

**Part B**  
**Syllabus Prescribed for Second Year PG Programme**  
**MSc (Home Science) Food Science and Nutrition**  
**Semester III**

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
FSN301	Research Methodology and Statistical Applications	60

**Course Outcomes**

After completion of the course students will -

1. Know the importance of research in food science and nutrition
2. Construct common data collection tools
3. Develop skills of preparing out line of research work

Unit	Content	Periods
Unit I	Introduction to Research Research – meaning and definition, Importance of research in the developmental context Research process	10
Unit II	Research Design and Sampling Meaning, Basic components of research design and types of research design Concept of Population and Sample, Characteristics of good sample Types and Methods of drawing Sample Probability sampling and Non probability sampling	12
Unit III	Data Collection Concept of data, Types of Data – Qualitative and Quantitative data, Primary and Secondary data Levels of data measurements and characteristics of good measurement Tools of data collection and their uses – Questionnaire, Schedule, Rating scale, Attitude scale Interview – structured and unstructured ·Observation – participant and non participant Attitude scale	12
Unit IV	Descriptive and Inferential Analysis of Data Measures of central tendency-mean, median, mode-arithmetic, mean and its uses Measures of dispersion /variability- range, variance, standard deviation, standard error, coefficient of variation, Kurtosis, skewness Large and Small Sample tests and interpretation Coefficient of correlation, t tests, Z test, F test, ANOVA Application of non parametric tests ·Chi square test, Spearman’s Rank correlation	14
Unit V	Report Writing Basic components of a research report- preliminaries, Introduction , Review of Related Literature, Methodology, Results, Discussion, Conclusion, Summary, Bibliography and Appendices	12

**Course Material/Learning Resources**

**References**

1. Devadas.R., 2000.A Handbook on methodology of Research,Sri Ramakrishna Vidyalaya, Coimbatore,
2. Gupta.S.P., 2002 .Statistical Methods, Sultan Chand & Sons, New Delhi,
3. Srivastava. A.B.L and Sharma K.K., 2003 .Elementary Statistics in Psychology and Education, Sterling Publishers Pvt. ltd.
4. Ingle P.O. Scientific Report Writing. Nagpur, Publisher Sarla P. Ingle
5. Gosh.B.N., 2006. Scientific Methods and Social Research Sterling Publishers Pvt.ltd., New Delhi.
6. Kulbir Singh. S., 2006 Methodology of Research in Education Sterling Publishers Pvt. Ltd., New Delhi.
7. Coolican, H. (2014). Research methods and statistics in psychology (6th ed.). Psychology Press.
8. Kothari, C.R. (2019) Research Methodology: Methods and Techniques. 4th Edition, New Age International Publishers, New Delhi.
9. Bryman A. and Cramer D. (1994) Quantitative Data Analysis for Social Scientist
10. Aravindra Chandra and Saxena T.P. Style Manual for Writin : Thesis, Dissertations and Papers in Social Sciences. New Delhi, Metropolitan Book Co. Pvt. Ltd.

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

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
FSN302	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.
  9. Wohlshils and Goodheart: Modern Nutrition in Health and Disease, McLaughlin and Ubrman, Philadelphia.
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Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN303 A(DSE 1)	Food Microbiology	60

**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., Stumpt. 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.

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Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
FSN303 B (DSE 1)	Food Biotechnology	60

**Course Outcomes**

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

- 1 Get familiar to the fundamentals of food biotechnology
- 2 Use the knowledge of fermentation for various food preparations
- 3 Know the basic requirements for tissue culture to be used in food industry

Unit	Content	Periods
Unit I	Biotechnology - Definition scope and applications, Techniques in food Biotechnology Genomics and proteomics Nutrigenomics - Concepts and applications	12
Unit II	Enzyme technology - Introduction and production of enzymes Applications of enzymes in food industry Immobilized plant cells for production of food flavours and colours Production of food additives and supplements Production of high fructose corn syrup	12
Unit III	Fermentation technology Fermented cereals and legume based products Fermented soy based foods, Fermentation of vegetables and fruits lactic acid Fermentation Fermented milk products - yogurt, buttermilk, cheese Fermentation of meat and fish	12
Unit IV	Microbial products in food Production of fatty acids and amino acids Production of vitamin B12, citric acid, vinegar, riboflavin and xanthan gums Technology for Production of alcoholic beverages Applications of Plant and animal tissue culture in food industry	12
Unit V	Production of single cell protein and importance of SCP Production of yeast and fungal biomass, mushrooms and spirulina cultivation Food industrial wastes and by products - types, sources and characteristics Management of food industrial wastes- utilization, recovery and recycling	12

**Course Material/Learning Resources**

**Reference:**

1. Watson, James D. (2007). Recombinant DNA: genes and genomes: a short course. San Francisco: W.H. Freeman. ISBN0-7167-2866-4.
2. Brown, Terry (2006). Gene cloning and DNA analysis: an introduction. Cambridge, MA: Blackwell Pub. ISBN1-4051 -1121-6.
3. Bader, G. D. & Hogue, W. V. C. in Genomics and Bioinformatics (ed. Sensen, C. W.) 399–413 (Wiley- VCH, Weinheim, 2001)
4. Jamil Momand, Concepts in Bioinformatics and Genomics, Oxford University Press, New York. 2017, ISBN9780199936991
5. Sinosh Skariyachan and Abhilash M, Introduction to Food Biotechnology, 2012, First Edition, CBS Publisher & Distributors P Ltd, New Delhi
6. Nisha Jain, Vijay Singh, Surabhi Sharma Instant Notes in Food Biotechnology, 2011, First Edition, CBS Publisher & Distributors P Ltd, New Delhi
7. Thomas Bernauer, Genes, Trade and Regulation – The Seeds of Conflict in Food Biotechnology, 2016, Princeton University Press
8. V. K. Joshi and R. S. Singh, Food Biotechnology: Principles and Practices, 2013, IK International Publishing House
9. Gustavo F. and Gutierrez-Lopez, Food Science and Food Biotechnology (Food Preservation Technology Series) 1st Edition, 2003, CRC press
10. Kalidas Shetty, Gopinadhan Paliyath, Anthony Pometto and Robert E. Levin, Food Biotechnology, 2005, Second edition, CRC press
11. Carlos Ricardo Soccol, Ashok Pandey and Christian Larroche, Fermentation Process Engineering in Food Industry, 2016, First edition, CRC Press

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Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN303 C (DSE 1)	Approaches in Nutrition	60

**Course Outcomes**

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

- 1 Comprehend the basic approaches in nutrition for development
- 2 Use the proper nutrition approach for awareness in the individual and community
- 3 Prepare the projected and non projected aids according to the necessity

Unit	Content	Periods
Unit I	Participatory learning – Meaning and principles Participatory Approach - Promoting participation, Community participation and mobilization, solutions to the community participation	12
Unit II	Traditional Approach – Meaning and advantages of Instructional approach and folk approaches including folk music, ballad form, puppets, Impact of modern electronic media on folk approaches Efficacy of traditional approaches	12
Unit III	Modern Approaches – Meaning and advantages of Analytical approach, dialogue approach, persuasive approach, and educational games	12
Unit IV	Presentation of traditional and modern approaches as per the set norms Mode of operation of various traditional and modern approaches Role of nutrition and health educator in selecting the approach	12
Unit V	Tools of communication Preparation and presentation of communication tools Projected aids Non projected aids Advantages and disadvantages of projected and non projected aids	12

**Course Material/Learning Resources**

**Reference:**

- 1) Maan, Gurmeet Singh (1987) The Story of Mass Communication :An Indian Perspective. New Delhi, Harnam Publishers.
- 2) Tiwari I.P. (1987) Communication Technology and Development. New Delhi, Ministry of Information and Broadcasting.
- 3) Sharma S.C. (1987) Media Communication and Development. Jaipur, Rawat Publishers.
- 4) Gamble M.W. and Gamble T.K. (1989) Introducing Mass Communication. 2nd Ed. New York, McGraw Hill Book.
- 5) Day P.R. (1977) Methods of Learning Communication Skills. Oxford, Peragamon.
- 6) Hartman, Paul and others (1986) The Mass Media and the Village Life : An Indian Study. New Delhi, Sage Publication.
- 7) Melkote S.R. (1991) Communication for Development in Third World: Theory and Practice. New Delhi, Sage.
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- 9) Scott B. (1986) The Skills of Communication. Aldershot Gower Press.
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Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN304 A (DSE 2)	Public Nutrition	60

**Course Outcomes**

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

1. Perceive the relationship between health and nutrition
2. Know the preventive and therapeutic measures for nutritional problems
3. Make out the association between health and environmental factors

Unit	Content	Periods
Unit I	Concept of Public Health Nutrition: Relationship between health and nutrition. Role of public nutritionist in the health care delivery system. Sectors and public policies relevant to nutrition. National health care delivery system.	12
Unit II	Population Dynamics: Demography, demographic cycle, world population trend, birth rates, death rates, growth rates, Demographic trends in India, age pyramid, sex ratio. Environment and Health: Water : Water pollution, surveillance of drinking water quality Air : Air pollution	12
Unit III	Nutritional Status: Determinants of nutritional status of individual and populations. Factors affecting nutritional status Major Nutritional Problems : Etiology, prevalence, clinical manifestations. Preventive and therapeutic measures of - Macro and micro deficiencies - LBW, PEM, xerophthalmia, nutritional anaemia. Other nutritional problems like lathyrism, aflatoxicosis, alcoholism and fluorosis.	12
Unit IV	National Nutrition Policy Approaches and strategies for improving nutritional status and health. Occupational health planning and management	12
Unit V	Communication for Health Education. Health planning in India. Health Care of the Community Concept of health care, health system, levels of health care	12

**Course Material/Learning Resources**

**Reference:**

1. Anshu Chaturvedi 2017. Nutrition for the Community. Gullybaba Publishing House ISBN: 9789382688433, 9382688439
2. Dash Bijayalakshmi 2016. A Comprehensive Textbook of Community Health Nursing. 1 st Edition, Jaypee Brothers Medical Publishers. ISBN: 9789386056054.
3. Dr. Prabha Bisht 2017. Community Nutrition in India. First Edition, Publisher Star Publications, ISBN: 9789381246795, 9381246793.
4. Sehgal Sal 2016. Text Book of Community Nutrition, Indian Council of Agricultural Research, ISBN: 9788171640744, 9788171640744,
5. Suryatapa Das, 2020. Textbook of Community Nutrition. 4 th Edition: Publisher: Academic Publisher, ISBN: 9789387162532.
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7. Berdanier CD. 4th, Hargrove JL. 1996. Nutrients and gene expression: Clinical Aspects. Boca Raton, FL CRC Press.
8. Bodwell CE. and Erdman JW. 1998. Nutrient Interactions. Marcel Dekker Inc, New York.
9. Chandra RK. 1992. Nutrition Immunology. ARTS Biomedical, New Found land.
10. Shills ME, Olson J, Shike M. and Roos C. 1998. Modern Nutrition in Health and Disease. 9th Edition, Williams and Williams. A. Beverly Co. London.

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Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN304 B (DSE 2)	Nutrition Through Life Span	60

**Course Outcomes**

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

1. Know the influence of nutrition on humans during the different stages of life
2. Disseminate the importance of nutrition in mother and child health
3. Get sensitized with the health and nutritional problems of geriatric people

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, Galactogogues	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**

**Reference:**

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: New York, 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

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Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN304 C (DSE 2)	Nutrition, Wellness and Fitness	60

**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 Sportspeople, Jaypee Brothers Medical Publishers
8. Mahan, L.K., Stump, S.E. 2008, Krause's Food, Nutrition and Diet therapy, 13th edition, Saunders / Elsevier 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, McGraw Hill Publisher



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Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	(No. of Periods/Week)
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<b>FSN305</b>	<b>Research Methodology and Statistical Applications Practical</b>	<b>30</b>
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**Course Outcomes**

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

1. Logically and Critical understanding of the research areas in the subject
2. Create the various forms of data presentation.

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

1	Collect and review the research paper on types of research on the topic related to your specialization
2	Use sampling techniques for drawing probability and non probability sample.
3	Prepare tools for collection of qualitative data.
4	Prepare tools for collection of qualitative data.
5	Practice statistical programs as MS Office or any other software for descriptive and inferential statistics.
6	Prepare Diagrammatic and graphical presentation of data – One dimensional diagrams -Two dimensional diagrams, carto graphs, frequency graphs.
7	Use of Plagiarism check software

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Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	(No. of Periods/Week)
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<b>FSN306</b>	<b>Clinical Nutrition and Dietetics – III Practical</b>	<b>60</b>
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**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 (Laboratory/Practical/practicum/hands-on/Activity)</b>	<b>(No. of Periods/Week)</b>
<b>FSN307A (DSE 3)</b>	<b>Food Microbiology Practical</b>	<b>60</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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<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)</b>	<b>(No. of Periods/Week)</b>
<b>FSN307B (DSE 3)</b>	<b>Food Biotechnology Practical</b>	<b>60</b>

**Course Outcomes**

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

1. Demonstrate biotechnological applications in food
2. Learn the basis for fermentation of food
3. Illustrate the cultivation of mushroom

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

1	Demonstrate the various analytical techniques for monitoring of food quality during processing and storage
2	To use the enzyme technology for application in food
3	To carry out fermentation of food under suitable conditions for consumption Cereals Pulses Vegetables Milk
4	To cultivate edible variety of mushroom
5	Visit food industry concerned with the application of food biotechnology

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<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject (Laboratory/Practical/practicum/hands- on/Activity)</b>	<b>(No. of Periods/Week)</b>
<b>FSN307 C (DSE 3)</b>	<b>Approaches in Nutrition Practical</b>	<b>30</b>

**Course Outcomes**

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

- 1** Initiate the individual and community participation for nutritional awareness
- 2** Learn to choose and implement effective approach for nutrition education
- 3** Develop skills in preparation of projected and non projected aids

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

1	Develop and participate in any one traditional approach
2	Develop educational games related to food and nutrition
3	Prepare different types of puppets – String puppet, rod puppet, shadow puppet and hand puppet
4	Prepare one projected aid
5	Prepare one non projected aid

**MSC (HSC)**

**FOOD SCIENCE AND NUTRITION**

**SEMESTER IV**

**Part B**  
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**MSc (Home Science) Food Science and Nutrition**  
**Semester - IV**

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
FSN401	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**

**References :**

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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Semester- IV**

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
FSN402	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 Living Stone.
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. Wohl Shils and Goodheart: Modern Nutrition in Health and Disease, McLaren and Ubrman, Philadelphia.

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Semester - IV**

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
FSN403	Entrepreneurship Development	60

**Course Outcomes**

After completion of the course students will be able to-

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	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	The Entrepreneur 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	Launching and Organising an Enterprise 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	Areas of Entrepreneurship Production and marketing of products Consultancy areas Services	12
Unit V	Agencies for Development of Entrepreneurship 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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Semester IV**

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands- on/Activity)	(No. of Periods/Week)
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<b>FSN404</b>	<b>Food Safety and Quality Control Practical</b>	<b>60</b>
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**Course Outcomes**

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

1. To learn quality control measures as per domestic and international requirements.
2. To conduct physical, chemical and nutritional analysis of commonly consumed raw and processed foods and the impact of packaging on quality.
3. Be familiar with various tests and standards used for quality assurance used for food safety hazards, contaminants, adulterants, waste management and implementation of HACCP at various food service and industrial units.
- 4.
5. \* 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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Semester - IV**

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands- on/Activity)	(No. of Periods/Week)
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<b>FSN405</b>	<b>Trends in Nutrition and Diet Counselling Practical</b>	<b>60</b>
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**Course 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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Semester -IV**

<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>FSN406</b>	<b>Scientific Writing Practical</b>	<b>50</b>

**Course Outcomes**

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

1. Effectively use the library resources
2. Access OPAC and WEBOPAC
3. Retrieve information and evaluate the resources

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

1	Use of Library - Get acquainted with the- Type of Library (Traditional, modern, digital, virtual) Services provided by Libraries Various sources (Printed and electronic) Technical work (classification, cataloguing) Information retrieval ( i.e. OPAC, WEBOPAC in library software, Library Portal, e-books etc.)
2	Use of Reference manager tool
3	Review, understand and critically evaluate Thesis Research project Abstract

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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>FSN407</b>	<b>Food Product Development Practical</b>	<b>50</b>

**Course Outcomes**

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

1. Develop the food product
2. Test the quality of the developed food product
3. Learn the packing and marketing of the food product

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

1	Food Product Formulation Enhancement of nutritive value, food waste utilization, cost effectiveness, value addition Testing the quality of formulated food/recipes using appropriate evaluation tests – Nutritional, Subjective, Objective, microbiological, keeping quality
2	Packing and marketing of the developed food product Submission of report along with the cost analysis

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Semester –IV**

<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>FSN408</b>	<b>Research Project Based on Trends and Issues in the subject</b>	<b>100</b>

**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