Multi-Disciplinary Course
based on NEP-2020
SEMESTER-II

(Effective from Session 2025-26)

(Batch: 2025-2028)

SAMBALPUR UNIVERSITY

JYOTI-VIHAR, BURLA, SAMBALPUR, ODISHA-768019

Multi-Disciplinary Course (MDC)

SEMESTER-II

SURVIVAL ANALYSIS AND BIOSTATISTICS

Credits: 3   Lecture: 45 Hour   **Full mark: 100**

Subject Teacher: Statistics.

Course Outcomes

- Understand survival data and censoring and truncation mechanisms
- Estimate survival curves for censored survival data
- Fit survival models using the Cox proportional hazards model
- Evaluate the validity of assumptions underlying the Cox model and modify the Cox model to accommodate time-dependent variables and multiple outcomes
- Understand how to accommodate competing risks and determine the power and sample size requirements for a survival analysis study

Learning Outcomes

This course emphasizes concepts and applications used in public health studies. The product limit estimator, the Cox proportional hazard model, and parametric models will be discussed. Censoring and truncation patterns will also be studied. Model building and checking will be discussed throughout.

UNIT-I

- Survival Analysis: Functions of survival times, survival distributions and their application, Gamma, Weibull, Rayleigh, lognormal, death density function for a distribution having bath-tub shaped hazard function.

- Censoring Schemes: Type I, Type II and progressive or random censoring with biological examples. Estimation of mean and median survival time and variance of the estimator for Type I and Type II censored data with numerical examples. Non- parametric methods: Actuarial and Kaplan-Meier methods for estimating survival function and variance of the Estimator.

UNIT-II

Competing Risk Theory: Indices for measurement of probability of death under competing risks and their inter-relations. Estimation of probabilities of death using maximum likelihood principle and modified minimum Chi-square methods. Theory of independent and dependent risks. Bivariate normal dependent risk model.

UNIT-III

Stochastic Epidemic Models: Simple epidemic models, general epidemic model definition and concept (without derivation). Duration of an epidemic.

UNIT-IV

Statistical Genetics: Introduction, Concepts-Genotype, Phenotype, Dominance, Excessiveness, Linkage and Recombination, Coupling and Repulsion. Mendelian laws of Heredity, Random mating, Genetic Array, relation between genotypic array and genetic array under random mating. Distribution of genotypes under random mating. Clinical Trials: Planning and design of clinical trials, Phase I, II and III trials. Single and double blind experiments.

Text books

Lee, E.T. and Wang, J.W. (2003): Statistical Methods for Survival data Analysis, 3rd Edition, John Wiley and Sons.

Biswas, S. (2007): Applied Stochastic Processes: A Biostatistical and Population-Oriented Approach, Reprinted 2nd Central Edition, New Central Book Agency.

Suggested Readings

Kleinbaum, D.G. (1996): Survival Analysis, Springer.

Chiang, C.L. (1968): Introduction to Stochastic Processes in Biostatistics, John Wiley and Sons.

Indrayan, A. (2008): Medical Biostatistics, 2nd Edition Chapman and Hall/CRC.

Activities to do

1. To estimate survival function
2. To determine death density function and hazard function
3. To identify type of censoring and to estimate survival time for type I censored data
4. To identify type of censoring and to estimate survival time for type II censored data
5. To identify type of censoring and to estimate survival time for progressively type I censored data
6. Estimation of mean survival time and variance of the estimator for type I censored data
7. Estimation of mean survival time and variance of the estimator for type II censored data
8. Estimation of mean survival time and variance of the estimator for progressively type I censored data
9. To estimate the survival function and variance of the estimator using Non- parametric methods with Actuarial methods

10. To estimate the survival function and variance of the estimator using Non- parametric methods with Kaplan-Meier method

11. To estimate Crude probability of death

12. To estimate Net-type I probability of death 13. To estimate Net-type II probability of death

14. To estimate partially crude prob.

APICULTURE

Credits: 3   Lecture: 45 Hour   **Full mark: 100**

Subject Teacher: Zoology.

Objectives

- Provide knowledge on economic aspects of livestock management.
- Make available information on lucrative facets of animal rearing and goods obtained.
- To familiarize with apiculture features

Course Outcomes

- Foundation through skilled learning for entrepreneurship.
- Acquire skills in developing economically viable ventures using bees.
- To know the basic concepts of beekeeping.
- Discern bee species, understand culture techniques, honey harvesting, and the identification and management of diseases and pests.
- Students will be equipped with practical knowledge that can be immediately applied in the field or even used to start their own beekeeping enterprise

Learning Outcomes

- Gain knowledge of the Biology of Bees, their identification, and social structure.
- Acquire skills in rearing bees and honey extraction.
- Identify pests of bees and their control and eradication.
- Skilled learning for entrepreneurship.

Unit 1:

Biology of Bees: Apis and Non-Apis Bee species and their identification. General Morphology of Apis Honey Bees. Social Organization of Bee Colony.

Unit 2:

Rearing of Bees: Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth box, Bee Pasturage,
Selection of Bee Species for Apiculture, Modern Bee Keeping Equipment, Methods of Extraction of Honey (Indigenous and Modern).

Unit 3:

Diseases and Enemies: Bee Diseases and Enemies, Control and Preventive measures

Unit 4:

Bee Economy and Entrepreneurship: Products of Apiculture Industry and their uses- Honey, Bees Wax, Propolis, Pollen. Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens.

SUGGESTED READINGS

- Prost, PJ. 1962. Apiculture, Oxford and IBH, New Delhi.

- Bisht DS. Apiculture, ICAR publication.

GENDER AND EDUCATION

Credits: 3   Lecture: 45 Hour   **Full mark: 100**

Subject Teacher: Education

Learning Outcomes:

After reading this paper, students will:

1. Understand the relationship between gender and education.
2. Get overall idea on educational policies which have incorporated gender.
3. Familiarize with feminist perspective on education, educational content, and pedagogy.
4. Understand and comprehend the inter-linkages between gender and education.
5. Critically evaluate how these inter-linkages operate towards discrimination and exclusion of women.

Unit-I: Introduction to Gender and Education

- Gender Concepts¬Definition of Gender and difference with sex
- Introduction to Gender and Education; Objectives and Aims of Schooling Women
- Nation, Education, and Gender Review of Policies: Kothari Commission, National Education Policy 1986, NEP-2020

Unit-II: Gender Issues & Inequalities in Education

- Gender as the Basis of Inequality in Education; Issue of patriarchy, hierarchy, power, dominance, subjugation and their relation to equality regarding Gender; Barriers to Gender Equality
- Gender Gap in Educational Access: Reasons and Implications Gender Gap in Educational Access: Reasons and Implications, Gap in Educational Access
- Dynamics of gender in the classroom in reference to girl-friendly school, co-education and single-sex schooling

Unit-III: Education from Gender Perspectives

- Developing a Feminist Perspective in Education: Curriculum Analysis
- The Report of the Committee on Status of Women in India (CSWI), The Beijing Platform for Action
- State initiated Policies and Programmes in Education from the perspectives of gender equalities
- Education for Women 's Equality

Transaction Mode

Lecture, Seminar, tutoring, dialogue, peer group discussion, mobile teaching, self-learning, Collaborative learning, Cooperative learning.

References

- Apple, Michael W.& Smith, Christian L.(ed.),(1991)The Politics of the Textbook, Routledge, New York.
- Bhasin, Kamla (1994).What is Patriarchy? Kali for Women, New Delhi
- Bhog, Dipta (2002),Gender and Curriculum,Review of Women Studies, Economic and Political Weekly,37(17):1638-1642
- Chakravarti, Uma (1998).Rewriting History; The Life and Times of Pandita Ramabai. OUP;Delhi.
- Geetha, V.(2002).Gender: Stree; Kolkata.
- Giroux, H.(1981).Ideology,Culture and the Process of Schooling. Falmer Press,London
- Kumar, Krishna (1992, 3rd edition in 2004).What is Worth Teaching, Orient Blackswan, Delhi
- Bhog, Dipta (2002). ‗Gender and Curriculum '. Economic and Political Weekly, 27th April, 37(17).p.1638-1642
- Chakravarti, Uma (1998). ‗Men Women and the Embattled Family', Rewriting History: The Life and Times of Pandita Ramabai. (pp. 200-245) New Delhi: Kali for Women/ Zubaan.
- Government of India (1964-66) Kothari Commission Report, New Delhi. Govt. of India (1986). National Policy on Education. (pp. 1-8). New Delhi: Ministry of Human Resource and Development, Government of India.
- Kalia, N.N (1986). Women and Sexism: Language of Indian School Textbooks, EPW, Vol 21, No. 18 May, 3rd Kishwar, Madhu (1986). ‗Daughters of Aryavarta'. Indian Economic & Social History Review, 23(2), 151-186

CLIMATOLOGY

Credits: 3   Lecture: 45 Hour   Full mark: 100

Subject Teacher: Geography/ Geology

Course Objective:
- To introduce Climate, climate change and its implications.
- To explain climate system and heat budget of earth
- To introduce the mechanism and effects of Monsoon
- To provide an understanding of Atmosphere and Hydrosphere and their circulation patterns

Learning Outcome:
- Describe a systematic observation on Climate and implications of climate change.
- Explain the significance of climate and climate change
- Elaborate the heat budget and the mechanism of monsoon
- Evaluate the various circulation patterns of Atmosphere and Hydrosphere and its impact on climate

Unit - I: Climate system and classification and Climate change

Components of the climate system, Climate controlling factors, Climate system response, response rates and interactions within the climate system. Basis of classification; Koppen's classification; Thorn Thwaite's classification; Brief idea on Types of Climate found in India. Climate forcing and feedbacks.

Unit - II: Heat budget of Earth and Interactions Incoming solar radiation,
receipt and storage of heat; Heat transformation; Earth's heat budget.

Interactions amongst various sources of earth's heat; Monsoon, its mechanism and its intensity influencing factors; Effects of monsoon.

Unit - III: Atmosphere & Hydrosphere

Stratification of atmosphere and atmospheric circulation; Atmosphere-ocean interaction and its effect on climate; Heat transfer in ocean; Global oceanic conveyor belt and its control on earth's climate; Surface and deep circulation.

Activities to do

1. Study of distribution of major climatic regimes of India on map.
2. Distribution of major wind patterns on World map.
3. Ocean currents and heat circulation.

Text Book:

- *Rudiman, W.F., 2001. Earth's climate: past and future. Edition 2, Freeman Publisher.*

Suggested Readings:

- Rohli, R.V. and Vega, A.J., 2007.Climatology. Jones and Barlatt.
- Lutgens, F., Tarbuck, E., and Tasa, D., 2009. The Atmosphere: An Introduction to Meteorology. Pearson Publisher.
- Aguado, E., and Burt, J., 2009. Understanding weather.

VEDIC CULTURE

Credits: 3   Lecture: 45 Hour   **Full mark: 100**

Subject Teacher: Philosophy

Introduction: -

In UG level this program will equip the students to understand the ancient Indian culture & vedic texts. A student will be able to inculcate & develop creative intellectual capabilities & enhance observation power.

Course outcome: -

❖ Widen their perspective about the intellectual heritage of India.

❖ Develop holistic understanding with respect to Vedic thinking.

Unit-I

1. The meaning of Veda, History of Vedic Literatures & main features of Vedic Societies,

2. Relevance of Vedas in Indian culture.

Unit-II

i. Vedic Systems of values

ii. The value of organizations of personal life (Asram)

Text Books: - Vadika Sahitya & Sanskruti- Baladeva Upadhyaya, varanasi

   Vaidika Sahitya O Sanskruti- A.C, Das, Grantha Mandir, Cuttack.

Reference: - Outlines of Indian philosophy- M. Hiriyan

   London: George Allen & Unwin-1952 Fundamentals of Hindusim- SC Chaterjee, Calcutta.

   Indian Philosophy- C.D. Sharma.

   'Indian Philosophy- S. Radhakrishnan, Vol-l.

VIGYAPAN AVADHARANA AUR PRAYOJANMULAK AAYAM

Credits: 3   **Lecture: 45 Hour**   **Full mark: 100**

Subject Teacher: Hindi

Multi Disciplinary Course-II

विज्ञापन अवधारणा और प्रयोजनमूलक आयाम

Credits-3 Full Marks-100 [Continues Evalution 20+Mid Sem.-20+ End. Sem.-60]

Course outcome:

- Students will develop their knowledge about advertisement. In this era making of advertisement has vital role in earning. So that students should know about marketing, brand making, printing and writing articles for radio, newspaper and television.

- Learning Outcome: After reading this paper, students should have:

1. Know about the advertisement, marketing and brand making with sponsored programs.
2. Know about various types of advertisement and advertisement writing for print media, radio and television.
3. Know about the language and speciality of advertisement through hindi language.
4. In making of advertisement they should learn how to write in print media, radio jingle and story book for television.

विज्ञापनः स्वरूप एवं अवधारणा

UNIT-I

(1) विज्ञापन अर्थ व परिभाषा

(II) विज्ञापन का महत्व

(III) विज्ञापन के सामाजिक तथा व्यावसायिक उद्देश्य, मार्केटिंग और ब्रांडनिर्माण

विज्ञापन: विविध माध्यम

UNIT-II

(1) सामान्य परिचय

(2) विज्ञापन माध्यम का चचन

(3) प्रिन्ट, रेडियो एवं टेलीविजन के लिए कॉपी लेखन

विज्ञापन की भाषा

UNIT-III

(1) विज्ञापन की भाषा का स्वरूप

(II) विज्ञापन की भाषागत विशेषताएँ

(III) विज्ञापन की भाषा के विभिन्न पक्ष, सादृश्य विधान, अलंकरण, तुकांतता, समानांतरता, विचलन, मुहावरे, लोकोक्तियाँ, भाषा संकर

(IV) हिंदी विज्ञापनों की भाषा

UNIT-IV

विज्ञापन निर्माण का अभ्यास

(i) प्रिंट माध्यम वर्गीकृत एवं सजावटी विज्ञापन निर्माण

(ii) रेडियो जिंगल लेखन

Meena Soni

FOOD SCIENCE AND PROCESSING

Subject Teacher: Home Science

Credits: 3   Lecture: 45 Hour   **Full mark: 100**

Course Outcome:
CO1**:** The students will get basic knowledge on macro and micro nutrients and different types of food and their nutritional contribution.

CO2**:** The students will gain practical knowledge on market survey and locally available food stuffs from each food group.

Learning Outcome:

- LO1: The students will learn the basic concepts in food, nutrition, and health.
- LO2: The students will gain an insight into the classification, functions, dietary sources, and daily of requirements various nutrients.
- LO3: The students will understand about different food processing and standardization.

Unit -1 Food Science

- Introduction to Food, Nutrition, Nutrients, Nutritional Status, Food Science, Food Additives, Food Fortification, Functional Food, Food Security
- Functions of food
- Food Groups (Five, Seven)

Micro Nutrients and Macro Nutrients

- **Macro Nutrients-** Introduction, Composition, Classification, Functions, Dietary Sources and Daily Requirements and deficiency diseases of Carbohydrates, Proteins, and Fats.
- **Micro Nutrients- (Vitamins and Minerals)**
- Introduction, Composition, Classification, Functions, Dietary Sources and Daily Requirements and Deficiency Diseases of Vitamins. Fat Soluble Vitamins - (A,D,E,K)
- Water Soluble Vitamins- (Thiamine, Riboflavin, Niacin, Folate, Vitamin B12, and Vitamin C)
- Minerals- (Calcium, Iron, Zinc and Iodine)

Unit II- Food Processing

- Food spoilage- factors contributing to food spoilage
- Principles of food preservation

- Preservation by – Low Temperature, High Temperature, by Preservatives, by Osmosis, by Dehydration, by Fermentation, by Irradiation.

Unit III- Food Standardization

- Food Adulteration, Meaning, Types
- Food Laws
- Food Packaging and Labelling, FSSAI, Codex, FPO, MPO, AGMARK, BIS, Specification of different Foods.
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TEXT BOOKS:

1. Sri lakshmi. B, Food Science, New Age International (P) Limited Publishers.
2. Srilakshmi. B, Nutrition Science, New Age International Pvt. Ltd.
3. N. Shakuntala Manay, M. Shadaksharaswamy, Foods Facts and Principles, New Age International (P) Limited Publishers.
4. Swaminathan. M, Advanced Text-Book on Food and Nutrition, Volume 1 and 2, The Bangalore printing and publishing co. LTD.

REFERENCEBOOKS:
1. Bamji MS, Krishna Swamy K. Brahman GNV. Textbook of Human Nutrition, Oxford and IBH publish Co Pvt. Ltd.
2. Norman. N Potter, Joseph H. Hotchkiss, Food Science,5th edition, CBS Publishers, and Distributors.
3. Mudambi S.R and Rajagopal M.V, Fundamentals of foods and Nutrition, New Age International Pvt. Ltd.
4. Gopalan, C. Rama Sastry, B.V., and Balasubramanian, S.C., Nutritive value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad.

MODELQUESTIONS:
1. Name the fat-soluble vitamins. (**One word**)

2. Define Nutrition. **(Maximum 50words)**

3. Discuss about the classification of carbohydrate. **(Maximum 250 words)**

4. Explain the classification and functions of food. **(Maximum 800words)**

FUNDAMENTAL OF ENTREPRENEURSHIP AND E-COMMERCE

Credits: 3   Lecture: 45 Hour   **Full mark: 100**

Subject Teacher- Commerce

Course Objectives:

The course aims to

- Understand the basic concepts and theories of entrepreneurship.
- Identify and evaluate business opportunities in the digital economy.
- Develop skills in creating effective business plans and strategies.
- Gain knowledge of e-commerce platforms and technologies.
- Learn digital marketing techniques for online businesses.
- Understand the legal and ethical considerations in e-commerce.
- Develop critical thinking and problem-solving skills relevant to entrepreneurship and e-commerce.

Course Outcomes

After completion of the course, learners will be able to:

- Understand Entrepreneurship Concepts and Identify Business Opportunities.
- Navigate Legal and Ethical Considerations for E-Commerce Platforms.
- Implement Digital Marketing Strategies.
- Manage and Analyze E-Commerce Performance.
- Develop Growth Strategies.

Unit-1: Introduction to Entrepreneurship

Definition of entrepreneurship, Characteristics of successful entrepreneurs, Importance of entrepreneurship in the economy, Types of entrepreneurship. Opportunity Recognition and Idea Generation; Identifying business opportunities, Idea generation techniques, Market research and analysis, Identifying target markets and customer segments.

Unit-2: Business Planning

Components of a business plan, Writing an executive summary, Marketing plan development, Financial projections and budgeting. Legal and Ethical Considerations; Legal structures for businesses, Intellectual property rights, Ethical considerations in entrepreneurship, Corporate social responsibility.

Unit-3: Introduction to E-Commerce

Definition and scope of e-commerce, Evolution of e-commerce, Types of e-commerce models (B2B, B2C, C2C), E-commerce platforms and technologies. Building an E-Commerce Website; Website design principles, choosing a domain name and hosting provider, Payment gateways and security, User experience optimization. Digital Marketing for E-Commerce; Search engine optimization (SEO), Pay-per-click (PPC) advertising, Social media marketing, E-mail marketing.

Unit-4: E-Commerce Logistics and Fulfilment

Order processing and fulfilment, Inventory management, Shipping and delivery options, Returns and customer service. E-Commerce Analytics and Performance Measurement; Key performance indicators (KPIs) for ecommerce, Web analytics tools, Customer feedback and reviews. Scaling and Growth Strategies; Scaling an ecommerce business, International expansion, Strategic partnerships and collaborations, Exit strategies: mergers, acquisitions, IPOs

Case Studies: Analysis of successful e-commerce ventures

Suggested Readings

- *Singh, K. (2008). Rural Development - Principles, Policies, and Management. New Delhi: Sage Texts.*
- *Samanta, R. K. (2000). New Vista in Rural Development Strategies & Approaches. Delhi: B.R. PublishingCorporation.*
- *Hussain, T., Tahir, M., &Tahir, R. (2017). Fundamentals of Rural Development. New Delhi: I. K.International Publishing House Pvt. Ltd.*
- *Sahu, B. K. (2003). Rural Development in India. New Delhi: Anmol Publications Pvt. Ltd.*
- *Dutta, S. K., &Ghosh, D. K. (2002). Empowering Rural Women. New Delhi: AkanshaPublishing House.*
- *Dutta, S. K., &Ghosh, D. K. (2006). Institutions for Development: The case of Panchayats. New Delhi: MittalPublications.*
- *Agarwala, K. N., Lal, A., &Agarwala, D. (2000). Business on the Net: An Introduction to the whats and hows ofE-commerce. Noida, Uttar Pradesh: Macmillan Publishers India Limited.*
- *Awad, E. M. (2009). Electronic Commerce from vision to fulfillment. Delhi: PHI Learning.*
- *Bajaj, K. K., &Debjani, N. (2005). E-Commerce. New Delhi: Tata McGraw Hill Education.*
- *Chhabra, T.N., Jain, H. C., & Jain, A. An Introduction to HTML. Delhi: DhanpatRai& Co.*
- *Dietel, H. M., Dietel, P. J., &Steinbuhler, K. (2001). E- Business and E- commerce for Managers. New Jersey:Prentice Hall.*
- *Diwan, P., & Sharma, S. (2002). Electronic commerce- A Manager's Guide to E- Business. Delhi: Vanity BooksInternational.*
- *Kosiur, D. (1997). Understanding Electronic Commerce. New Delhi: Prentice Hall of India Pvt. Ltd.*
- *Turban, E., King, D., Lee, J., Warkentin, M., Chung, H. M., & Chung, M. (2002). Electronic Commerce: AManagerial Perspective. New Jersey: Prentice Hall Publishing.*
- *Whiteley, D. (2000). E-Commerce: Strategy, Technologies and Applications. New York: McGraw Hill.*

DEMOGRAPHY

Credits: 3   Lecture: 45 Hour   **Full mark: 100**

Subject Teacher: Economics

Objectives: The main objective of this paper is to make the students aware of the importance of population in economic development. The paper also enlightens the student on the quantitative and the qualitative aspects of the population through various demographic techniques.

Expected outcomes: The students will learn the issues relating to population in economic development and apply the various demographic techniques.

Unit-1: Introduction

LO. Understanding of key concepts of demography as a discipline

Demography: Definition, Nature and Scope; Sources of Demographic Data in India: Census, SRS bulletin, NFHS data & NSSO data; Concepts of population dynamics: Fertility, Mortality and Migration.

Unit -II: Population Dynamics

LO. Computation and Analysis of population dynamics and resultant issues.

Population Growth in India from 1901 to 2011; Crude Birth rate (CBR), Crude Death rate (CDR), Computation of the population growth rate of India using census data, Importance of mid-Year Population; Theory of Demographic Transition and India's Population growth. Migration: interstate migration, international migration (emigration and immigration) concept only. Population composition: Age and Gender composition of population; Sex ratio; Preparation of Population Pyramid.

Unit-III: Mortality

LO. Learning different concepts related mortality and the factors associated

Concepts of Infant mortality rate (IMR), Neonatal mortality rate, under-five mortality rate, maternal mortality rate, age specific mortality rate; Analysis of IMR of India over time and in its major states. Factors of IMR; link of IMR with the life expectancy rate.

Unit-IV: Fertility

LO. Learning different concepts related to fertility and factors associated with fertility rate

CBR vs Fertility rate, Total fertility rate, Gross reproduction rate, Net reproduction rate, age specific fertility rate; inter-state fertility rates in India; factors that influence the fertility rate.

Text Book:

☑ Bhende, A. and Kanitkar T. (2000). Principles of Population Studies, Himalaya Publishing House.

Reference Books:

☑ Pathak, K.B and F. Ram (2016). Techniques of Demographic Analysis, Himalaya Publishing House, Mumbai.

☑ Srinivasan, K (1998). Basic Demographic Techniques and Applications, Sage Publications, New Delhi.