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**Sant Gadge Baba Amravati University**  
**Faculty: Interdisciplinary Studies**  
**Two Years- Four Semesters Master's Degree Programme**  
**NEPv23 (with Exit and Entry Option)**  
**M. Sc Home Science (Food Science and Nutrition) Second Year Semester - III**

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**Part B**

**Syllabus Prescribed for Second Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**  
**Semester III**

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 301	<b>Advancements and Contemporary Research in Food and Nutrition</b> (Contemporary Applied Technological Advancements in Research relevant/supportive to Major)	60

**Course Outcomes**

**After completion of the course students will -**

1. Acquaint with the contemporary research areas in Food Science and Nutrition
2. Apply the online applications for research
3. Understand the process of publication of research

Unit	Content	Periods
Unit I	<b>Newer Concepts and Advancements in Food Science</b> Artificial Intelligence and analytics in food science Food processing robots 3D food printing Cold plasma Radio frequency pasteurization Enzymes in food preservation	10
Unit II	<b>Newer Concepts and Advancements in Nutrition</b> ICMR Dietary Guidelines for Indians 2024 and basis for the revised guidelines Nutrigenomics Personalized Nutrition Protein Concentrates – Vegetables and plant sources Gut Brain Axis and dietary factors	12
Unit III	<b>Research Management Tools</b> Recent sources of secondary data Database online, offline, Patents and Standards etc. Non-Documentary Reference Tools/Sources Literature and review management tools and applications like Mendely, Endnote, Academia education, etc. Online Survey tools- Development and use of Google form and Quiz etc.	12
Unit IV	<b>Advance Analysis tools in Research</b> Free and Open Source Software (FOSS) Statistical Package for Social Sciences (SPSS) Statistical Analysis using Microsoft Excel	14
Unit V	<b>Research Publication</b> Selection of research journal- Impact factor, H Index, Concept and Usage of Copy right and Plagiarism tools and applications Ethics for Publication	12

## Course Material/Learning Resources

### References

- Brace, N; Kemp, R; Snelgar, R (2003) SPSS for Psychologists: A Guide o data Analysis using SPSS for Windows (Second Edition). New York: Palgrave Macmillian.
- Field, A. (2018). Discovering statistics using IBM SPSS statistics. London: SAGE.
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### Websites/weblinks

- <https://icar.org.in/>
- <https://www.homescienceassociationofindia.com/>

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## NEPv23 Syllabus Prescribed for Second Year PG Programme

### Programme: MSc (Home Science) Food Science and Nutrition

#### Semester III

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 302	Clinical Nutrition and Dietetics - III	60

### Course Outcomes

#### After completion of the course students will –

1. Provide nutritional care in the diseases of inborn errors of metabolism and musculoskeletal diseases
2. Apply nutritional knowledge and dietary adjustments for people with hypertension and heart diseases
3. Evaluate and deliberate the dietary requirements of patient suffering from renal disorders

Unit	Contents	Periods
Unit I	Meaning, causes, signs and symptoms, complications, nutritional and dietary considerations of Inborn Errors of Metabolism- Phenylketonuria Maple Syrup Urine syndrome Galactosemia	12
Unit II	Meaning, causes, signs and symptoms, complications, nutritional and dietary considerations of Hypertension and stroke Hyperlipidemia	12
Unit III	Meaning, causes, signs and symptoms, complications, nutritional and dietary considerations of Atherosclerosis and Heart disease – Angina pectoris, Ischemic heart disease, coronary artery disease	12
Unit IV	Meaning, causes, signs and symptoms, complications, nutritional and dietary considerations of Renal Disorders – Glomerulonephritis Nephrotic syndrome Acute Renal Failure Urinary Calculi Chronic Renal Failure	12
Unit V	Meaning, causes, signs and symptoms, complications, nutritional and dietary considerations of Musculoskeletal disorders – Arthritis Gout Osteoporosis	12

## Course Material/Learning Resources

### References

1. Antia F.P. and Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford Publishing Company.
  2. B. Srilakshmi, (2007): Dietetics, published by K.K. Gupta for Newage International Pvt.Ltd. New Delhi.
  3. Benion M.: Clinical Nutrition, Harper and Row Publishing M.Y.
  4. Mahan L.K., Sylvia Escott-Stump (2000): Krause's Food Nutrition and Diet Therapy 10<sup>th</sup> Edition, W.B. Saunders Company London.
  5. Passmore P. and M.A. East Wood: Human Nutrition and Dietetics, Churchill LivingStone.
  6. Raheena M. Begum (1989): A Text Book of Foods Nutrition and Dietetics, Wiley Eastern Ltd., New Delhi.
  7. Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal and Therapeutic Nutrition, Macmillan Publishing Company.
  8. Sue Rodwell Williams, (1993): Nutrition, Diet Therapy, (7<sup>th</sup> Ed): W.B. Saunders Company London.
- Wohlshils and Goodheart: Modern Nutrition in Health and Disease, McLaughlin and Ubrman, Philadelphia

## NEPv23 Syllabus Prescribed for Second Year PG Programme

### Programme: MSc (Home Science) Food Science and Nutrition

#### Semester III

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN303	Nutrition Through Life Span	60

### Course Outcomes

#### After completion of the course students will –

1. Explain the nutritional requirements throughout the stages of the life span including factors which affect food choice, preparation and dietary manipulation.
2. Understand the policies and guidelines to improve health outcomes and reduce health inequalities through the life span
3. Discuss factors affecting of nutrients and nutritional requirements through the life span

Unit	Content	Periods
Unit I	Nutrition in pregnancy - Weight gain during pregnancy and nature of weight gain, Maternal nutrition and fetal outcome, Nutritional needs during pregnancy, Complications of pregnancy and their dietary implications Nutrition in lactation - Physiology of milk production, Hormone controls and reflex action, Nutrition requirements during lactation, Nutritional components of colostrum and mature milk, Problems of breastfeeding, Galactoguges	12
Unit II	Growth and development of infants Infants- weight as the indicator , Feeding premature infants and low birth weight infants, breastfeeding versus bottle feeding Nutrition requirements for infants Supplementary feeding and weaning foods	12
Unit III	Nutrition in preschool children Growth and development of preschool children Food habits of preschool children Nutritional requirements and supplementary foods for preschool children Nutritional problems and feeding programmes	12
Unit IV	Nutrition in early and middle childhood Growth and development of childhood, Food habits nutritional needs and feeding and pack lunch for children Nutrition during Adolescence Physical growth physiological and psychological changes and problems in adolescence, Eating disorders among adolescents	12
Unit V	Nutrition during adulthood - Nutrition work efficiency and nutritional needs Nutritional requirements in geriatrics Factors affecting food intake in Geriatrics, Common nutritional problems in geriatrics, enteral and parenteral feeding for old age people	12

## Course Material/Learning Resources

### References:

1. Ganong. W.F. (1985): Review of Medical Physiology, 12 th Edition, Lange Medical Publication.
2. Bonnie S. Worthington Roberts and Sue Rodwell williams. Nutrition throughout life cycle. McGraw Hill press: Newyork, p. 173-210
3. Individual dietary intakes of different physiological groups, NNMB, Annual report, NIN, 2001
4. Mahan, L.K and Sylvia Escott, Krouses Food, nutrition and diet therapy, W.S. saunders company, 2000

5. Raheena, M. Foods, nutrition and dietetics, sterling publishers, Pvt. Ltd., New Delhi, 2008, p. 173-210
6. Shubhangini, A.J., Nutrition and dietetics, Tata McGraw-Hill publishing company Ltd., New Delhi, 2002, p. 142-173
7. Brown, J. E. (2005). Nutrition Through the Life Cycle. Belmont, California: Thompson Learning, Inc. v
8. B. Srilakshmi, Dietetics, 9th Edition, 2023, New Age International Private Limited
9. B. Srilakshmi, Nutrition Science, 7th Edition, 2021, New Age International Private Limited
10. Nutrient Requirements And Recommended Dietary Allowances For Indians., 2009 A Report of the Expert Group of the Indian Council of Medical Research 2009., National Institute Of Nutrition, ICMR, Jamai-Osmania PO, Hyderabad – 500 604

### NEPv23 Syllabus Prescribed for Second Year PG Programme

#### Programme: MSc (Home Science) Food Science and Nutrition

#### Semester III

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 304A	Food Microbiology	45

#### Course Outcomes

##### After completion of the course students will -

1. Identify the types of microorganisms and explain the food contamination and spoilage
2. Determine the significance of food borne diseases and risk factors associated with food borne illness.
3. Evaluate the importance of hygiene and sanitation related to food and compile the various food standards to maintain the quality of foods.

Unit	Content	Periods
Unit I	General Morphology and Types of microorganisms Bacteria, Fungi, Algae, Yeast and Virus - Bacteriophage Microorganisms in foods Factor affecting multiplication and survival of microorganisms Control of microbial growth in foods	12
Unit II	Food Spoilage- Causes of food spoilage, Role of microbes in food spoilage Factors affecting food spoilage, Changes in foods caused by microbes Contamination in food - Source of contamination, Modes of disease transmission	12
Unit III	Microbial agents of food borne illness Food borne infections and food poisoning, risk factors associated with food borne illness. Bacterial agents of food borne illness – Clostridium botulinum, clostridium perfringens, Escherichia coli, salmonella, shigella, vibrio and staphylococcus aureus. Non-bacterial agents of food borne illness - Toxigenic algae and fungi, Food borne viruses, Helminths, nematodes and protozoa. Control of food borne illnesses	12
Unit IV	Control of Microbes in food Use of antimicrobial chemicals- organic acids, sugars, sodium chloride, nitrites, phosphates, sulphites, benzoates, sorbates / propionates naturally occurring antimicrobials; physical methods- low and high temperatures, drying, radiation and high pressure; tolerance of microbes to chemical and physical methods in various foods.	12
Unit V	Importance of Personal hygiene of food handlers General principles of hygiene – personal and environmental hygiene. Hygienic Practices in Handling and Serving Foods. Planning and implementation of training programme for health personnel. Sanitation – definition, practices	12

#### Course Material/Learning Resources

##### Reference:

1. Conn, E.E., Stumpe, P.K. Bruening G. and Doi, R. H. (2001): 5<sup>th</sup> Ed. Outlines of Biochemistry, John Wiley and Sons.
2. Ranganna S. (1986) Handbook Analysis and Quality Control for Fruit and Vegetable Products. 2<sup>nd</sup> Edition, Tata McGraw Hill publishing Co. Ltd., New Delhi
3. Roday S. (1999) Food Hygiene and Sanitation. 1<sup>st</sup> Edition, Tata McGraw Hill publishing Co. Ltd., New Delhi
4. Chris Bell, Paul Neaves and Anthony Williams (2005) Blackwell publishing
5. William Frazier and Dennis Westhoff (1995) 4<sup>th</sup> Edition, Tata McGraw Hill publishing Co. Ltd., New Delhi
6. Montville, Thomas J. and Karl R. Matthews “ Food Microbiology: An Introduction”. ASM Press, 2005
7. Ray, Bibek and ArunBhunia. “Fundamental Food Microbiology” 4<sup>th</sup> Edition, CRC Press, 2008
8. Pawsey, R. K. “Case Studies in Food Microbiology for Food Safety and Quality”. The Royal Society of Chemistry, 2001.
9. Forsythe, S.J. “The Microbiology of Safe Food”. Blackwell Science, 2000.
10. Doyle, Michael P. “Food Microbiology: Fundamentals and Frontiers”. 2<sup>nd</sup> Edition, ASM Press, 2001.

NEPv23 Syllabus Prescribed for Second Year PG Programme

Programme: MSc (Home Science) Food Science and Nutrition

Semester III

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
FSN 304B	Exercise Physiology and Fitness	45

**Course Outcomes**

After completion of the course students will -

1. Know the muscle physiology and body systems involved for exercise performance
2. Get insight into physical activities and their benefits
3. Learn the nutrition assessment and weight management of athletes

Unit	Content	Periods
Unit I	<b>Muscle Physiology for Performance</b> The Skeletal Muscle, types of muscle contraction Types of muscle fibre, Fibre type transitions and athletic performance Factors determining muscle strength, Muscle fatigue Adaptations of skeletal muscles to exercise training	9
Unit II	<b>The Skeletal system and Cardiopulmonary System</b> Divisions of skeletal system, types of bones, structure and composition of bones Joints, bone and joint disorders Cardiovascular system, cardiac cycle, blood pressure and blood flow The pulmonary system, mechanics of respiration, pulmonary volumes and capacities Cardiopulmonary adaptations to exercises, Effect of training on cardiopulmonary function	9
Unit III	<b>Energy Production and Physical Activity</b> Energy exchange, energy transfer, energy conservation, energy production and utilization Aerobic and anaerobic energy systems, phosphagen system, lactic acid system Physical activity, types of physical activity, determinants of physical activity, benefits of physical activity	9
Unit IV	<b>Exercise</b> Classification of exercise, specific exercises for various health benefits, exercises for strengthening different parts of the body Exercise machines, abdominal machines and other equipments Exercises for various disease conditions	9
Unit V	<b>Nutrition Assessment and Weight Management of Athletes</b> Somatotyping Dietary Assessment Body Composition Assessment Biochemical Assessment Clinical Assessment Body composition and sports performance Weight Management in Athletes	9

**Course Material/Learning Resources**

**Reference:**

- 1 B Shrilakshmi, V Suganthi, C Kalaivani Ashok (2017), Exercise Physiology Fitness and Sports Nutrition, New Age International Publishers
- 2 Ganong. W.F. (1985): Review of Medical Physiology, 12 th Edition, Lange Medical Publication.
- 3 Moran Campell E. J., Dickinson, C.J., Slater, J.D., Edwards, C.R.W. and Sikora, K. (1984): Clinical Physiology, 5 th Edition, ELBS, Blackwell Scientific Publications.
- 4 Guyton. A.C. (1985): Function of the Human Body, 4 th Edition, B. Sanders Company, Philadelphia.
- 5 Guyton. A.C. and Hall. J. B. (1996): Text Book of Medical Physiology, 9 th Edition. W.B. Sanders Company. Prirrr Books (Pvt.) Ltd. Banglore.
- 6 Wilsion. K. J. W. and Waugh. A (1996): Ross and Wilson Anatomy and Physiology in Health and illness. 8 th Edition. Churchill Livingstone.
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- 8 Wilmore, J H and Costill, D L (2004) Physiology of Sport and Exercise. Champaign, Illinois: Human Kinetics
- 9 McArdle, W.D., Katch, F.I. and Katch, V.L. (2007). Exercise Physiology, Energy, Nutrition and Human Performance. Baltimore: Lippincott, Williams &Wilkins

**Websites/Weblinks**

- [www.acsm.org](http://www.acsm.org) American College of Sports Medicine - Physical Fitness  
[www.cdc.gov](http://www.cdc.gov) Centre for Disease Control and Prevention – Nutrition and Physical Fitness  
<http://www.ncbi.nlm.nih.gov/PubMed/> Exercise Physiology

**NEPv23 Syllabus Prescribed for Second Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester III**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 305</b>	<b>Advancements and Contemporary Research in Food and Nutrition</b>	<b>2/Week</b>

**Course Outcomes**

**By the end of the Lab/Practical Course, generally students will -**

1. Acquaint with the current thrust areas of research in Food and Nutrition
2. Apply the online research tools and applications
3. Demonstrate writing research paper

**\* List of Practical/Laboratory Experiments/Activities etc.**

1	Enlist advance research topics in Food and Nutrition (at least 10)
2	List out recent research topics for Food and Nutrition
3	Select a topic and Prepare Google form for Community survey
4	Use online Sample calculator for defined target population
5	Write a draft research paper and check plagiarism by using online software

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<b>FSN 306</b>	<b>Clinical Nutrition and Dietetics – III Practical</b>	<b>2/Week</b>

**Course Outcomes**

**By the end of the Lab/Practical Course, generally students will –**

1. Learn the modification of regular diets for different disease conditions
2. Plan appropriate diets for patients with necessary dietary instructions
3. Prepare the planned diets as per the nutritional requirements and foods to be allowed or avoided

**\* List of Practical/Laboratory Experiments/Activities etc.**

1	Planning and preparation of diets/recipes in Inborn errors of metabolism
2	Planning and preparation of diets in Hypertension
3	Planning and preparation of diets in heart diseases
4	Planning and preparation of diets in the renal disorders
5	Planning and preparation of diets in conditions of musculoskeletal problems

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<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 307</b>	<b>Nutrition Through Life Span Practical</b>	<b>2/Week</b>

**Course Outcomes**

**By the end of the Lab/Practical Course, generally students will -**

1. Learn to develop recipes to meet the nutritional requirements for various physiological conditions
2. Critically evaluate the food habits of school children or adolescents
3. Develop IEC material for lactating mothers
4. \* List of Practical/Laboratory Experiments/Activities etc.

1	Prepare 5 recipes for pregnant women considering the specific nutritional requirements
2	Prepare IEC material on galactogguages and breast feeding
3	Prepare 5 recipes as weaning food and supplementary food using local/regional foods
4	Study the food habits of at least 25 school children or adolescents and prepare reports including factors responsible/influencing the food habits
5	Prepare 5 recipes for geriatric people

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**NEPv23 Syllabus Prescribed for First Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester 1**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 108 A</b>	<b>Food Microbiology Practical</b>	<b>2/Week</b>

**Course Outcomes**

**By the end of the Lab/Practical Course, generally students will -**

1. Learn the methods of microbial assessment of water and food
2. Demonstrate the techniques of isolation of microorganisms
3. Illustrate the keeping quality of milk and milk products

**\* List of Practical/Laboratory Experiments/Activities etc.**

1	Study of common equipments in a microbiology lab
2	Preparation of media and culturing, sub culturing of bacteria.
3	Staining of bacteria: gram-staining and study of colony morphology
4	Isolation of spoilage microbes from bread
5	Study of Shelf life of specific food item- raw, cooked, packaged
6	Assessment of keeping quality of milk and milk products

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**NEPv23 Syllabus Prescribed for Second Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester III**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 308 B</b>	<b>Nutrition and Exercise Physiology Practical</b>	<b>2/Week</b>

**Course Outcomes**

**By the end of the Lab/Practical Course, generally students will -**

- 1 Demonstrate cardiopulmonary response to exercises using tests
- 2 Learn various forms of physical exercises
- 3 Develop skills in nutrition assessment of athletes

**\* List of Practical/Laboratory Experiments/Activities etc.**

1	Record cardiopulmonary response to maximal exercise – Heart rate, stroke volume, cardiac output, VO <sub>2</sub> , systolic and diastolic blood pressure
2	Study various traditional and modern forms of physical exercises (low, medium and high intensity) including aerobic exercises, strengthening exercises, Yoga etc and prepare report
3	Visit to an academic or professional institute to learn about the exercise machines and prepare report
4	Conduct dietary assessment of 10 athletes using various methods
5	Conduct body composition assessment of 5 female and 5 male athletes

**NEPv23 Syllabus Prescribed for Second Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester III**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 309</b>	<b>Research Project Phase-I</b>	<b>2/Week</b>

**Course Outcomes**

After successful completion of the course students will

1. Formulate research topic on thrust areas
2. Draw sample by using appropriate techniques
3. Develop tools of data collection

<b>Unit</b>	<b>Contents</b>	<b>Periods</b>
Unit I	<b>Research Topic</b> -Characteristics of good research -Considerations while Selection of research topic -Defining objectives -Formulation of the hypothesis -Variables of the study	10
Unit II	<b>Literature Review and Sampling</b> -Various referencing procedures -Writing review -Sample and Sampling techniques	10
Unit III	<b>Tools of Data Collection</b> -Research Design -Selection of data collection tool -Preparation of tools of data collection -Checking validity and reliability of the tools -Administration of tools	10

**Practical -**

1. Identify the research areas in communication and extension
2. Statement of research problem/ topic.
3. Collect review in selected variables from print and non-print sources.
4. Find the key words with dictionary meaning write the operational definitions
5. Define the specific objectives of the study.
6. Define variables of the study and their measurements.
7. Design conceptual model of the study.
8. Identify the population of study and prepare sampling plan.
9. Draw the sample by using appropriate sampling techniques.
  10. Develop tools of data collection.
  11. Prepare time plan for the research study and note down facilities required for the study.

**References -**

- Best, John W and Kahn James, V. (1999). Research in Education. 2nd ed. New Delhi: Prentice Hall of India.
  - Busha, Charles H and Harter, Stephen H (1988). Research Methods in Librarianship: Techniques and Interpretations. New York: Academic Press.
  - De Vaus, David (2001). Research Design in Social Research. New Delhi: Sage Publications
  - Trochim, William M (2003). 2nd ed. Research Methods. New Delhi: Biztantra.
  - Bhardwaj, R. S. (1999). Business Statistics. New Delhi: Excel Books.
  - IGNOU Study Material (2005). EEC-13: Elementary Statistical Methods and Survey Techniques, Block 6.
  - Kothari, C.R. (1985). Research Methodology: Methods and Techniques. New Delhi: Wiley Eastern.
  - Young, P. V. (1988). Scientific Social Surveys and Research, Prentice Hall of India: New Delhi.
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Sant Gadge Baba Amravati University

Faculty: Interdisciplinary Studies

Two Years- Four Semesters Master's Degree Programme

NEPv23 with Exit and Entry Option

M. Sc. Home Science (Food Science and Nutrition) Second Year Semester- IV

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NEPv23 Syllabus Prescribed for Second Year PG Programme

Programme: MSc (Home Science) Food Science and Nutrition

Semester 1V

Code of the Course/Subject      Title of the Course/Subject      Total Number of Periods

FSN 401      Food Safety and Quality Control      60

Course Outcomes

After completion of the course students will -

1. Analyze and emphasize the importance of food safety, food quality, food laws and regulations
2. Capable of identifying preservatives and detecting common adulterants in food
3. Perform testing of food quality with subjective and objective tests

Unit	Content	Periods
Unit I	Food Quality - Meaning and definition of food quality Quality factors in foods, indicators of food quality. Meaning, importance and ways of Food Quality Assessment. Enrichment and fortification of food Food Adulteration - Meaning and detection of common adulterants	12
Unit II	Testing of Food Quality: Food Quality meaning and need of food quality testing; Types of evaluation -Subjective and objective. Subjective evaluation methods based on difference rate, sensitivity etc; Objective evaluation methods – tools and instruments used; quality standards for cereal, pulses and legumes, vegetables and fruits, milk, egg and flesh foods, fat and sugar and related products	12
Unit III	Food Safety Concept and importance of safe foods, Importance of sanitation and hygiene in foods Integrated approach to food safety Good hygiene practice (GHP) Good manufacturing practice (GMP) Hazard analysis critical control point (HACCP) Microbial risk assessment Quality management ISO series Total quality management	12
Unit IV	Food Laws and standards International and National food laws, Essential Commodities Act (ECA). Indian Standards Institute (ISI), Bureau of Indian Standards (BIS), AGMARK, Prevention of Food Adulteration Act (PFA), Fruit Products Order(FPO), Food Safety and Standards Bill 2005, Food and Agriculture Organization (FAO) , World Health Organization (WHO), Codex Alimentarius, World Trade Organization (WTO) ,Joint Expert Committee for Food Additives (UN Food and Agriculture Organization and World Health Organization JECFA), Agricultural and Processed Food Products Export Development Authority (APEDA)	12
Unit V	Food Additives and preservatives : Definition of food additives, acid, bases, buffer systems and salt ,chelating agents ,antimicrobial agents, sweeteners, stabilizers and thickeners, fat replacements, firming texturizer, appearance control and clarifying agents, Flavour enhancers, aroma substances. Sugar substitutes, sweetener, antioxidants, Anticaking agents, bleaching agents, protective gases.	12

## Course Material/Learning Resources

### Reference:

1. Gould ,G.W. (1995 ). New Methods of food preservation ,Blackie Academic & professional, London
2. Connor J.M.and Schick W.A.( 1997), Food Processing An Industrial Powerhouse in Transition .Jon Wiley and Son, New york.
3. Stadelman W.J. and Conteril , D.S. (1986) Egg Science and Technology, AVI publishing Co., INC, Westport.
4. Arthey ,D. and Ashurst ,P.R.(1996 ) ,Fruit processing ,Blackie Academic and professional London
5. Phillips ,R.D. and Family J.W. (1989) Protein Quality & Effect of processing, Marcel Dekker,INC, New York.
6. Inglett. G.C. and Munet, L. ( 1980 ), Cereals for Food and Beverages, Academic press, New York.
7. Subbulakshmi, G and Udipi, S. A. (2001). Foods Processing and Preservation, New Delhi: New Age International (P) Ltd. Publishing.
8. Scottsmith and Hui Y.H (Editors) (2004) Food Processing – Principles and Applications London Blackwell Publishing
9. Borvers, J. (1992). Food Theory and Application (2ndEd), New York: Maxwell MacMillan International Edition.
10. Manay, N. S. and Sharaswamy, S. M. (1997). Foods: Facts and Principles New Delhi: New Age International Publishers.

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## NEPv23 Syllabus Prescribed for Second Year PG Programme

### Programme: MSc (Home Science) Food Science and Nutrition

#### Semester 1V

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 402	Trends in Nutrition and Diet Counselling	60

### Course Outcomes

#### After completion of the course students will -

1. Relate the significance of functional foods to disease management
2. Gain knowledge on nutrition support and drug nutrient interactions
3. Comprehend the process of diet counselling

Unit	Content	Periods
Unit I	Functional foods and nutraceuticals – History, definition and classification Functional foods and management of diabetes, cancer and coronary artery disease Probiotics and prebiotics – Gut microbiota, Factors affecting and composition of gut microbiota, examples, characteristics and mechanism of probiotics and prebiotics	12
Unit II	Nutrition Support – Rationale and criteria for nutrition support Enteral and parental nutrition and feeding access Refeeding syndrome, transitional feeding	12
Unit III	Food, nutrient and drug interactions Pharmacological aspects of food drug interactions Effect of food on drug therapy Effect of drugs on food and nutrition	12
Unit IV	Diet counselling – Meaning, importance and need Counselling for change – social behavior and cultural competency Individual client and models for behavioral change, activities that facilitates behavioral change	12
Unit V	Diet Counselling sessions – Ready to Change and Not Ready to Change Counselling sessions Unsure About Change Counselling sessions Resistance Behaviors and potential strategies to modify them	12

## Course Material/Learning Resources

### Reference Books:

1. Antia F.P. and Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford Publishing Company
  2. B. Srilakshmi, (2007): Dietetics, published by K.K. Gupta for New Age International Pvt.Ltd. New Delhi.
  3. Benion M.: Clinical Nutrition, Harper and Row Publishing M.Y.
  4. Gopalan C., Ram Sastri B.V. and Balsubramaniam S.C., (2006) Nutritive Value of Indian Foods, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research.
  5. Mahan L.K., Sylvia Escott-Stump (2000): Krause's Food Nutrition and Diet Therapy 10<sup>th</sup> Edition, W.B. Saunders Company London.
  6. Passmore P. and M.A. East Wood: Human Nutrition and Dietetics, Churchill LivingStone.
  7. Raheena M. Begum (1989): A Text Book of Foods Nutrition and Dietetics, Wiley Eastern Ltd., New Delhi.
  8. Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal and Therapeutic Nutrition, Macmillan Publishing Company.
  9. Sue Rodwell Williams, (1993): Nutrition, Diet Therapy, (7<sup>th</sup> Ed):W.B. Saunders Company London.
  10. Wohlshils and Goodheart: Modern Nutrition in Health and Disease, McLaren and Ubrman, Philadelphia.
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## NEPv23 Syllabus Prescribed for Second Year PG Programme

### Programme: MSc (Home Science) Food Science and Nutrition

#### Semester 1V

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 403	Entrepreneurship in Food	45

#### Course Outcomes

##### After completion of the course students will -

1. Provide conceptual inputs regarding entrepreneurship development in food
2. Sensitize and motivate towards entrepreneurship development
3. Orient and impart knowledge towards identifying and implementing entrepreneurship opportunities

Unit	Content	Periods
Unit I	<b>Food Entrepreneurship</b> Conceptual Framework Concept, need and process in entrepreneurship development Types of enterprise – merits and demerits Role of enterprise in national and global economy	12
Unit II	<b>The Entrepreneur</b> Entrepreneurial motivation – dynamics of motivation Entrepreneurial competency – concepts Developing entrepreneurial competencies – requirements and understanding the process of entrepreneurship development, self awareness, interpersonal skills, creativity, assertiveness, achievement, factors affecting entrepreneur's role	12
Unit III	<b>Launching and Organising an Food Enterprise</b> Environment scanning – information, sources, schemes of assistance, problems Enterprise selection - enterprise, feasibility study, SWOT analysis Resource mobilization – finance, technology, raw material, site and man power Market assessment, costing and quality control	12
Unit IV	<b>Areas of Food Entrepreneurship</b> Production and marketing of value added food products, therapeutic products, low cost nutritious food products, indigenous food products, supplementary foods Consultancy areas – Diet counseling through diet clinics, Health clubs, Services – Catering daily meals, therapeutic diets, packed lunch, meals for various occasions	12
Unit V	<b>Agencies for Development of Entrepreneurship</b> Government of India's policy towards promotion of entrepreneurship reservations and sanctions for small scale sector Role of SSI, Procedures and formalities for setting up SSI Role of banks and other agencies for development of Entrepreneurship	12

#### Course Material/Learning Resources

##### References:

- 1) Hisrich R.D. and Peters M.P. (1995) Entrepreneurship – starting, developing and managing a new enterprise. Richard D. Irwin INC, USA.
  - 2) Meredith C.G. et al (1982) Practice of Entrepreneurship. ILO , Geneva.
  - 3) Deshpande M.V. (1984) Entrepreneurship of small scale industries, concept, growth and management. Deep and Deep Publication D-1/24, R-Garden, New Delhi.
  - 4) Parekh U. and Rao T.V. (1978) Personal Efficacy in Development Entrepreneurship, Learning system. New Delhi.
  - 5) Vasant Desai (1991) Entrepreneurship and Entrepreneur Development, Vol. I, II, III, Himalaya Publishing House.
  - 6) Maratha Chamber of Commerce, Industrial Development of Maharashtra, Latest edition
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Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 404 A	Nutrition Wellness and Fitness	45

**Course Outcomes****After completion of the course students will -**

- 1 Realize the importance of nutrition, wellness and fitness
- 2 Perceive the physical fitness assessment and role of nutrients in exercises
- 3 Get insight into nutrition and fitness in physiological as well as psychological health

Unit	Content	Periods
Unit I	Physical activity and exercise - Importance, Benefits, types Fitness – Concept, Definition, Dimensions, Factors affecting fitness, Benefits Assessment of Physical Activity Level (PAL) – Criterion Methods, objective methods, field tests, direct observations, self reports	12
Unit II	Physical fitness assessment - Tests for Evaluating Physical Fitness Components, Muscular fitness assessment Cardio respiratory fitness – VO2 Max, Effect of training on cardio respiratory fitness, Aerobic exercises to develop cardio respiratory fitness, Tests to estimate cardio respiratory fitness	12
Unit III	Substrate utilization during work Assessment of energy expenditure Direct method on assessment of body composition Indirect method on assessment of body composition Flexibility assessment	12
Unit IV	Diet in exercise - Carbohydrates for exercise, Role of protein and fat in exercise, Role of vitamins and minerals in exercise, Hydration and physical fitness	12
Unit V	Health problems related to physical inactivity Nutrition and fitness during menopause, Nutrition and fitness for elderly and for differently abled, Stress related disorders, Health benefits of yoga and meditation	12

**Course Material/Learning Resources****Reference:**

1. Bishop J.G. 2004, Fitness through Aerobics, Benjamin Cummings, USA
  2. Brown K. M. 2002, Physical Activity and Health: An Interactive Approach, Jones and Baelett Publisher, USA
  3. Katch VL, Katch FI, McArdle WD, Exercise Physiology: Energy, Nutrition, & Human Performance, 2007
  4. Plowman SA, Smith DL, Exercise Physiology: for Health, Fitness, and Performance, 2nd Edition, 2003
  5. Shubhangini A Joshi, 2021, Nutrition and Dietetics with Indian case studies (Nutrition For Fitness and Sports), 5<sup>th</sup> Edition, Tata McGraw Hill Education (India) Private Limited
  6. Srilalshmi B., Suganthi V., Kalaivani Ashok C. 2016, Exercise Physiology, Fitness and Sport Nutrition, 1<sup>st</sup> Edition, New Age International Publishers
  7. Geetanjali Bhide and Subhadra Mandalika, 2018, Nutritional Guidelines for Sportspersons, Jaypee Brothers Medical Publishers
  8. Mahan, L.K, Stump, S, E 2008, Krause's Food, Nutrition and Diet therapy, 13th edition, Saunder's / Elsevierr Publications
  9. A.M. Coulston, C.J. Boushey, Nutrition in the Prevention and Treatment of Disease, Elsevier publications, San Diego, 2012.
  10. Charles Corbin, Gregory Welk, William Corbin and Karen Welk, 2023, Corbin's Concepts of Fitness And Wellness: A Comprehensive Lifestyle Approach, 13th Edition, Mc Graw Hill Publisher
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**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester IV**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b>	<b>Total Number of Periods</b>
<b>FSN 404 B</b>	<b>Sports Nutrition</b>	<b>45</b>

**Course Outcomes**

**After completion of the course students will -**

1. Gain knowledge about the importance of nutrition in sports
2. Comprehend the role of various macronutrients, micronutrients and fluid for athletes
3. Realize the importance of balanced diet and meals for various sport events

<b>Unit</b>	<b>Content</b>	<b>Periods</b>
Unit I	<b>Introduction to Sports Nutrition</b> Definition, History of sports nutrition Importance of nutrition in sports, Organisations working for sports nutrition Recommended dietary allowance for athletes Energy metabolism in athletes, Factors affecting energy requirements of athletes	<b>9</b>
Unit II	Macronutrients in Sports Nutrition Carbohydrates – classifications, functions, maintenance of blood glucose level, metabolism, carbohydrate loading, training, carbohydrate injection and the inflammatory responses, requirements, sources, supplements Proteins - classifications of amino acids and proteins, metabolism, requirements, sources, protein supplements and high protein diets Lipids – functions, metabolism, requirements, sources, high fat diets and athletes performance	<b>9</b>
Unit III	<b>Micronutrients and fluids in Sports Nutrition</b> Minerals and vitamins for athletes Fluid and electrolytes for athletes, distribution of water and electrolytes Water and electrolyte balance in non athletes Fluid balance and thermoregulation, Measuring hydration status Requirements, effect of dehydration, water intoxication, sports drinks	<b>9</b>
Unit IV	<b>Balanced diet for athletes</b> Determinants of food choice Balanced diet, planning balanced diet, diets for athletes, diets for child/ junior athletes, aging athletes, recommendations by NIN and SAI Diet for competition - diet before competition, diets on the competition day, nutrient timing, pre event meals, diets for different Sports Diet related problems of athletes - the female athlete triad, weight control, adjuncts of weight management, travelling athlete, diabetic athletes, disabled athletes GI stress and athletes	<b>9</b>
Unit V	<b>Supplements - Sports foods</b> Creatinine, Beta Alanine, Branched Chain Amino Acids (BCCAs), Omega 3 fatty acids, Beta Hydroxy Beta Methylbutyrate (HMB), Protein supplements Whey protein, Casein, Soya protein Bovine colostrum, Glutamine, Ephedra, Caffeine, Glucuronolactone, Nitric oxide Sodium Bicarbonate, Spirulina, Hormonal supplements, Antioxidants, Herbals, energy gels Meal Replacement Products	<b>9</b>

**Course Material/Learning Resources**

**References:**

1. B Shrilakshmi, V Suganthi, C Kalavani Ashok (2017), Exercise Physiology Fitness and Sports Nutrition, New Age International Publishers
2. Carolyn D. Berdanier, CRC Desk Reference for Nutrition, CRC Press 1998
3. Fink, H., Burgoon, L., & Mikesky, A. (2006). Practical Applications in Sports Nutrition.
4. James Groff, Advanced Nutrition and Human metabolism, Wadsworth 2000.
5. Jones and Bartlett. USA Williams (2005). Nutrition for Health, Fitness, & Sport (7edn) Mc Graw Hill Publication. Newyork
6. Judy A. Driskell & Ira Wolinsky, Sports Nutrition, friends Pub. 2006
7. Manore M and Thompson J. 2000. Sport Nutrition for Health and Performance. Human Kinetics, Windsor, ON. ISBN: 9780873229395.
8. Mark Kern, Sports Nutrition, Taylor & Francis Group 2005
9. Meltzer, S., & Fuller, C. (2005). The Complete Book of Sports Nutrition: A Practical Guide to Eating for Sport. New Holland Publishers. London

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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1V

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 405	Food Safety and Quality Control Practical	2/Week

### Course Outcomes

By the end of the Lab/Practical Course, generally students will –

1. Learn quality control measures as per domestic and international requirements.
2. Conduct subjective evaluation of food
3. Develop understanding of nutritional information on packaged foods and also the standards and certification marks

\* List of Practical/Laboratory Experiments/Activities etc.

1	Subjective evaluation of food using appropriate tests
2	Detection of adulteration in grains, nuts, spices, tea and coffee
3	Detection of adulteration in edible oils, milk and milk products, honey and jaggery
4	Study of nutritional information and ingredients of at least 10 packed food products for preservatives and additives
5	Study of minimum 10 food products for standards of BIS, AGMARK and FSSAI

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## NEPv23 Syllabus Prescribed for Second Year PG Programme

Programme: MSc (Home Science) Food Science and Nutrition

Semester 1V

Course	Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
	FSN 406	Trends in Nutrition and Diet Counselling Practical	2/Week

### Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Use functional foods in disease management
2. Acquaint with the requirements for diet counselling
3. Execute effective diet counselling

\*List of Practical/Laboratory Experiments/Activities etc.

1	Prepare recipes containing functional components for the patients of diabetes, cancers and coronary artery diseases
2	Prepare and exhibit information and/or recipes of probiotic and prebiotic foods
3	Visit to hospitals to observe enteral and parental feeding given to the patients
4	Conduct at least two case studies of patients suffering from any non-communicable disease. Record their medical history, drugs taken, diet history and prepare diet charts to be given along with the foods allowed and avoided
5	Perform diet counselling to the patients selected for case studies

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**NEPv23 Syllabus Prescribed for Second Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester 1V**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 407</b>	<b>Entrepreneurship in Food (Practical)</b>	<b>2/Week</b>

**Course Outcomes**

**By the end of the Lab/Practical Course, generally students will -**

1. Analyze entrepreneurial opportunities in food science and nutrition
2. Learn various funding agencies and their norms for food entrepreneurship
3. Prepare proposal for food entrepreneurship

**\* List of Practical/Laboratory Experiments/Activities etc.**

1	Enlist entrepreneurial opportunities in Food Science and Nutrition
2	Select any enterprise and prepare a report of SWOT analysis.
3	Visit to funding agencies offices for understanding the formalities for registrations and the licenses for enterprise.
4	Prepare and use the business games for development of entrepreneurial qualities.
5	Prepare proposal for food entrepreneurship

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**NEPv23 Syllabus Prescribed for Second Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester 1V**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 408 A</b>	<b>Nutrition Wellness and Fitness Practical</b>	<b>2/Week</b>

**Course Outcomes**

**By the end of the Lab/Practical Course, generally students will -**

1. Use various tests for muscular fitness and cardiorespiratory fitness
2. Learn the the nutrition and physical activities of post-menopausal woman/ elderly/differently abled persons
3. Prepare IEC material on physical activities/exercises/yoga and meditation

**\*List of Practical/Laboratory Experiments/Activities etc.**

1	Assess the Physical Activity Level (PAL) of 5 Adults
2	Measure the muscular fitness and cardiorespiratory fitness using standard tests
3	Record the daily activities and food intake of the subject and calculate energy intake and energy expenditure
4	Conduct 2 case studies on the nutrition and physical activities of post-menopausal woman/elderly/differently abled persons
5	Prepare IEC material on physical activities/exercises/yoga and meditation

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**NEPv23 Syllabus Prescribed for Second Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester 1V**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 408 B</b>	<b>Sports Nutrition Practical</b>	<b>2/Week</b>

**Course Outcomes**

**By the end of the Lab/Practical Course, generally students will –**

1. Learn the commercial supplements for athletes
2. Develop skill in planning and preparation of pre and post event meals
3. Get knowledge about the protein rich recipes and sports drinks for athletes

**\* List of Practical/Laboratory Experiments/Activities etc.**

1	Study ten commercial carbohydrate and protein supplements available for athletes
2	Plan and prepare pre event meal for female and male athletes
3	Plan and prepare post event meal for female and male athletes
4	Prepare at least 5 sports drinks for female and male athletes
5	Prepare protein rich recipes for female and male athletes

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**NEPv23 Syllabus Prescribed for Second Year PG Programme**

**Programme: MSc (Home Science) Food Science and Nutrition**

**Semester 1V**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b> (Laboratory/Practical/practicum/hands-on/Activity)	<b>No. of Periods/Week</b>
<b>FSN 409</b>	<b>Research Project Phase II</b>	<b>2/Week</b>

**Course Outcomes**

**After successful completion of the course students will**

1. Analyse data by using statistical software
2. Present and interpret the analysed data
3. Write research report in scientific format

<b>Unit</b>	<b>Contents</b>	<b>Periods</b>
Unit I	<b>Analysis of Data</b> -Preparation of data for statistical analysis -Nominal and Ordinal Data, Numerical Data -Application of statistical package	10
Unit II	<b>Presentation of Data</b> -Presentation of data <ul style="list-style-type: none"><li>• Text format</li><li>• Tabular format</li><li>• Graphical format</li></ul>	10

Unit III	<b>Research Report</b> -The Structure of the Research Report -Cover page/Title page -Content Page -Preface -Acknowledgements -Introduction -Literature Review -Research Methodology -Thematic Chapters -Conclusion -References and Bibliography -Annexure	10
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### Practical –

1. Edit the collected data for adequacy and completeness.
2. Classify the nominal and ordinal data.
3. Decide the statistical test according to the nature of data
  4. Use software for data analysis.
  5. Prepare table and describe it.
  6. Prepare graphs and figures by using software/ computer
  7. Write preliminary pages.
  8. Write main text in scientific format.
  9. Prepare the draft report.
  10. Check for language, style and layout of the report.
  11. Prepare final report.
  12. Plagiarism check by standard software.

### Guideline for writing Research Project Based on Trends and Issues in

the subject Research Project should consist following chapters:

- Introduction
- Review of Literature
- Methodology/ Materials and methods
- Results and Discussion
- Summary and Conclusion
- Reference (APA style)
- Appendix

### Instructions

- Research project report should be according to standard norms of scientific writing.
- Internal assessment will be on the seminar presentations
  - Before finalization of the topic
  - Mid review
  - Final presentation
- Plagiarism check report is mandatory with report

### References –

- Henn, M., Weinstein, M., and Foard, N. (2006). A Short Introduction to Social Research. London: Sage.
- Khattri, P. (2016). Livelihood Issues in Disaster Context: Case of Floods in Bahraich District of Uttar Pradesh. Unpublished research report submitted to the ICSSR, New Delhi. Writing of the Research Report
- Khattri, P., Joshi, P.C., Minakshi and Guha-Sapir, D. (2012). “Projections of Disaster: Investigations into Visual and Textual Images of Flood in Badaun, Uttar Pradesh”. Anukriti. 2(5).
- Khattri, P., Joshi, P.C., Wind, T., Komproe, I.H. and Guha-Sapir, D. (2012). “Understanding Mental Health as a Function of Social Vulnerabilities in a Disaster Situation: Evidence from Recurrent Flooding in Bahraich District, Uttar Pradesh”. Journal of the Anthropological Survey of India. 61 (1). 109-124.

- Mudgal, V. (2011). "Rural Coverage in The Hindi And English Dailies". Economic and Political Weekly. XLVI(35). Trautmann, T.R. (2007). The Aryan Debate. New Delhi: Oxford University Press.
  - Ripley Brian D.(2004). Statistical Methods Need Software. Netherlands Statistical Society, 27 April 2004. <http://www.stats.ox.ac.uk/pub/bdr/NethStatSoc.pdf> Downloaded 08/11/05
  - Sarma K.V.S. (2001). Statistics made simple- Do it yourself on PC. Prentice-Hall of India: New Delhi.
  - SPSS for Windows Release 11.0. Help Documentation.
  - Wegman Edward J., Solka Jeffrey L. (2005). Statistical Software for Today and Tomorrow. Center for Computational Statistics, George Mason University Fairfax, VA 22030. Downloaded 16/11/05 <http://www.galaxy.gmu.edu/papers/guide.pdf>
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