

## 10. Fisheries Economics

### M.F.Sc. (Fisheries Economics) Course Structure and Credit Distribution

<b>A</b>	<b>Major Courses</b>			<b>20 Credits</b>
1	FEC 501	Microeconomics	2+0	
2	FEC 502	Macroeconomics	2+0	
3	FEC 503	Socioeconomics, Vulnerability and Fisherfolk welfare	2+1	
4	FEC 504	Fishery Regulations and Ecosystem Valuation	2+1	
5	FEC 505	Marketing Intelligence and Business Analysis	2+1	
6	FEC 506	International Fisheries Trade	1+1	
7	FEC 507	Fisheries Finance, Accounting and Control	2+1	
8	FEC 508	Introduction to Econometric Tools	1+1	
<b>B</b>	<b>Minor Courses</b>			<b>8 Credits</b>
	(From the subjects closely related to a students major subject)			
1	FEC 510	Management of R&D Innovations and Policy	1+1	
2	FEC 511	Economics of Fisheries Enterprises	1+1	
3	FEC 512	Fisheries Development Planning and Policy	2+0	
4	FEC 513	Fisheries Project Management	1+1	
	<b>Supporting courses</b> (The subject not related to the major subject. It could be any subject considered relevant for students research work (such as Statistical Methods, Design of Experiments etc.) or necessary for building his/her overall competence)			<b>6 Credits</b>



	<b>Common courses</b> (The following courses, one credit each will be offered) <ol style="list-style-type: none"> <li>1. Library and Information Services</li> <li>2. Technical Writing and Communication Skills</li> <li>3. Intellectual Property and its management in Agriculture</li> <li>4. Basic concepts in Laboratory Techniques</li> <li>5. Agricultural Research, Research ethics and Rural Development Programmes</li> </ol> (Some of these courses are already in the form of e-courses/MOOCs. The students may be allowed to register these courses/similar courses on these aspects, if available online on SWAYAM or any other platforms. If a student has already completed any of these courses during UG, he/she may be permitted to register for other related courses with the prior approval of the HoD/BoS).		5	5 Credits
<b>C</b>	<b>MASTERS' SEMINAR</b>			<b>1 Credit</b>
1	FEC 591	Masters' Seminar	0+1	
	<b>Total Course Work Credits</b>			<b>40 Credits</b>
<b>D</b>	<b>MASTERS' THESIS RESEARCH</b>			<b>30 Credits</b>
1	FEC 599	Masters' Research (Semester III)	0+15	
2	FEC 599	Masters' Research (Semester IV)	0+15	
	<b>Total M.F.Sc Program Credit Hours</b>			<b>70 Credits</b>

### M.F.Sc. (Fisheries Economics) Course Contents



<b>FEC 501</b>	<b>MICROECONOMICS</b>	<b>2+0</b>
<b>Objective</b>	To teach economics theories that apply to the decisions of individual consumers and producers and also firms.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Consumer theory:</b> Theory of Demand- Consumer Behaviour- Cardinal Utility theory – Indifference Curves theory- Income and Substitution effect- Derivation of demand curve- Consumer surplus- Equilibrium of the consumer- Elasticity of demand - Market demand - Constant elasticity demand function	
<b>UNIT II</b>	<b>Production economics:</b> Basic theory of the firm: concepts, production functions, isoquants derivations and applications, optimization behaviour – alternative models, short run and long run cost functions; total price effect-substitution effect, output effect and profit maximization effect decomposition analysis-analytical approaches, joint products-concepts and constrained optimization.	
<b>UNIT III</b>	<b>Production theory:</b> Theory of production and costs- Production functions- Returns to scale – long run analysis of production – Law of variable proportions- Technological progress- Equilibrium of the firm- Choice of optimal combination of factors of production- Derivation of cost function from production function- Production function of a multiproduct firm- Iso-revenue curve of the multiproduct firm- Linear production functions- Linear programming	
<b>UNIT IV</b>	<b>Theory of costs:</b> Theory of costs- Cost curves- Traditional theory of costs- Modern theory of costs- Short and Long run costs- Marginal cost, Minimum Average Total Costs- Analysis of Economies of Scale- Social and Private costs.	
<b>UNIT V</b>	<b>Factor pricing:</b> Theory of Price in Perfectly Competitive markets- The supply curve of the firm and industry- Short run equilibrium of the firm and industry- Equilibrium of firm and industry in long run- Optimal Resource Allocation- The stability of equilibrium - Dynamic equilibrium with lagged adjustment - Futures market- Hedging/ risk assumption.	
<b>UNIT VI</b>	<b>Welfare economics:</b> General Equilibrium theory- Two commodity exchange- Production and exchange- Multimarket equilibrium- General equilibrium and allocation of resources- Factor ownership and income distribution- Welfare economics- Pareto optimality- Maximization of social welfare- Welfare maximizing state.	
<b>Practical</b>	-	
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Brickley, J., Smith, C. and Zimmerman, J. 2008. Managerial Economics &amp; Organizational Architecture (4<sup>th</sup> Ed.). New Delhi: Tata McGraw Hill Education Private Limited.</li> <li>2. David M Kreps 1990. <i>A Course in Microeconomic Theory</i>. Princeton University Press.</li> <li>3. Dewitt K.K. 2002. <i>Modern Economic Theory</i>. Sultan Chand &amp; Co.</li> <li>4. Geetika, G. P and Choudhury, P. R. 2011. Managerial economics (2<sup>nd</sup> Ed.). New Delhi: Tata McGraw Hill Education Private Limited.</li> <li>5. Haran, J. 2012. Managerial economics. Jaipur: Garima Publications</li> </ol>	



	6. Henderson, J.M. and Quandt, R.E. 2000. <i>Microeconomic Theory: A Mathematical Approach</i> . McGraw-Hill. 7. Jhingan, M. L. and Stephen, J. K. 2012. Managerial economics (2 <sup>nd</sup> Ed.). Delhi: Vrinda Publications (P) Ltd. 8. Jhingan, M.L. 2004. Micro Economic Theory. Vikash Publishing House Pvt. Ltd. New Delhi. 9. Koutsoyiannis, A. 2003. <i>Modern Microeconomics</i> . The Macmillan Press. 10. Salvatore, D. 2011. Principles of microeconomics (5 <sup>th</sup> Ed.). Oxford: Oxford University Press 11. Shrivastava, O. S. 2013. Modern managerial economics: including micro and macroeconomics. New Delhi: Anmol Publications Pvt. Ltd. 12. Silberberg E & Suen W. 2001. <i>The Structure of Economics – A Mathematical Analysis</i> . McGraw-Hill. 13. Varian, Hal R. 1992. <i>Microeconomic Analysis</i> . W. W. Norton and Co. 14. Varian, Hal R. 1999. Intermediate Microeconomics. Affiliated East-West Press
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FEC 502	MACROECONOMICS	2+0
<b>Objective</b>	To understand the basic concepts and principles of macroeconomics including the analytical tools used for them.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Basic concepts:</b> Nature and Scope of Macroeconomics-Methodology and Keynesian Concepts National income-Concepts and measurement (GNP, NNP, PI & DI), methods for measuring national income, importance of NI analysis, Nominal and Real GDP .Balance of Payments (BoP)- meaning, structure, deficit and surplus , Disequilibrium , control measures	
<b>UNIT II</b>	<b>Theory of income and employment:</b> Classical theory of Employment and Say's Law-Modern theory of Employment and Effective Demand, Consumption function- Investment and savings: Consumption function –Average propensity to consume and marginal propensity to consume, measure of propensity to consumption, Keynes's theory of consumption and the determinants of consumption, Importance of consumption function.	
<b>UNIT III</b>	<b>Investment and Saving:</b> Saving function- average propensity to save and marginal propensity to save; Investment function – Meaning, types of investment, determinants of the levels of investment, Marginal efficiency of investment, Induced investment.	
<b>UNIT IV</b>	<b>Multiplier and accelerator:</b> Concept of Multiplier and Accelerator-Output and Employment-Rate of interest-Classical, Neo classical and Keynesian version-Theory of Multiplier- concepts of investment multiplier, derivation of investment Multiplier, Importance of multiplier; Aggregate demand and supply; unemployment – meaning, types; full employment	



<b>UNIT V</b>	<b>Monetary and fiscal policy:</b> Inflation-meaning, types, inflationary gap, cause and effect of inflation, Control measures for inflation; Monetary policy – Meaning, objective, instruments, Fiscal policy – Meaning, objective, Fiscal policy for economic growth, merits and demerits of the fiscal policy.
<b>UNIT VI</b>	<b>Public finance and expenditure:</b> Public finance and Public expenditure – concepts, types of public expenditure, growth of public expenditure, effects of public expenditure on production and distribution; Government expenditure (Taxation) – Government budget constraints; Tax- meaning, classification, characteristics of good tax system, problems of equity in taxation.
<b>Practical</b>	-
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Ahuja H.L. 2007. <i>Macroeconomics: Theory and Policy</i>. S. Chand &amp; Co.</li> <li>2. Deepashree, V. A. 2012. <i>Macroeconomics</i> (5th Ed). New Delhi: Ane Books Pvt. Ltd.</li> <li>3. Eugene A Diulio 2006. <i>Macroeconomics</i>. 4 Ed. Schaums' Outlines.</li> <li>4. Gardner Ackley 1987. <i>Macro-Economic: Theory and Policy</i>.</li> <li>5. Collier Macmillan. Dornbusch. 2006. <i>Macroeconomics</i> McGraw Hill Publication.</li> <li>6. Gardner Ackley. 1987 <i>Macro-economics: Theory and policy</i>. Macmillan Publishing Co., Inc., New York. Mankiw, N.G. 2004. <i>Macro-economics</i>, World Publishers, New York.</li> <li>7. Gregory Mankiw N. <i>Macroeconomics</i>, 2004, Worth publishers, New York</li> <li>8. Gupta, G. S. 2010. <i>Macroeconomics: theory and applications</i> (3<sup>rd</sup> Ed.). New Delhi: Tata McGraw Hill Education Private Limited</li> <li>9. Haran, J. 2012. <i>Managerial economics</i>. Jaipur: Garima Publications</li> <li>10. Kennedy, E. P. 2012. <i>Macroeconomic essentials: understanding economics in the news</i> (3<sup>rd</sup> Ed.). New Delhi: PHI Learning Private Limited.</li> <li>11. Kennedy, M. M. J. 2011. <i>Macroeconomic theory</i>. New Delhi: PHI Learning Private Limited.</li> <li>12. Maheshwari, Y. 2012. <i>Managerial economics</i> (3<sup>rd</sup> Ed.). New Delhi: PHI Learning Private Limited.</li> <li>13. Mankiw, M. G. 2012. <i>Principles of macroeconomics</i> (6<sup>th</sup> Ed.). Delhi: Cengage Learning India Pvt. Ltd.</li> <li>14. Reddy, M. K and Saraswathi, S. 2007. <i>Managerial economics and financial accounting</i>. New Delhi: PHI Learning Private Limited</li> <li>15. Robert J. Gordon. <i>Macroeconomics</i>, Addison-Wesley, New York. Shapiro, E. <i>Macroeconomic Analysis</i>. Galgotia Publications, Delhi.</li> <li>16. Shapiro, E. <i>Macroeconomic Analysis</i>. Galgotia Publications, Delhi.</li> <li>17. Tailor, R. K. 2012. <i>Principles of managerial economics</i>. Jaipur: RBSA Publishers</li> <li>18. Thomas, F. Dernburg. <i>Macro-economic-Concepts, theories and policies</i>, McGraw Hill Book Company, London.</li> <li>19. Walsh, E. C. 2010. <i>Monetary: theory and policy</i> (3<sup>rd</sup> Ed.). New Delhi: PHI Learning Private Limited.</li> </ol>

<b>FEC 503</b>	<b>SOCIOECONOMICS, VULNERABILITY AND FISHERFOLK WELFARE</b>	<b>2+1</b>
<b>Objective</b>	To make the students understand about the socioeconomic conditions of the fisherfolk and the impact of climate change over it to assess their standard of living to draft various means of welfare schemes to them.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Factors affecting socioeconomic status:</b> An over view of socioeconomic status of fisherfolk in India, Livelihood and Income-indebtedness- poverty, inequality and unemployment in fisheries-regional disparities in wage, work and livelihood security. Equity theory; Risk and uncertainty in fisheries -Standard of living of fisherfolk - Saving, Income, Consumption, poverty, Health status.	
<b>UNIT II</b>	<b>Socioeconomic analysis:</b> Concepts in socioeconomics - Gender discrimination, Income inequality, Gini coefficient and Lorenz curve, Theil index, Livelihood Index, Engel's curve, Duncan Socioeconomic Index (SEI), Occupational Status Score (OSS), household prestige (HHP) score - Recent measurement of economic development NEW (New Economic Welfare)- MRW (Measurement of Economic Welfare)- PQLI (Physical Quality Living Index)- HDI (Human Development Index)- Green GNP Index.	
<b>UNIT III</b>	<b>Fisheries and climate change:</b> Fisheries and climate change – Fisheries policy- Issues for future impact and adaptation- Socio economic condition and Fisheries policy- Fisheries and sustainability - Biodiversity of climate change- Indian fisheries current scenario in climate change - climate change threat- Impact of climate change in fisheries- Dynamics of climate change- Futuristic endeavour	
<b>UNIT IV</b>	<b>Climate change impact analysis:</b> Economic impact on climate changes –Climate change mitigation and adaptation- ongoing initiatives and future strategies for fisheries sector- Methods and tools for climate change adaptation- Impacts of climate driven extreme events and disasters in fishermen communities. Social impact on climate change -Vulnerability assessment – Top down and Bottom up approaches - Socio-economic vulnerability - Criteria and indicators – Vulnerability assessment framework and methods – Exposure, Sensitivity and Adaptive Capacity – Vulnerability Index – SeVI	
<b>UNIT V</b>	<b>Legal instruments to mitigate climate change:</b> An overview of international legal and policy framework to address climate change developed over time and points out some of the key issues under negotiation - history of international climate change negotiations and Nations Framework Convention on Climate Change (UNFCCC). - key provisions of the UNFCCC, its organisational structure, and different Party groups under the Convention - Kyoto Protocol and its associated bodies, as well as key commitments by Parties - an overview of main	



	negotiation issues - highlights some of the key issues relevant for a future climate change regime.
<b>UNIT VI</b>	<b>Welfare economics:</b> Fundamental theorems of welfare economics- Promising features of welfare economics, Welfare Schemes for fisherfolk in India- Women empowerment in Fisheries-Overview of fisherfolk welfare schemes-Fisheries Cooperatives, Corporations and NGOs in fisherfolk welfare development.
<b>Practical</b>	Assessment of socioeconomic parameters of fisherfolk in marine fisheries sector; Assessment of socioeconomic parameters of fisherfolk in inland fisheries sector; Consumption and savings behaviour of fisherfolk; Nutrition and Health analysis of fisherfolk; Case studies on effects on climate change in world fisheries with special emphasis to Indian fisheries; Climate change impact on coastal fisheries and aquaculture in India; Case studies on sustainability of fisheries sector in India; Case studies on climate change driven disasters affecting the fishermen communities in India; Effectiveness of fisherfolk welfare schemes; Impact of welfare schemes on fisherfolk
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Bahuguna, P. 2011. Rural marketing. New Delhi: Centrum Press</li> <li>2. Brander, K.M., 2007. Global fish production and climate change. Proceedings of the National Academy of Sciences, 104(50):19709-19714.</li> <li>3. CMFRI- Central Marine Fisheries Research Institute – <a href="http://www.cmfri.org.in">www.cmfri.org.in</a></li> <li>4. CMFRI-NICRA Annual Report, 2015-2016, Marine Fisheries, Report of work done at CMFRI submitted to CRIDA, pp. 27.</li> <li>5. De Silva, S. S., and Doris Soto, 2009. "Climate change and aquaculture: potential impacts, adaptation and mitigation." Climate change implications for fisheries and aquaculture: overview of current scientific knowledge. FAO Fisheries and Aquaculture Technical Paper 530: 151-212.</li> <li>6. Delgado, C.L., Wada, N., Rosegrant, M.W., Meijer, S. and Ahmed, M., 2003. Outlook for fish to 2020: meeting global demand. Penang, International food policy research group and worldfish centre. 28 pp.</li> <li>7. Glick, P., Stein, B.A. and Edelson, N.A. 2011. Scanning the conservation horizon: a guide to climate change vulnerability assessment. Washington, DC, National Wildlife Federation. 168 pp. (also available at <a href="https://www.nwf.org/Educational-Resources/Scientific-Reports/2011/01-19-2011-Scanning-the-Conservation-Horizon">https://www.nwf.org/Educational-Resources/Scientific-Reports/2011/01-19-2011-Scanning-the-Conservation-Horizon</a>).</li> <li>8. Gopalakrishnan A et al, 2016. Climate change impact on coastal fisheries and aquaculture in the SAARC region: Country paper- India, 1-25.</li> <li>9. Higgins, Benjamin. <i>Economic Development: Problems Principles &amp; Policies</i>. Universal Book, New Delhi</li> <li>10. IPCC – Intergovernmental Panel on Climate Change – <a href="https://www.ipcc.ch">https://www.ipcc.ch</a></li> </ol>



11. IPCC, 2007: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 976pp.
12. Ishwar C. Dhingra, "The Indian Economy, Environment and Policy", published by Sultan Chand, ed. 2006, pp. 53.56,641.
13. Khader, V. 2008. Empowerment of Fisher Women. Udaipur: Agrotech Publishing Academy
14. Khan, N. A. 2009. Fundamentals of entrepreneurship. New Delhi: Anmol Publications Pvt. Ltd.
15. Kindleberger, Charles P. *Economic Development*, McGraw Hill International. Meir, Gerald M. *Leading Issues in Economic Development*.
16. Kumar D, "Climate Economics- Impact and assessment of climate change", published by Dominant Publishers, ed. 2012.
17. Kumari, Sonia. Zacharia, P.U., Kripa, V., Sreenath, K.R. and George, Grinson., 2015. Distribution pattern and community structure of Zoanthids (Zoantharia) along the coast of Saurashtra, Gujarat, India. Journal of the Marine Biological Association of the United Kingdom, 96(8): 1577-1584.
18. McMichael, A.J., 2001. Impact of climatic and other environmental changes on food production and population health in the coming decades. The Proceedings of the Nutrition Society, 60 (2): 195-201.
19. NICRA- National Initiative on Climate Resilient Agriculture – [www.icar.nicra-icar.in](http://www.icar.nicra-icar.in)
20. NOAA- National Oceanic and Atmospheric Administration – <https://www.noaa.gov>
21. Ogier, E.M., Davidson, J., Fidelman, P., Haward, M., Hobday, A.J., Holbrook, N., Hoshino, E. & Pecl, G.T. 2016. Fisheries management approaches as platforms for climate change adaptation: comparing theory and practice in Australian fisheries. Marine Policy, 71: 82–93.
22. Rathakrishnan, L. 2008. Empowerment of women through entrepreneurship. New Delhi: Gyan Publishing House
23. Singh, K. 2012. Rural development: principles, policies and management (3<sup>rd</sup> Ed.). New Delhi: SAGE Publications.
24. Thakur, A.K. and Sharma, P. 2009. Micro-credit and rural development. New Delhi: Deep & Deep Publications Pvt. Ltd.
25. Tiwari, S and Tiwari, A. 2007. Women entrepreneurship and economic development. New Delhi: Sarup & Sons
26. Todaro, Michael, P. and Smith, S.C. *Economic Development*. Pearson Education.
27. UNFCCC- United Nations Framework Convention on Climate Change – <https://unfccc.int>



<b>FEC 504</b>	<b>FISHERY REGULATIONS AND ECOSYSTEM VALUATION</b>	<b>2+1</b>
<b>Objective</b>	To provide an overview of the concept and methods for payment for ecosystem services and their policy implications. This course is aimed at providing a rigorous and application-oriented treatment of different valuation techniques for measuring the value of aquatic environmental goods and services.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Fisheries regulations:</b> Fisheries Regulations – Imperative needs for the regulation of marine fisheries in India, types of fishery regulations – possible objectives of fisheries regulations; Fisheries regulations followed in the maritime states of India. Classification and Characteristics of Natural Resources, sustainability issues, property rights, externalities transaction costs, and collective action. Allocation of Renewable & Non-renewable Resources	
<b>UNIT II</b>	<b>Aquaculture guidelines:</b> Aquaculture: Guidelines under CRZ notification of 1991 and its Amendments, land leasing policies, regulations on use of chemicals and antibiotics - features of Aquaculture Seed (Quality Control) Relevant Central/state legislative provisions of Environment, Wildlife, Water, Biodiversity: (riverine, reservoir and aquaculture), processing in different States	
<b>UNIT III</b>	<b>Ecosystem valuation:</b> Economic Role in Resource Management, Economic Models in Resource Use, Environmental and ecosystem valuation – the concept of value and valuation –Theoretical basis of valuation – consumer surplus, compensating variation and equivalent variation. Cost-benefit analysis of a conservation project. Ecosystem valuation – Payment for ecosystem services. Ethical issues in valuation – choice of discount rate.	
<b>UNIT IV</b>	<b>Methods of valuation - Revealed preference methods:</b> Taxonomy of ecosystem values – use value, non-use value, direct and indirect use value, existence value, bequest value and option value. Revealed preference methods – Change in productivity method – Averting behavior and substitutable private and environmental goods. Models for bundled attribute goods - Hedonic of differentiated commodities. Discrete choice model of differentiated commodities – Hedonic property value model. Replacement cost approach. Substitute goods approach. Travel cost methods.	
<b>UNIT V</b>	<b>Methods of valuation –Stated preference methods:</b> Stated preference methods – Contingent behavior - contingent valuation techniques – Willingness to accept and willingness to pay – Bidding games. Choice experiment approach. Combining revealed preference and stated preference methods. Discrete choice models for stated preference data. Validity of stated preference data. Other methods - Benefit transfer.	



<b>UNIT VI</b>	<b>Risk valuation and assessment:</b> Morbidity and Mortality Risk Valuation - Risk assessment and the environment - Conceptual models – Health production model - Endogenous mortality risk - Measuring the value of a statistical life - Wage hedonics - Valuing health changes. Defensive expenditures and cost of illness. Economic valuation of biodiversity. Measurement of carbon sequestration benefits.
	Measurement of climate change impact – agronomic vs. economic methods – Ricardian model, Just-Pope model.
<b>Practical</b>	Contemporary global environmental issues, movement, policies, programmes, laws and other regulatory mechanisms; Fishery regulation in India; Criteria for evaluating the environment related projects and review of Environmental Impact Assessment (EIA) techniques; Recreation demand models of environmental valuation – Contingent valuation techniques – Environmental Resource Accounting Techniques; Practical considerations and comparison of instruments of environmental policy; Non-Point source pollution control methodologies - economic valuation and environmental economics; Exercises on change in productivity method; Replacement cost method with examples and insights from literature; Exercises on hedonic pricing. Travel cost method – design and application with example, Stated preference approaches – Contingent valuation methods; Measuring WTP and WTA – Empirical exercises



<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Adamowicz, Wiktor, Peter Boxall, Michael Willioams, and Jordon Louviere. —Stated Preference Approaches for Measuring Passive Use Values: Choice Experiments and Contingent Valuation. <i>American Journal of Agricultural Economics</i> 80:64-75 (February 1998).</li> <li>2. ASC – Aquaculture Stewardship Council – <a href="https://www.asc.aqua.org">https://www.asc.aqua.org</a></li> <li>3. Bartik, Timothy J. —Measuring the Benefits of Amenity Improvements in Hedonic Price Models, <i>Land Economics</i> 64(2): 172-183 (May 1988).</li> <li>4. Bavinck, M., 2001. Marine resource management: conflict and regulation in the fisheries of the Coromandel Coast. Sage Publications.</li> <li>5. Berkes, F., 2001. Managing small-scale fisheries: alternative directions and methods. IDRC.</li> <li>6. Bromely, W. Daniel, —The Hand Book of Environmental Economics   (Madison:Black Well Publications), 1995.</li> <li>7. Carlson GA, Miranowski J &amp;Zilberman D. 1998. Agricultural and Environmental Resource Economics. Oxford Univ. Press.</li> <li>8. Champ, Patricia A., Kevin J. Boyle, and Thomas Brown. A Primer on Nonmarket Valuation.Boston, Dordrecht, London: Kluwer Academic Publishers, 2003.</li> <li>9. CMFRI- Central Marine Fisheries Research Institute – <a href="http://www.cmfri.org.in">www.cmfri.org.in</a></li> <li>10. Dillman, Don A. Mail and Internet Surveys: The Tailored Design Methods. New York: John Wiley and Sons, 2000.</li> <li>11. Dixon, John A., Louise Fallon Scura, Richard A Carpenter and Paul B. Sherman,“Economic Analysis of Environmental Impacts” (London: Earthscan Publications Ltd.), 1995.</li> <li>12. FAO – Food and Agriculture Organization – <a href="http://www.fao.org">www.fao.org</a></li> <li>13. Fisher, Antony C., —Resource and Environmental Economics   (London: Cambridge University Press), 1981.</li> </ol>
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14. Freeman, A. Myrick, III. The Measurement of Environmental and Resource Values. Second Edition. Washington, D.C.: Resources for the Future, 2003.
15. Haab, T., and T.E. McConnell (2002), Valuing Environmental and Natural Resources: The Econometrics of Non-market Valuation, Edward Elgar Publishers.
16. Hanemann, W. Michael. —Valuing the Environment Through Contingent Valuation,||Journal of Economic Perspectives 8(4): 19-43 (Fall 1994).
17. Hannesson, R., 1993. Bioeconomic analysis of fisheries. Fishing News Books Ltd.
18. Hosetti, B.B. and A. Kumar "Environmental Impact assessment and Management" (New Delhi: Daya Publishing House), 1998.
19. <http://ocw.mit.edu/courses/economics/14-42-environmental-policy-and-economics>
20. <http://ocw.mit.edu/courses/economics/14-42-environmental-policy-and-economics->
21. <http://www.agecon.purdue.edu/staff/shively/courses/AGEC406/index.htm>
22. <http://www.colorado.edu/economics/morey/4545/4545Ints.html>
23. <http://www.economicsnetwork.ac.uk/environmental/resources>
24. Joy E. Hecht, "Natural Environmental Accounting – Bridging the gap between Ecology and Economy" 2004.
25. Myrick Freeman. A, "The Measurement of Environmental and Resource values – Theory and Methods" (Resource for the future press) 2003.
26. Nick Hanley, Jason F. Shogran and Ben White, "Environmental Economics in Theory and Practice", (Delhi: Mc Millan, India), 1997.
27. Pinkerton, E. ed., 2011. Co-operative management of local fisheries: new directions for improved management and community development. UBC Press.
28. Portney, Paul R. —The Contingent Valuation Debate: Why Economists Should Care,|| Journal of Economic Perspectives 8(4): 3-17 (Fall 1994).
29. Sathiadhas, R., 1997. Production and marketing management of marine fisheries in India. Daya Books.
30. Timothy C. Haab and Kenneth R. Mc Connell, "Valuing Environmental and Natural Resources – The econometrics of Non-market valuation" (Edward Elgar Publishing Limited, UK), 2003.
31. Tom Totenberg, "Environmental and Natural Resource Economics" (Pearson – Addison Wesley publication), 2006.
32. Turner, Kerry, David prance, Ian Batsman and Johns Hopkins - Environmental Economics: An Elementary Introduction|| 1993.
33. Wilson, D.C., Nielsen, J.R. and Degnbol, P. eds., 2003. The fisheries co-management experience: accomplishments, challenges and prospects (Vol. 26). Springer Science & Business Media
34. [www.env-econ.net](http://www.env-econ.net)
35. [www.teebweb.org](http://www.teebweb.org)

<b>FEC 505</b>	<b>MARKETING INTELLIGENCE AND BUSINESS ANALYSIS</b>	<b>2+1</b>
<b>Objective</b>	To give an idea about the marketing intelligence and business analysis applied in the fisheries sector.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Fundamentals of Marketing:</b> Marketing- concepts and scope, Classification of markets, Market structure, Conduct and performance, problems in marketing of fish and fisheries products. Review of agricultural marketing concepts - Marketing in a developing economy, Marketing functions and its importance in fish marketing. Marketable and marketed surplus.	
<b>UNIT II</b>	<b>Concept and estimation:</b> Demand and supply models; formulation, estimation and projections. Marketing channels and intermediaries and their role, need for market regulation in the present context, price instability, price stabilization measures and policies; forward and backward linkage trading, future markets, marketing cost, price spread and efficiency; market integration; government interventions in fish marketing including regulations, marketing of inputs.	
<b>UNIT III</b>	<b>Requirements in business analysis:</b> Requirements in Business Analysis - Management - communication - tracing - configuration and change management -quality assurance - Development - elicitation including stakeholders and/or product requirements development – specification. <b>Business analytics:</b> Business Analysis -Internal analysis - External analysis - Business need definition - Gap analysis - Solution proposal (including feasibility analysis) - Solution delivery or maintenance program/project initiation- Business process definition - Business goals- Business needs- Business requirements- - Limitations and assumptions	
<b>UNIT IV</b>	<b>Role of institutions:</b> NFDB; MPEDA; State Fisheries Development Corporations; value chains- Marketing information system, Role of IT in marketing of fisheries commodities, Market information service - electronic auctions (e-bay), e-Chaupals, Agmarknet, e-NAM, APMC Domestic and Export market Intelligence Cell (DEMIC)- marketing extension, ISO.	
<b>UNIT V</b>	<b>Market structure, conduct and performance:</b> domestic market structure, conduct and performance analysis; Demand and supply of domestic fish products. Determination of marine domestic fish prices; Seafood exports markets. Marketing co-operatives, fish retail in high end domestic markets; direct and online fish and fish products domestic marketing; contract farming and retailing; supply chain marketing management; market infrastructure needs, performance and government.	



<b>UNIT VI</b>	<b>Data analysis in marketing research:</b> Data sources for assessing consumer preferences, firm performance, and market condition and competition- analyze enterprise data, especially for purposes of segmentation, targeting, positioning, and evaluating consumer value-process of organizing, writing, framing, and refining analytics reports-delivering effective presentations, and aligning analytic results with stakeholder needs and preferences, Spatial and temporal price relationship, marketing research tools; price-forecasting, time- series analysis and models, Scope for price policy and regulated domestic fish marketing and commodity markets and futures trading; non-price instruments.
<b>Practical</b>	Marketing Research – ethics, standards and issues; Utilisation of Secondary Data Resources for Customer Segmentation Pricing and Elasticity; Linear Regression Basics; Using Linear Regression to Forecast; Estimation of Supply and demand elasticities, Identification of market channels, Estimation and analysis of price spread and marketing efficiency of different channels. Marketing structure analysis through concentration ratios.



<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Axelos, Managing Successful Projects with PRINCE2® 2017 Edition, Axelos, 2017 ISBN:9780113315338</li> <li>2. Bens, Ingrid, Facilitation at a Glance! 4th Edition, Goal/QPC; 4th edition, 2016, ISBN-10: 1576811832</li> <li>3. Brown Tim, Change by Design: How Design Thinking Transforms Organizations</li> <li>4. Carlson C.C., Wilmot, W.W., Innovation: The five disciplines for creating what customers want, New York: Crown Business, 2006, ISBN: 0307336697 Edition, ISBN 13: 978-0-13-608543-0,</li> <li>5. eNAM – National Agricultural Market <a href="https://enam.gov.in">https://enam.gov.in</a></li> <li>6. Harrington H. James, Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity, and Competitiveness, 1991 Inspires Innovation, HarperCollins, 2009, ISBN 978-0061766084</li> <li>7. MPEDA – Marine Products Export Development Agency – <a href="http://mpeda.gov.in">mpeda.gov.in</a></li> <li>8. Naresh Malhotra, Marketing Research: an Applied Orientation, Sixth</li> <li>9. NFDB- National Fisheries Development Board – <a href="http://nfdb.gov.in">nfdb.gov.in</a></li> <li>10. Pearson Prentice Hall Analyzing the Target Market, Part 1: Chapter 3, Marketing Research, Harvard Business Publishing BEP 117, length 18 pages</li> <li>11. S Acharya &amp; N.L. Agrawal. Agriculture Marketing in India, Oxford and IBH Publication</li> <li>12. Phillip K &amp; Armstrong G. 2007. Principles of Marketing. Prentice Hall.</li> </ol>
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<b>FEC 506</b>	<b>INTERNATIONAL FISHERIES TRADE</b>	<b>1+1</b>
<b>Objective</b>	To familiarize students with basic concepts and principles of economics applied to international trade with reference to fisheries.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Introduction to international economics:</b> International Economics - concepts and scope, Nature of international trade, difference between domestic and foreign trade; Theories of international trade- absolute and comparative advantage, modern theories of international trade – Hecksher Ohlin theorem.	
<b>UNIT II</b>	<b>Concepts in trade:</b> Concepts of terms of trade, free trade, protection, tariffs, quantitative restrictions and other non-tariff measures; exchange rate; devaluation and depreciation; Balance of payments. EXIM policy of India in relation to fish and fishery products.	
<b>UNIT III</b>	<b>Export- Import procedures:</b> Export- Import procedures, and certification. Growth of marine product exports – MPEDA and its development programmes	



<b>UNIT IV</b>	<b>Institutions and trade policies:</b> GATT and WTO, transition from GATT to WTO, WTO provision and its agreements: Agreement on Agriculture (AoA), Agreement on SPS measures and its salient features, Role of Codex Alimentarius Commission (CAC) and Agreement in Trade Related Intellectual Property rights (TRIPs) WTO in dispute settlement.
<b>Practical</b>	Pattern and performance of India's seafood exports; Product and market diversification; Competitiveness of Indian fish and fish products; Exports of value added seafood products; Case study of a seafood export firm; Use of SPS / TBT measure; Non-tariff barriers in fisheries trade; Dumping and anti-dumping measures in seafood trade.



<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Apple yard DR &amp; Field A. J. 2001. International Economics. 4th Ed. McGraw Hill.</li> <li>2. Bradley, T. 2008. Essential mathematics for economics and business (2<sup>nd</sup> Ed.). New Delhi: Wiley India Pvt. Ltd</li> <li>3. CAC – Codex Alimentarius Commission – <a href="http://www.fao.org">www.fao.org</a></li> <li>4. Charles PK. 1968. International Economics. Richard D. Irwin.</li> <li>5. Cherunilam Francis International Economics Tata McGraw, Hill, New Delhi</li> <li>6. Cherunilam, F. 2011. International economics (5<sup>th</sup> Ed.). New Delhi: Tata McGraw Hill Education Private Limited.</li> <li>7. Deepti . 2011. Foreign direct investment: in different sectors of Indian economy. New Delhi: Deep &amp; Deep Publications Pvt. Ltd.</li> <li>8. Dennis Appleyard, Trade Theory and Practice. Irwin Publishers</li> <li>9. Ethier WJ. 1995. Modern International Economics. Norton International Ed.</li> <li>10. Francis C. 1999. International Economics. Tata McGraw Hill. Kemp MC. 1964. Pure Theory of International Trade. Prentice Hall.</li> <li>Walterjngo&amp;Kaaj A. 1981. International Economics. 3rd Ed. Prentice Hall.</li> <li>11. Francis C. 2008. International Economics. Tata McGraw Hill.</li> <li>12. GATT – General Agreement on Tariffs and Trade – <a href="https://www.wto.org">https://www.wto.org</a></li> <li>13. Jain, S. K. 2012. Export import procedures and documentation (6<sup>th</sup> Ed.). Girgaon, Mumbai: Himalaya Publishing House</li> <li>14. Krugman PR &amp;Obstfeld M. 1991. International Economics: Theory and Policy. Harper Collins Publ.</li> <li>15. Krugman, R. P. and Obstfeld, M. 2013. International economics: theory and policy (8<sup>th</sup> Ed.). New Delhi: Pearson Education.</li> <li>16. Mithani. J.P International Economics Tata McGraw, Hill, New Delhi</li> <li>17. MPEDA – Marine Products Export Development Agency – <a href="http://mpeda.gov.in">mpeda.gov.in</a></li> <li>18. Nath , H. S. 2012. Economics of foreign exchange and global finance. New Delhi: Cyber Tech Publications</li> <li>19. Pugel , A. T. 2012. International economics (13<sup>th</sup> Ed.). New Delhi: Tata McGraw Hill Education Private Limited.</li> <li>20. Samuelson and Nordnaus, Economics, Tata McGraw, Hill, New Delhi</li> <li>21. Taneja, P. 2011. Statistics for business and economics. New Delhi: Rajat Publications</li> <li>22. Tejpal, B. K. 2012. Business economics: modern methods &amp; techniques. Jaipur: Ritu Publications</li> <li>23. Venkatachalam, P. V. 2012. Text book on international economics. New Delhi: Cyber Tech Publications</li> <li>24. WTO – World Trade Organisation - <a href="https://www.wto.org">https://www.wto.org</a></li> </ol>
<b>FEC 507</b>	<b>FISHERIES FINANCE, ACCOUNTING AND CONTROL</b>
<b>Objective</b>	To make aware about the innovations in the fisheries finance and accounting.



<b>Theory</b>	
<b>UNIT I</b>	<b>Principles of finance:</b> Importance of fisheries finance; principles of fisheries financial management, rural credit structure-demand and supply, sources and forms; estimation of credit requirement; cost of credit/capital; credit appraisal- –The concept of 3C's, 7P's and 3R's of credit. District Credit Plan and lending to agriculture/priority sector Micro-Financing
<b>UNIT II</b>	<b>Reforms in policies and institutions:</b> Reforms in fisheries credit policy; innovations in fisheries financing – micro Finance, role of institutions in fisheries, finance, public and private sector banks; cooperatives, micro-finance institutions (MFIs), SHGs; Financing through Co-operatives, NABARD and Commercial Banks and RRBs International Financial Institutions; successes and failures of co-operative sector in India; Role of co-operatives under emerging economic scenario.
<b>UNIT III</b>	<b>Capital and cost concepts:</b> Sources of long-term finance and cost of capital; concepts of components of working capital, managing working capital - cash management, dividend decision; capital budgeting, appraisal criteria; fish business financing system in India-money and capital markets, national, regional and global financial institutions; insurance; risk management; micro-credit.
<b>UNIT IV</b>	<b>Project formulation and appraisal:</b> Elements of project cycle: Identification, preparation, appraisal, financing and implementation of projects. Project Appraisal techniques: Undiscounted measures, ranking by inspection, pay-back period, average annual proceeds per unit of outlay, Time value of money. Use of discounted measures, derivation of incremental net benefit; B-C ratio, NPV and IRR. Project management Net-work Techniques – PERT and CPM
<b>UNIT V</b>	<b>Accounting types:</b> Branches of Accounting, Internal and External Users of Accounting. Financial Accounting- Meaning, Need, Concepts and Conventions; Advantages and Limitations, Accounting Standards. The Double Entry System- Its Meaning and Scope, The Journal, Cash Book, Ledger, Trial Balance, Trading Account, Profit and Loss Account, Balance Sheet, Entries and Adjustments of different heads in different Books and Accounts. Introduction of Company Accounts.
<b>UNIT VI</b>	<b>Accounting management:</b> Management Accounting-Meaning, Functions, Scope, Utility Limitations and Tools of Management Accounting. Cost Accounting – basics – significance – objectives, Classification of Costs, Marginal Costing. Responsibility Accounting— meaning and significance. Budgets and Budgetary Control-Types of Budgets.
<b>Practical</b>	Rural Lending Programmes of Commercial Banks; Lead Bank Scheme-Preparation of District Credit Plan; Preparation of financial statements using farm/firm level data; Farm credit appraisal techniques and farm



	financial analysis through financial statements; Different case studies on fisheries cooperative societies and their performance (marine and inland sector); Practical exercise on PERT and CPM; Ratio analysis; Valuation of project inventories; Project appraisal techniques–undiscounted and discounted measures; Company accounts format and formatting
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Bhatia, B. S.; H. L. Verma, Mahesh. C. Harg., 2001. Encyclopaedia of Co-operative Management (Vol. I, II, III, IV), Deep and Deep publications, New Delhi</li> <li>2. Chodhury, Project Management Tata McGraw Hill Publishing Company Ltd., New Delhi</li> <li>3. FAO Technical Paper No.334, Fisheries Project Formulation, FAO, Rome.</li> <li>4. FAO, 1971. Manual on Fishermen's Co-operatives, Rome.</li> <li>5. Gittinger, J. Price, Economic analysis of Agricultural projects, EDI Series in Economic Development, John Hopkins University Press, Baltimore and London</li> <li>6. NABARD – National Bank for Agriculture and Rural Development – <a href="https://www.nabard.org">https://www.nabard.org</a></li> <li>7. Proctor T. 2005. Essentials of Marketing Research. Financial Times, Prentice Hall.</li> <li>8. Rajagopalan, R., 1997. Rediscovering cooperation Vol. I, II, III, IRMA Anand.</li> <li>9. Ronald W. Cotterill, 1998. Competitive Strategy Analysis for Agri-marketing Co-operatives. 5. FISHCOPFED. 1989. Fish Co-operatives, New Delhi.</li> <li>10. Shang, Y.C., Aquaculture Economic Analysis – An Introduction, The World of Aquaculture Society Ltd.</li> <li>11. Twiner and Simister (ed.), Project Management, Infinity Books, New Delhi.</li> </ol>

<b>FEC 508</b>	<b>INTRODUCTION TO ECONOMETRIC TOOLS</b>	<b>1+1</b>
<b>Objective</b>	To make students acquainted with econometric tools applied to social sciences. This course on quantitative and econometric analysis focuses on practical applications that are relevant in fields such as economics, finance, public policy, business and marketing.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Nature and scope of econometrics:</b> Definition and Scope of Econometrics; Methodology of econometrics - The nature of the econometrics Approaches – Simple regression estimation and testing procedures – Stochastic and Non-Stochastic relations – Statistical properties of least squares estimators –Confidence interval and Hypothesis testing – Goodness of fit – Reporting the results of regression Analysis; Matrix Algebra.	
<b>UNIT II</b>	<b>Introduction to classic linear regression analysis:</b> Two variable regression model – The basic assumptions; Application of regression	



	model The covariance and covariance estimator – Functional forms of regression models and methods of estimation; Cobb-Douglas Production Model - Multiple regression model, Relationship between simple and multiple regression coefficients; Auto correlation-Heteroscedasticity; Multicollinearity; Meaning and problem. Autoregressive models for univariate time series stationary data (AR), trend (ARIMA), and seasonal component (SARIMA), <b>Linear programming: Objective function, Simplex method. Assumptions, formulation of a linear programming problem; primal and dual LP problems, variable resource and price programming, game theory.</b>
<b>UNIT III</b>	<b>Regression models and forecasting techniques:</b> Simultaneous – Equation Models; Problems of Simultaneous equation model; Multinomial regression models Ordinal – Regression models.
<b>UNIT IV</b>	<b>Forecasting with regression model:</b> Panel data regression models-Survival analysis – Parametric and non-parametric tests in Social Sciences; Adhoc procedures in Regression analysis – Estimation of Probit, Logit and Tobit Probability Models
<b>Practical</b>	Analysis on fitting classical linear regression models; Detection of multicollinearity; Forecasting models; Heteroscedasticity and autocorrelation for the given data sets in fisheries; Parametric and non-parametric tests; Data analysis in MS excel, SPSS and STATA; Forecasting models that can be developed for univariate time series data.



<b>Suggested Readings</b>	<ol style="list-style-type: none"><li>1. Brooks, C. 2009. RATS handbook to accompany: introductory econometrics for finance New York: Cambridge University Press</li><li>2. Damodar Gujarati. 2006. Basic Econometrics. Tata McGraw-Hill Publishing Company Ltd, Delhi</li><li>3. Damodar Gujarati.2012. Econometrics by example, Palgrave Macmillan, New York</li><li>4. Debbie Holmes, Peter Moody &amp; Diana Dine. 2006. Research Methods for the biosciences. International Student edition, Oxford University Press.</li><li>5. Deepak Chowla&amp;Neena Sondhi.2011. Research Methodology: Concepts and Cases. Vikas Publishing House Pvt. Ltd, New Delhi</li><li>6. Dougherty, C. 2011. Introduction to econometrics (4<sup>th</sup> Ed.). Oxford: Oxford University Press</li><li>7. Greene, H. W. 2012. Econometric analysis (5<sup>th</sup> Ed.). New Delhi: Pearson Education.</li><li>8. Gujarati, D. 2011. Econometrics by example. New York: Palgrave</li><li>9. Gujarati, D. N., Porter, D. C and Gunasekar, S. 2012. Basic econometrics (5<sup>th</sup> Ed.). New Delhi: Tata McGraw Hill Education Private Limited</li><li>10. Harry H. Kelejin&amp; Wallace E.Oates.1975. Introduction to Econometrics: Principles and Applications, Herber International Edition, Joanna Cotler Books</li><li>11. <a href="http://www.oswego.edu/">http://www.oswego.edu/</a></li><li>12. <a href="http://www.tiesindia.net/">http://www.tiesindia.net/</a></li><li>13. <a href="https://guides.lib.monash.edu/econometrics">https://guides.lib.monash.edu/econometrics</a></li><li>14. <a href="https://www.amstat.org/">https://www.amstat.org/</a></li><li>15. <a href="https://www.rss.org.uk">https://www.rss.org.uk</a></li></ol>
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	<p>16. Koutsoyiannis, A. 2013. Theory of econometrics: an introductory exposition of econometric methods (2<sup>nd</sup> Ed.). New York: Palgrave</p> <p>17. Madnani, G. M. K. 2012. Introduction to econometrics: principles and applications (8<sup>th</sup> Ed.). New Delhi: Oxford &amp; IBH Publishing Co. Pvt. Ltd.</p> <p>18. Murray R. Spiegel &amp; Larry J. Stephens. 2000. Theory and Problems of Statistics, Tata McGraw-Hill edition, New Delhi</p> <p>19. Studenmund A.H. 2015. Using econometrics (6<sup>th</sup> Ed.). Chennai: Pearson</p> <p>20. Teresa Bradley &amp; Paul Patton. 2008. Essential mathematics for economics and Business. John Wiley &amp; Sons Ltd. New Delhi.</p>
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<b>FEC 510</b>	<b>MANAGEMENT OF R&amp;D INNOVATIONS AND POLICY</b>	<b>1+1</b>
<b>Objective</b>	To give an idea about the R&D Management and fisheries policy analysis.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Innovation and technology:</b> Innovation, productivity and economic growth; Nature, process and importance of technological innovation. Role of fisheries in economic and rural development.	
<b>UNIT II</b>	<b>Fisheries in economic development theories:</b> Growth stage theories, structural transformation leading sectors and dual economy models. Technology adoption, diffusion and transfer- theoretical models and case studies, technology, resources and environment	
<b>UNIT III</b>	<b>Fisheries research systems:</b> Fisheries research systems -evolution and growth, selected case studies of major countries, investment trends, international comparisons, institutional details; Changing public-private roles in technology development. Institutions and fisheries development; collective actions, property rights, transaction cost economics.	
<b>UNIT IV</b>	<b>Theories and policies:</b> Need for separate/sound fisheries policy – resource policies, credit policies, input and product marketing policies – price policies. Theories of fisheries development – conservation, urban industrial impact, and diffusion, high-pay- off input. Science and technology policy – regulation, incentives; Technology and intellectual property rights- selected case studies.	
<b>Practical</b>	Measurement of productivity growth; Exercise on total factor productivity; Using frontier production function; Institutional structures and national and international fisheries research systems; Ex-ante and ex-post methods of estimation of R&D impacts in fisheries	
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Alston, J.M., Norton, G.W. and Pardey, P.G. 1995. Science Under Scarcity. Cornell University Press, Ithaca.</li> <li>2. Blaug, M. 1986. Economic History and the History of Economic Thought. Wheatsheaf Books, Brighton. Ghatak, S. and Ingersent, K. Agricultural Economic Development. Select Book Service Syndicate, New Delhi.</li> </ol>	



	3. FAO – Food and Agriculture Organization – <a href="http://www.fao.org">www.fao.org</a> 4. GATT – General Agreement on Tariffs and Trade – <a href="https://www.wto.org">https://www.wto.org</a> 5. Khurana, V.K. 2007. Management of Technology and Innovation. Ane Books India, Delhi. 6. Ruttan, V.W. 2001. Technology, Growth and Development: An Induced Innovation Perspective. Oxford University Press, New York. 7. Schultz, T.W. 1964. Transforming Traditional Agriculture. Yale University Press, New Haven Ruttan, V.M. 2001. Technology, Growth and Development. Oxford University Press. 8. WTO – World Trade Organisation - <a href="https://www.wto.org">https://www.wto.org</a>
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<b>FEC 511</b>	<b>ECONOMICS OF FISHERIES ENTERPRISES</b>	<b>1+1</b>
<b>Objective</b>	To make the students aware about the economics of the various culture fisheries and the post – harvest operations.	
<b>Theory</b>		
<b>UNIT I</b>	<b>Production economics:</b> Aquaculture in economic development- Production concepts in aquaculture Production function- Cost and return concepts in aquaculture- Optimization of use of single resource- Cost of production- Short run production cost- Long run cost- Production function analysis in various aquaculture system. Preparation of financial statements-Balance Sheet, Cash Flow Statement and Profit and Loss Account. Ratio Analysis and Assessing the performance of farm/firm.	
<b>UNIT II</b>	<b>Planning and budgeting:</b> Farm income and budget analysis- Planning and budgeting- Aquaculture management decisions- Resource, labour and financial management. Managing risks and uncertainties - Economics of different aquaculture systems- Socio economic issues. Causes for aquaculture problems- Government support policies for inland, coastal and marine aquaculture systems.	
<b>UNIT III</b>	<b>Value Chain Management concept:</b> Value Chain Management concepts, value addition in fish marketing. Constraints and approaches to VCM in fisheries sector. Domestic and external markets for fisheries products. Export – Infrastructure development from landing to marketing.	
<b>UNIT IV</b>	<b>Value chain analysis:</b> Post-harvest operations in inland and marine fisheries including deep sea fishing - methodological issues in marine capture fisheries- needed measures for the constraints in post-harvest operations -	
<b>Practical</b>	Estimation of cost and returns of different aquaculture systems in India; Production trends of aquaculture in India for the past 10 years and the projected production estimates; Production function analysis; Planning and budgeting; Financial analysis in aquaculture production systems; Case studies of various aquaculture systems in India; Visit to various shrimp hatcheries or farms; Visit to various finfish farms and ornamental units; Visit to various craft and gear manufacturing units;	



	Cost and returns of marketing establishments including export processing firms
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Asche, F., Roll, K.H. and Tveteras, R., 2009. Economic inefficiency and environmental impact: An application to aquaculture production. <i>Journal of Environmental Economics and Management</i>, 58(1), pp.93-105.</li> <li>2. Battese, G.E., 1992. Frontier production functions and technical efficiency: a survey of empirical applications in agricultural economics <i>Agricultural economics</i>, 7(3-4), pp.185-208.</li> <li>3. CIBA – Central Institute of Brackish water Aquaculture – <a href="http://www.ciba.res.in">www.ciba.res.in</a></li> <li>4. CIFRI – Central Inland Fisheries Research Institute – <a href="http://www.cifri.ernet.in">www.cifri.ernet.in</a></li> <li>5. CMFRI- Central Marine Fisheries Research Institute – <a href="http://www.cmfri.org.in">www.cmfri.org.in</a></li> <li>6. Engle, Carole R., et al., 2017. "Economics of sustainable intensification of aquaculture: evidence from shrimp farms in Vietnam and Thailand." <i>Journal of the World Aquaculture society</i> 48(2), 227-239.</li> <li>7. Hatch, U. and Tai, C.F., 1997. A survey of aquaculture production economics and management. <i>Aquaculture Economics &amp; Management</i>, 1(1-2), pp.13-27.</li> <li>8. Jolly, C. M., &amp; Clonts, H. A., 1993. <i>Economics of aquaculture</i>. CRC Press.</li> <li>9. Knapp, G., &amp; Rubino, M. C., 2016. The political economics of marine aquaculture in the United States. <i>Reviews in Fisheries Science &amp; Aquaculture</i>, 24(3), 213-229.</li> <li>10. Ngoc, P. T. A., Meuwissen, M. P., Cong Tru, L., Bosma, R. H., Verreth, J., &amp; Lansink, A. O., 2016. Economic feasibility of recirculating aquaculture systems in pangasius farming. <i>Aquaculture Economics &amp; Management</i>, 20(2), 185-200.</li> <li>11. Olayide, S.O. and Heady, E.O., 1982. <i>Introduction to agricultural production economics</i>. Ibadan University Press, University of Ibadan.</li> <li>12. Shang, Y.C., 1990. <i>Aquaculture economic analysis: an introduction</i>. World Aquaculture Society.</li> <li>13. Subba Reddy, S. and Raghu Ram, P., 1996. <i>Agricultural finance and management</i>. Oxford &amp; IBH Pub. Co.</li> </ol>

<b>FEC 512</b>	<b>FISHERIES DEVELOPMENT PLANNING AND POLICY</b>	<b>2+0</b>
<b>Objective</b>	To understand fisheries policy of different states and plans for development	
<b>Theory</b>		



<b>UNIT I</b>	<b>Economic development and growth:</b> Development Economics – Scope and Importance - Economic development and economic growth, divergence in concept and approach - theories of development; Indicators and Measurement of Economic Development – GNP as a measure of economic growth – Green GNP - Criteria for under development – Obstacles to economic development, Economic and Non-Economic factors of economic growth.
<b>UNIT II</b>	<b>Theories of development:</b> Role of fisheries in economic development, characteristics of developing and developed economies; theories of development; role of economic, technological, social, cultural, political and environmental factors; interdependence between fisheries and industrial development.
<b>UNIT III</b>	<b>Growth models:</b> Growth models – Harrod - Domar, neo-classical, Von Neumann; development strategies in India; five-year plans and fisheries. Growth analysis, determinants of growth and their measurements.
<b>UNIT IV</b>	<b>Planning:</b> Planning models, features of planning in capitalist, socialist, neosocialist and mixed economies; types of planning - micro level, regional, sectoral, agro eco regional development.
<b>UNIT V</b>	<b>Institutions and policies:</b> Role of non-government organizations (NGOs) and self-help groups (SHGs) in agriculture and fisheries development; characterizing fisheries growth, changes in fishing and farming pattern, decomposition analysis and sources of output growth; transfer of technology - constraints to technology adoption, yield gap analysis and research planning; fisheries information system. Fisheries policy analysis and reforms.
<b>UNIT VI</b>	<b>Food and nutritional security:</b> Concepts of food and nutritional security, production-oriented policies, food price policies, food subsidies, food safety and food quality. Measurement of poverty, poverty alleviation programmes.
<b>Practical</b>	-



<b>Suggested Readings</b>	<ol style="list-style-type: none"><li>1. Chakaravathi RM. 1986. Under Development and Choices in Agriculture. Heritage Publ., New Delhi.</li><li>2. Dewett KK. 2002. Modern Economic Theory. S. Chand &amp; Co.</li><li>3. Dutta and Sundaram Indian economy</li><li>4. H .L.Ahuja Indian Economy</li><li>5. M.L. Jhingan Economics of Development and Planning</li></ol>
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<b>FEC 513</b>	<b>FISHERIES PROJECT MANAGEMENT</b>	<b>1+1</b>
<b>Objective</b>	To highlight the different institutions financing fisheries projects	
<b>Theory</b>		
<b>UNIT I</b>	<b>Finance and management:</b> Sources of long term finance and cost of capital; concepts of components of working capital, managing working capital - cash management, dividend decision; capital budgeting, appraisal criteria.	
<b>UNIT II</b>	<b>Financing system in India:</b> Financing system in India- money and capital markets, national, regional and global financial institutions; insurance; risk management; micro-credit.	
<b>UNIT III</b>	<b>Project formulation:</b> Elements of project cycle: Identification, preparation, appraisal, financing and implementation of projects. Project Appraisal techniques: Undiscounted measures, ranking by inspection, pay-back period, average annual proceeds per unit of outlay, Time value of money	
<b>UNIT IV</b>	<b>Project Evaluation:</b> Identification, preparation, appraisal, financing and implementation of projects. Project Appraisal technique- Undiscounted Measures. Time value of money, Use of discounted measures – B-C ratio, NPV and IRR. Agreements, supervision, monitoring and evaluation phases in appraising fisheries investment projects. Net worth Techniques–PERT and CPM.	
<b>Practical</b>	Rural Lending Programmes of Commercial Banks, Lead Bank Scheme; Insight on District Credit Plan; Preparation of financial statements using farm/firm level data; Farm credit appraisal techniques and farm financial analysis through financial statements; Different case studies on fisheries cooperative societies in India; Visit to marine and inland cooperatives to analyse performance; Practical and Case studies: Ratio analysis, valuation of project inventories; Project appraisal techniques–undiscounted and discounted measures.	
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Chodhury, Project Management Tata McGraw Hill Publishing Company Ltd., New Delhi</li> <li>2. Dhubashi P.R. 1986. <i>Policy and Performance - Agricultural and Rural Development in Post Independent India</i>. Sage Publ.</li> <li>3. FAO Technical Paper No.334, Fisheries Project Formulation, FAO, Roam.</li> <li>4. Gittinger J.P 1982. <i>Economic Analysis of Agricultural Projects</i>. The Johns Hopkins Univ. Press. Gupta S.C. 1987. <i>Development Banking for Rural Development</i>. Deep &amp; Deep Publ.</li> <li>5. Gittinger, J. Price, Economic analysis of Agricultural projects, EDI Series in Economic Development, John Hopkins University Press, Baltimore and London</li> <li>6. Little I.M.D &amp; Mirlees J.A. 1974. <i>Project Appraisal and Planning for Developing Countries</i>. Oxford &amp; IBH Publ.</li> <li>7. Muniraj R. 1987. <i>Farm Finance for Development</i>. Oxford &amp; IBH Publication.</li> <li>8. Shang, Y.C., Aquaculture Economic Analysis – An Introduction, The World of Aquaculture Society Ltd.</li> </ol>	