastructure and support systems- good policies, schemes for entrepreneurship development; role of financial institutions, and other agencies in entrepreneurship development.		
	13	Steps involved in functioning of an enterprise.		
	14-16	Selection of the product/services, selection of form of ownership; registration, selection of site, capital sources, acquisition of manufacturing knowhow, packaging and distribution.		
	17-19	Planning of an enterprise, project identification, selection, and formulation of project; project report preparation, Enterprise Management.		
	20-22	Production management – product, levels of products, product mix, quality control, cost of production, production controls, Material management.		
	23-24	Production management – raw material costing, inventory control.		
	25-26	Personal management – manpower planning, labour turn over, wages/salaries.		
	27-29	Financial management / accounting – funds, fixed capital and working capital, costing and pricing, longterm planning and short-term planning, book keeping, journal, ledger, subsidiary books, annual financial statement, taxation.		
	30-31	Marketing management- market, types, marketing assistance, market strategies.Marketing management- market, types, marketing assistance, market strategies.		
	32	Crisis management- raw material, production, leadership, market, finance, natural etc.		
	PRACTICAL			

	1-4	Visit to small scale industries/agro-industries		
	5-8	Interaction with successful entrepreneurs/ agric entrepreneurs.		
	9-12	Visit to financial institutions and support agencies.		
	13-16	Preparation of project proposals for funding by different agencies.		
4.	**II**	**BSC.127**	**Personality Development**	**2 (1+1)**
	Lecture	***THEORY :***		
	1	Personality Definition, Nature of personality, theories of personality and its types.		
	2	The humanistic approach - Maslow's self-actualization theory		
	3	Shaping of personality, determinants of personality		
	4	Myers-Briggs Typology Indicator, Locus of control and		
		performance,		
	5	Type A and Type B Behaviours, personality and Organizational Behaviour.		
	6	Foundations of individual behavior and factors influencing individual behavior, Models of individual behavior		
	7	Perception and attributes and factors affecting perception,		
	8	Attribution theory and case studies on Perception and Attribution.		
	9	Learning: Meaning and definition, theories and principles of learning.		
	10	Learning and organizational behavior, Learning and training, learning feedback.		
	11	Attitude and values		
	12	Intelligence- types of Intelligence, theories of intelligence		
	13	Measurements of intelligence, factors influencing intelligence		
	14	Intelligence and Organizational behavior, emotional intelligence		
	15	Motivation- theories and principles		
	16	Teamwork and group dynamics		
	PRACTICAL			
	1-2	MBTI personality analysis		
	3	Learning Styles and Strategies		
	4	Motivational needs		
	5	Firo-B,		
	6	Interpersonal Communication		
	7-8	Teamwork and team building		
	9	Group Dynamics		
	10-11	Win-win game		
	12	Conflict Management		
5.	**III**	**FEES.211**	**Fisheries Extension**	**1+1=2**
	Lecture	***THEORY :***		
	1	Introduction to extension education and fisheries extension – concepts, objectives and principles;		
	2	extension education, formal and informal education		

	3	History and role of fisheries extension in fisheries development.		
	4	Fisheries extension methods- individual, group and mass contact methods and their effectiveness, factors influencing their selection and use		
	5	characteristics of technology		
	6	transfer of technology process. Important ToT programs in fisheries		
	7	role of NGOs and SHGs in fisheries		
	8	Fisheries co-management		
	9	Adoption and diffusion of innovations, adoption and diffusion process,		
	10	adopter categories and barriers in the diffusion of fisheries innovations		
	11	Extension program planning and evaluation – steps and importance		
	12	participatory planning process.		
	13	Basic concepts in rural sociology and psychology and their relevance in fisheries extension;		
	14	social change, social control, social problems and conflicts in fisheries		
	15	gender issues in fisheries		
	16	Theories of learning, learning experience, learning situation		
	Practical	***PRACTICAL:***		
	1	Collection of socio-economic data from fishing villages;		
	2	Study of social issues/problems through participatory and rapid rural appraisal techniques,		
	3	Study of social issues/problems through stake holders analysis		
	4	Study of social issues/problems through needs assessment		
	5	Assessment of development needs of community and role of formal and non – governmental organizations through stakeholder analysis;		
	6	Case studies on social/gender issues and social conflicts in fisheries.		
	7	Case studies on extension programs and Success stories.		
	8	Practical exercise on conducting fish farmers meet.		
	9	Case study on fish seed hatchery/fish farm		
	10	Study of social issues/problems through needs assessment		
	11	Study of social issues/problems through needs assessment		
	12	Case study on fishermen co-operative society		
	13	Case study on fishermen co-operative society		
	14	Formulation of fisheries extension programme		
	15	Formulation of fisheries extension programme		
	16	Formulation of fisheries extension programme		
6.	**III**	**BSC.219**	**Agriculture Marketing and Trade**	**3 (2+1)**
	Lecture	**THEORY :**		
	1	Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing,		

	2	Market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets;
	3	Demand, supply and producer's surplus of agri commodities: nature and determinants of demand and supply of farm products,
	4	Producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities
	5	Pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing;
	6	Market promotion – advertising, personal selling, sales promotion and publicity – meaning, merits and demerits
	7	Marketing process and functions: Marketing process concentration, dispersion and equalization;
	8	Exchange functions – buying and selling;
	9	Physical functions – storage, transport and processing;
	10	Facilitating functions – packaging, branding, grading, quality control and labeling (Agmark)
	11	Market functionaries and marketing channels:
	12	Types and importance of agencies involved in agricultural marketing
	13	Meaning and definition of marketing channel; Number of channel levels; marketing channels for different farm products
	14	Integration, efficiency, costs and price spread: Meaning, definition and types of market integration;
	15	Marketing efficiency; Marketing costs, margins and price spread
	16	factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs
	17-20	Role of Government in agricultural Marketing Public sector institutions- CWC, SWC, FCI, CACP and DMI – their objectives and functions;
	21	Cooperative marketing in India;
	22	Risk in marketing: Types of risk in marketing;
	23	Speculation and hedging; an overview of futures trading;
	24	Agricultural prices and policy: Meaning and functions of price
	25	administered prices; need for innovations in
		agricultural price policy;
	26	Trade: Concept of International Trade and its need, theories of absolute and comparative advantage.
	27	Present status and prospects of international trade in agri-commodities;
	28	WTO
	29	Agreement on Agriculture (AoA) and its implications on Indian agriculture
	30	IPR
	31	Role of government in agricultural marketing.
	32	Role of APMC and its relevance in the present-day context

	PRACTICAL			
	1-3	Plotting and study of demand and supply curves and calculation of elasticities		
	4	Study of relationship between market arrivals and prices of some selected commodities		
	5	Computation of marketable and marketed surplus of important commodities;		
	6-7	Study of price behaviour over time for some selected commodities; Construction of index numbers		
	8-9	Visit to a local market to study various marketing functions performed by different agencies		
	10	Identification of marketing channels for selected commodity		
	11-13	Collection of data regarding marketing costs, margins and price spread and presentation of report in the class		
	14-15	Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning;		
	16	Application of principles of comparative advantage of international trade		
7.	**III**	**BSC.211**	**Agricultural Informatics and Artificial Intelligence**	**3(2+1)**
	Lecture	**THEORY :**		
	1	Introduction to Computers, Anatomy of Computers, Memory Concepts, Units of Memory		
	2-4	Operating System: Definition and types, Applications of MS-Office for creating, Editing and Formatting a document, Data presentation, Tabulation and graph creation, Statistical analysis, Mathematical expressions		
	5-6	Database, concepts and types, creating database, Uses of DBMS in Agriculture		
	7	Internet and World Wide Web (WWW): Concepts and components		
	8-9	Computer programming: General concepts, Introduction to Visual Basic, Java, Fortran, C/ C++, etc. concepts and standard input/output operations		
	10-11	e-Agriculture, Concepts, design and development, Application of innovative ways to use information and communication technologies (IT) in Agriculture		
	12-15	Computer Models in Agriculture: Statistical, weather analysis and crop simulation models, concepts, structure, inputs-outputs files, limitation, advantages and application of models for understanding plant processes, sensitivity, verification, calibration and validation		

	16-18	IT applications for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone mobile apps in agriculture for farm advice: Market price, postharvest management etc.
	19	Geospatial technology: Concepts, techniques, components and uses for generating valuable agri-information
	20-22	Decision support systems: Concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc. for supporting farm decisions
	23-25	Preparation of contingent crop-planning and crop calendars using IT tools, Digital India and schemes to promote digitalization of agriculture in India
	25	Introduction to artificial intelligence, background and applications,
	26-28	Turing test, Control strategies, Breadth-first search, Depth-first search, Heuristics search techniques: Best-first search, A* algorithm, IoT and Big Data
	29-31	Use of AI in agriculture for autonomous crop management, and health, monitoring livestock health, intelligent pesticide application, yield mapping and predictive analysis, automatic weeding and harvesting, sorting of produce, and other food processing applications
	32	Concepts of smart agriculture, use of AI in food and nutrition science etc.
		PRACTICAL
	1-2	Study of computer components, accessories, practice of important DOS Commands.
	3-4	Introduction of different operating systems such as Windows, Unix/ Linux, creating files and folders, File Management.
	5	Use of MS-WORD and MS Power-point for creating,
		editing and presenting a scientific document
	6	MS-EXCEL - Creating a spreadsheet, Use of statistical tools, Writing expressions, Creating graphs, Analysis of scientific data, Handling macros.
	7	MS-ACCESS: Creating Database, preparing queries and reports, Demonstration of Agri- information system
	8	Introduction to World Wide Web (WWW) and its components
	9-10	Introduction of programming languages such as Visual Basic, Java, Fortran, C, C++
	11-13	Hands-on practice on Crop Simulation Models (CSM), DSSAT/Crop-Info/Crop Syst/ Wofost, Preparation of inputs file for CSM and study of model outputs, computation of water and nutrient requirements of crop using CSM and IT tools
	14	Use of smart phones and other devices in agro-advisory and dissemination of market information

	15-16	Introduction of Geospatial Technology, Hands on practice on preparation of Decision Support System, Preparation of contingent crop planning, India Digital Ecosystem of Agriculture (IDEA).		
8.	**III**	**SEC.215**	**Fish Market Survey and Value Chain Analysis**	**0+2=2**
	Practical	***PRACTICAL:***		
	1-4	**Market Observation and Data Collection** • Visit to various fish markets, record prices of various fish species, their quality, and any seasonal trends. • Observe the volume of fish sold, the types of fish, and the main buyers (retailers, wholesalers, or direct consumers). Conduct informal interviews with buyers and sellers to learn about demand fluctuations, preferred fish species, and pricing decisions.		
	5-8	**Supply Chain Mapping** • Interview the key stakeholders like fishermen, wholesalers, retailers, and consumers. • Identify and document each step in the fish supply chain: harvesting, processing, transportation, distribution, and retailing. • Analyse the roles, relationships, and power dynamics between stakeholders. Look at logistics, cold storage facilities, and transportation methods used to keep fish fresh and safe.		
	9-13	**Price Analysis** • Track fish prices at different stages: from fishermen (or fish farms) to wholesalers to retailers. • Collect data on seasonal price variations, geographic price differences, and the impact of supply and demand. Analyse the cost structures of fish-related businesses to identify profit margins and costs at each stage of the chain.		
	14-17	**Stakeholder Interviews and Focus Groups** • Conduct interviews or focus group discussions with fishermen, market vendors, retailers, and consumers. • Ask about their challenges, needs, pricing strategies, and how they see changes in the fish market (e.g., environmental impacts, fish scarcity, or government policies). Gather insights into the quality and freshness of fish, consumer preferences, and purchasing habits.		
	18-21	**Fish Quality Assessment** • Inspect fish for signs of freshness: clear eyes, shiny scales, firm flesh, and the smell. • Record how quality varies between different types of fish, seasons, and suppliers. • Interview consumers on how they assess the quality of fish before buying, and what factors influence their choice (appearance, price, freshness).		

		Compare the quality of fish at different market points (auction, wholesalers, and retail).		
	22-23	**Fish Waste and Loss Analysis** • Quantify fish waste at different stages, including unsold fish, damaged fish, and spoilage. • Interview stakeholders about the causes of waste (e.g., improper storage, handling, or transportation). Assess how much waste is recycled or disposed of and the environmental impacts of this waste.		
	24-25	**Economic Impact Study** • Conduct surveys with local fish market participants to understand their income sources, employment generation, and contribution to the local economy. • Track spending patterns and local investments made by fish market stakeholders (e.g., the purchase of equipment, hiring labour, etc.). Identify the flow of revenue and economic multiplier effects on related sectors such as transportation, packaging, and retail.		
	26-27	**Consumer Behaviour Survey** • Distribute questionnaires to consumers in the fish market and gather data on factors influencing their choice of fish (e.g., price, quality, type of fish, ethical sourcing, or sustainability concerns). • Explore purchasing frequency, spending patterns, and potential willingness to pay for premium fishes. Examine awareness of health benefits.		
	28-29	**Regulatory and Policy Analysis** • Review local, regional, and national regulations governing fish trade, fishing quotas, and sustainability practices. • Interview policymakers, fish traders, and fishery management authorities about the impact of policies on the fish market. Assess how regulations are enforced, and the level of compliance within the industry.		
	30-32	**Sustainability Assessment** • Investigate if and how fish sellers and buyers are incorporating sustainability into their practices (e.g., buying from sustainable fisheries or adopting eco-friendly packaging). • Interview stakeholders about practices such as catch limits, fishing gear, etc. Assess consumer demand for sustainably sourced or certified fish.		
9.	**Semester**	**Course No.**	**Title**	**Credits**
	V	**FEES.312**	**Statistical Methods**	**2+1=3**
	Lecture	***THEORY :***		
	1	Definition of statistics		
	2	Concepts of population, sample		
	3	Census and sample surveys.		
	4	Classification of data, frequency and cumulative frequency table.		

	5	Diagrammatic and graphical representation of data - bar diagrams, pie-diagram.
	6	Diagrammatic and graphical representation of data - histogram, frequency polygon, frequency curve and Ogives.
	7	Important measures of central tendency - arithmetic mean, median and mode. Relative merits and demerits of these measures.
	8	Important measures of dispersion - Range, Mean Deviation, Relative merits and demerits of these measures.
	9	Important measures of dispersion - Variance and Standard Deviation. Relative merits and demerits of these measures.
	10	Coefficient of variation;
	11	Normal Curve, Concepts of skewness
	12	Concepts of kurtosis
	13	Definitions of probability, mutually exclusive and independent events.
		Conditional probability, addition and multiplication theorems
	15	Random variable, concepts of theoretical distribution;
	16	Binomial distributions and their use in fisheries
	17	Poisson distributions and their use in fisheries
	18	Normal distributions and their use in fisheries
	19	Basic concept of sampling distribution;
	20	Standard error and central limit theorem.
	21	Introduction to statistical inference
	22	General principles of testing of hypothesis, types of errors.
	23	Tests of significance based on Normal distributions
	24	Tests of significance based on t distributions
	25	Tests of significance based on Chi-square distributions
	26	Bivariate data, scatter diagram.
	27	Simple linear correlation, measure and properties
	28	Linear regression, equation and fitting; relation between correlation and regression.
	29	Length-weight relationship in fishes
	30	Applications of linear regression in fisheries.
	31	Methodology for estimation of marine fish landings in India.
	32	Estimation of inland fish production in India and problems encountered.
	Practical	***PRACTICAL:***
	1	Construction of questionnaires and schedules.
	2	Diagrams and frequency graphs
	3-5	Calculation of arithmetic mean, median, mode
	6-7	Calculation of, range, mean deviation, variance, standard deviation.
	8	Exercises on probability

	9-10	Binomial and Poisson distributions, Area of normal curve, confidence interval for population mean		
	11-13	Test of hypothesis based on normal, t, and chi-square distributions		
	14-15	Computation of Simple correlation and regression		
	16	Fitting of length-weight relationship in fishes		
10.	**Semester**	**Course No.**	**Title**	**Credits**
	VI	**FEES.322**	**Fisheries Economics**	**2+1=3**
	Lecture	***THEORY :***		
	1	Introduction to fisheries economics.		
	2	Basic economic terminologies - micro and macro-economics, positive and normative economics, Environmental economics		
	3	Resource, scarcity, farm-firm relationships, production, Contribution of fisheries sector to the economic development of country		
	4	Micro-economics: theories of demand, supply.		
	5	Market - equilibrium price, consumption, utility, consumer's surplus.		
	6	Elasticity - price, income, cross, Application of elasticity in fisheries managerial decision.		
	7	Farm production economics - production functions in capture and culture fisheries.		
	8	Costs and returns. Breakeven analysis of fish production system.		
	9	Concepts of externalities and social cost.		
	10	Factors of production		
	11	Marginal cost and return, Law of diminishing marginal return,		
	12	Returns to scale, Economies of scale and scope.		
	13	Revenue, profit maximization, measurement of technological change.		
	14	Farm planning		
	15	Farm budgeting.		
	16	Significance or importance of marginal cost.		
	17	Macro-economics: Introduction to national income, accounting. Measurement and determinants of national income		
	18	Contribution of fisheries to GNP and employment.		
	19	Balance of payments, Economic growth and sustainable development		
	20	Globalisation: dimensions and driving Forces.		
	21	Introduction to GATT and WTO.		
	22	WTO Framework - Key Subjects - Agreement on Sanitary and Phytosanitary Measures (SPS),		
	23	Seafood Export Regulations, Non-Tariff Barriers (NTBs) and Agreement on Anti-Dumping Procedures		
	24	Fisheries Subsidies and WTO.		
	25	Fisheries Trade and Environment;		
	26	Protests against globalisati Shifting demand and surplus curve and its important in fish price.on and WTO.		

	27	Intellectual Property Rights (IPR) and different forms.		
	28	Patents and patenting process		
	29	Agreement on TRIPS, Bio-piracy.		
	30	GMOs in fisheries		
	31	Salient features of Indian Patent (Amendment) Act 2005.		
	32	Overview of Patents in Indian fisheries sector.		
	Practical	***PRACTICAL:***		
	1	Demand functions of fish market - determination of equilibrium price for fish and fisheries products.		
	2	Supply functions of fish market - determination of equilibrium price for fish and fisheries products.		
	3	Calculation of price elasticities.		
	4	Calculation of income elasticities.		
	5	Calculation of cross elasticities.		
	6-9	Production function - production with one or two variable inputs.		
	10-11	Shifting demand and surplus curve and its important in fish price.		
	12	Economic analysis on cost, return and break even of fish farm.		
	13	Economic analysis on cost, return and break even of shrimp farm.		
	14	Economic analysis on cost, return and break even of seed production unit.		
	15	Economic analysis on cost, return and break even of Fish processing plant		
	16	Economic analysis on cost, return and break even of Export unit.		
11.	**Semester**	**Course No.**	**Title**	**Credits**
	VI	**FEES.324**	**Fisheries Policy and Laws**	**1+0=1**
	Lecture	***THEORY :***		
	1	Introduction to public administration, principles of organization and management of public enterprise.		
	2	Central and State responsibilities for fisheries development, organizational set up of fisheries administration at the Centre and state levels.		
	3	Present relevance of past fisheries policies and recent policies in fisheries sector.		
	4	Functions and powers of functionaries of the department of fisheries, corporations and cooperatives.		
	5	Different central and state-level fisheries institutions		
	6	Role of Central and State Government in the regulatory activities of Aquaculture and fisheries.		
	7	Implementation of community-based resource management plans.		
	8	Historical review of fisheries development and management in India.		
	9	Historical review of fisheries development and		

		management in world.		
	10	International agencies/organizations for promotion of fisheries worldwide.		
	11	Fisheries legislation: Overview of fisheries and aquaculture legislations in India.		
	12	Indian Fisheries Act, 1897.		
	13	Environmental legislation; Water Act,		
	14	Environmental legislation; Air Act		
	15	Environmental legislation; Environmental (Protection) Act.		
	16	International environmental legislation and its impact on fisheries.		
12.	**Semester**	**Course No.**	**Title**	**Credits**
	VI	**FEES.325**	**Fisheries Co-Operative and Marketing**	**1+1=2**
	Lecture	***THEORY :***		
	1	Principles and objectives of co-operation, co-operative movement in fisheries in India		
	2	Structure, functions, status and problems of fisheries co-operatives management in relation to resources, production and marketing		
	3	Role of credit for fisheries development, credit requirements of fishers, source and type of credit/finance, micro-credit, indigenous and institutional finance, structure of institutional finance in fisheries;.		
	4	Returns, risk bearing ability and recovery in fisheries sector;		
	5	Role of NABARD in fisheries development; role of insurance in fish and shrimp farming and industry		
	6	Basic accounting procedures, profit and loss account.		
	7	Introduction to marketing management Core marketing concepts		
	8	Market structure functions and types, marketing channels and supply chain		
	9	Marketing margins, marketing environment, marketing strategies		
	10	Product development and product mix, consumer behavior and marketing research		
	11	Fish markets and marketing in India, demand and supply of fish, market structure and price formation in marine and inland fish markets;		
	12	cold storage and other marketing infrastructure in India export markets and marketing of fish and fishery products;		
	13	Trade liberalization in fisheries markets. Integrated marketing approach in fisheries.		
	14	Sea food export case study on product and market diversification - export and import policies (fisheries).		
	15	New product development and market segmentation.		
	16	Export and import policies relevant to fisheries sector.		

	Practical	***PRACTICAL:***		
	1	Developing questionnaire and conducting market surveys		
	2	Analysis of primary and secondary market data.		
	3	Exercises on equilibrium price for fish and fishery products;		
	4	Estimation of demand using simple regression.		
	5	Estimation of supply using simple regression.		
	6	Analysis of credit schemes of banks and the government.		
	7	Case studies of cooperatives.		
	8	Visit to co-operative societies.		
	9	Visit to commercial banks.		
	10	Visit to fish markets		
	11	Visit to organizations dealing with marketing of fish and fishery products.		
	12	Pattern and Performance of India's Seafood Exports		
	13-14	Case studies on product and market diversification.		
	15-16	Case studies on competitiveness of Indian fish and fish products.		
13.	**Semester**	**Course No.**	**Title**	**Credits**
	VII	**FEES.416**	**ICT in Fisheries**	**1+1=2**
	Lecture	***THEORY :***		
	1	ICTs – meaning, concepts, roles and initiatives, basics of ICTs, Global and National status		
	2	Types and functions of ICTs, Meaning of e-Governance, e-learning, m-Learning, Advantages and Limitations of ICTs		
	3	Knowledge management: Meaning, Approaches and Tools, Role of ICTs in Agricultural Knowledge Management,		
	4	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 NGOs in India		
	5	ICT applications: Knowledge centres (tele centres), CSC, Digital kiosks, Web portals, Community radio, Internet radio, Kisan call centres, Mobile based applications, INCOIS-PFZ advisories		
	6	Self-learning CDs on Package of practices, Augmented Learning, Virtual Learning, social media, Market Intelligence and Information Systems-e-NAM, Agmarknet, etc.		
	7	Expert System/ Decision Support System/ Management Information Systems, Farm Health Management and Intelligence System for Plant /Animal/ Soil Health, Fishery, Water, Weather, etc., National e-Governance Plan in Agriculture (NeGP-A).		
	8	Networks and policies: Global and regional knowledge networks, international information management systems, e-Learning platforms (MOOCS, Coursera, EduEx, etc.); Digital networks among extension personnel		

	9	Farmer Producers Organisations (FPOs) / SHGs/ Farmers Groups,		
	10	Video conference, Live streaming and Webinars		
	11	Types and functions of social media applications, Guidelines for preparing social media content, Engaging audience, Data- analytics and Info graphics		
	12	Smart technologies for extension: Open technology computing facilities, System for data analytics/ mining/ modelling/ Development of Agricultural simulations		
	13	Remote Sensing, GIS, GPS, Information Utility (AIU)		
	14	Disruptive technologies Analysis		
	15	Internet of Things (IoTs), Drones, Artificial intelligence (AI)		
	16	Blockchain technology, Social media and Big Data analytics for extension		
	Practical	***PRACTICAL:***		
	1	Content and client engagement analysis.		
	2-5	Case studies and exercises on ICT-based interventions in fisheries and agriculture.		
	6	Designing extension content for ICTs		
	7-8	Creating and designing web portals, blogs, social media pages		
	9	Development and use of online and offline e-learning modules in fisheries.		
	10	Live streaming extension programs and organizing webinars.		
	11	Visit to KCC		
	12	Exercises on developing mobile-based applications.		
	13	Developing social media pages for disseminating fisheries related information.		
	14	Writing for digital media.		
	15	Developing video content related to fisheries.		
	16	Conducting exercise on remote sensing and GIS		
14.	**Semester**	**Course No.**	**Title**	**Credits**
	VII	**FEES.417**	**Marketing Intelligence and Business Analysis**	**1+1=2**
	Lecture	***THEORY :***		
	1	Research methodology: The role of marketing intelligence in the firm, The process of marketing research, The difference between exploratory and confirmatory research		
	2	Secondary and primary data, Qualitative and quantitative research methodologies, Sampling theory.		
	3	Requirements in business analysis: Management, Communication, Tracing, Configuration and change management, quality assurance,.		

	4	Development, Elicitation including stakeholders and/or product requirements development, Specification
	5	Business analytics: Business Analysis, Internal analysis, External analysis, Business need definition, Gap analysis, Solution proposal (including feasibility analysis)
	6	Solution delivery or maintenance program/project initiation- Business process definition, Business goals, Business needs, Business requirements, Limitations and assumptions.
	7	Modelling and forecasting: Solution modelling, validation and verification, Solution evaluation and optimization,
	8	Assessing the solution options (proposals), Evaluating performance of the solution, Solution/business process optimization, Model Volatility with ARCH and GARCH for Time Series Forecasting.
	9	Marketing research: Definitions of the various methodological concepts, various steps involved in designing a research plan.
	10	Data collection methods; Characteristics, Structure, Sources, Value, and use of Big Data.
	11	The relationship between digital analytics and inbound marketing strategies
	12	Consumer information and measurement services, Rules for designing a questionnaire
	13	Data analysis in marketing research: Data sources for assessing consumer preferences, firm performance, and market condition.
	14	Competition analyze enterprise data, especially for purposes of segmentation, targeting, positioning, and evaluating consumer value.
	15	Process of organizing, writing, framing, and refining analytics reports.
	16	Delivering effective presentations, and aligning analytic results with stakeholder needs and preferences.
	Practical	***PRACTICAL:***
	1-2	Marketing Research – ethics, standards and issues.
	3-5	Utilization of Secondary Data Resources for Customer Segmentation Pricing and Elasticity.
	5-7	Linear Regression, Basics; Using Linear Regression to Forecast.
	8-10	Conjoint Analysis; Digital Marketing Metrics Customer Lifetime Value; Cluster Analysis.
	11-12	Finding and interpreting secondary data.
	13-14	Suggesting a methodology for fisheries marketing research.
	15-16	Tools and concepts of data visualization.