

**P.G. (M.A.-H.Sc.)**

**Food & Nutrition**

**NEP-2020**

**M.A./M.Sc. Home Science Ist, IInd, IIIrd &  
IVth Semester  
Food & Nutrition Course Curriculum  
according to NEP2020**



**Shri Agrasen Kanya P. G. College (An Autonomous)  
Varanasi**

**Shri Agrasen Kanya P. G. College, Varanasi**  
**(An Autonomous Institution)**  
**Structure of Syllabus for the M.A./M.Sc. Home Science**  
**Food & Nutrition**  
**(Credit and Grading System)**

Course Code	Course Title	T/P	Credits	Evaluation (M.M. 100)	
				Internal	External
<b>P.G. Semester I</b>					
FNA130701T	Applied Physiology	T	4	25	75
FNA130702T	Nutritional Biochemistry	T	4	25	75
FNA130703T	Food Science & Experimental Cookery	T	4	25	75
FNA130704T	Research Methods	T	4	25	75
FNA130705P	Practicals related to Theory Papers	P	4		100
FNA130706R	Project Report	PR			
<b>P.G. Semester II</b>					
FNA130801T	Advance in Food Microbiology	T	4	25	75
FNA130802T	Public Nutrition	T	4	25	75
FNA130803T	Assessment of Nutritional Status	T	4	25	75

FNA130804T	Statistics & Computer Application	T	4	25	75
FNA130805P	Practical Related to Theory Papers	P	4		100
FNA130806R	Project Report	PR	4	25	75
C010806M A060806M A010806M	Minor Elective	M	4	25	75
<b>P.G. Semester III</b>					
FNA130901T	Maternal & Child Nutrition	T	4	25	75
FNA130902T	Geriatric Nutrition	T	4	25	75
FNA130903T	Problems in Human Nutrition	T	4	25	75
FNA130904T	Scientific Writing	T	4	25	75
FNA130905P	Practicals related to Theory Papers	P	4		100
FNA130906R	Project Report/ Dissertation	D			
<b>P.G. Semester IV</b>					
FNA130001T	Clinical & Therapeutic Nutrition	T	4	25	75
FNA130002T	Nutrition for Health & Fitness	T	4	25	75
FNA130003T	Sensory Evaluation	T	4	25	75

FNA130004T	Food Safety & Quality Control	T	4	25	75
FNA130005P	Practicals related to theory papers	P	4		100
FNA130006R	Project Report/ Dissertation	D	4		100

**M.A./M.Sc. Ist Semester**  
**Home Science : Food and Nutrition**  
**Paper-I Applied Physiology**

Course Code- FNA130701T

Credits - 4

M.M.- 25+75=100

**Objective :**

This course will enable the students to:

- (i) Advance their understanding of some of the relevant issues and topics of human physiology.
- (ii) Understand alterations of structure and function to various organs and systems in disease conditions.
- (iii) Enable the students to understand the integrated functions of all systems and grounding of nutrition science in physiology.

**Unit – I**

- (i) Cell and Tissues structure and functions

Brief review- cell membrane, transport across cell membrane and intracellular communication. Regulation of cell multiplication.

- (ii) The circulatory system- Blood formation, Composition, blood clotting. Haemostasis, blood group.

Structure and functions of heart and blood vessels. Haemoglobin its composition and function use of blood investigation and diagnosis of specific disorders. Anaemias.

Regulation of cardiac output, blood pressure, heart failure.

## **Unit – II**

(i) The Nervous system- Review of Structure and functions, Organisation of Central Nervous system, Brain and Spinal cord.

(ii) Digestive System

Review of structure and functions of digestive organs. Digesting and absorptive function, role of liver, pancreas and gall bladder..

(iii) The musculo- skeletal system- structure and function of bone, cartilage and connective tissue Disorder of the skeletal system, types of muscles, structure and function.

## **Unit – III**

(i) The Excretory system

(a) Structure and function of nephron, urine formation. Role kidney in maintaining pH of blood.

(b) Water, electrolyte and acid-base balances.

(ii) Sense Organs:

Review of structure and function. Role of skin, eye, ear, nose, tongue in perception of stimuli.

## **Unit – IV**

### **Respiratory System**

(i) Review of structure and functions role of lungs in the exchange of gases. Transport of oxygen and CO<sub>2</sub> role of hemoglobin.

Cardio respiratory response to exercise and physiological effects of training.

(ii) Reproductive System

Reproductive organs, the ovary development of Graffin follicle. The testis, maturation of the sperm, fertilization development of the ovum, implantation, pregnancy, fetal membrane, lactation and its regulation affect of hormones on menstruation.

**References-**

1. Function of Human Body, 4<sup>th</sup> Edition, Guyton, A.C. (1985).
2. Human Physiology (Vol.-I & II), C.C. Chatterjee.
3. Human Physiology, H. M. Mitchell.
4. Physiology for Medical Studies, Harper.
5. Human Physiology, Berst and Taylor.
6. A text book on human physiology, Joslin.
7. Sharir aur Sharir Kriya Vigyan (Hindi), Evlin Pears.
8. Sharir Kriya Vigyan, Vrinda Singh
9. Manav Sharir Kriya Vigyan, Dr. Nitika Agrawal & Dr. Monika Patel

**M.A./M.Sc. Ist Semester**  
**Home Science : Food and Nutrition**  
**Paper-II Nutritional Biochemistry**

Course Code- FNA130702T

Credits - 4

M.M.- 25+75=100

**Objective :**

This course will enable the students to:

- (i) Provide in depth knowledge of the physiological and metabolic role of various nutrients and their interactions in human nutrition.
- (ii) Get an insight into interrelationships between various metabolic pathways.

**Unit-I**

1. Energy: Energy Content of Foods

- Measurements of energy expenditure- BMR, RMR, thermic effect of feeding & physical activity methods of measurement.
- Estimating energy requirement of individual & groups.
- Regulation of energy metabolism : control of food intake, digestion, absorption & body weight.

**Unit – II**

1. Carbohydrates, proteins & lipids : classification, digestion, absorption, transport review
  - Glycemic index of foods

- Function of EFA
- Role of n-3, n-6 fatty acids in health & disease

## 2. Intermediary metabolism

- Carbohydrates, protein, lipids
- Carbohydrates- glycolysis, gluconeogenesis, citric acid cycle
- Lipid-  $\beta$ -oxidation

### **Unit – III**

- Water- Regulation of intra & extra cellular volume, osmolarity water balance & its regulation.
- Minerals- Nutrient, sources, bioavailability, metabolism, function, requirement, RDI/ESA DDI, Deficiency & toxicity, interaction with other nutrients.
- Vitamins- Classification, foods sources
- Biological function, deficiency, toxicity.

### **Unit – IV**

- Hormones- classification, function, hypo & hyper effect, mechanism of hormones.

### **References-**

1. Murray, R. K. Granner, D. K. Mayes, p. a. & rodwell, v. w. (2000), 25<sup>th</sup> edition Harpers Biochemistry, Macmillan Worth Publishing.
2. Nelson, D. L. & Cox, M.M. (2000) 3<sup>rd</sup> edition Lehninger Principles of Biochemistry Macmillan Worth Publisher.

3. Suyer, L. (1998) : 4<sup>th</sup> edition Biochemistry, W.H. Freeman & Company.
4. Conn, E.E. stump, P.K. Brueing G. & Doi, R. H. (2001) : 5 outlines of Biochemistry, John Wiley & sons.
5. Voet, D. Voet, J.G. & Pratt, C.W. (1999) : Fundamentals of Biochemistry.
6. Jain, J. L. Biochemistry
7. Chatwal, Textbook of Biochemistry
8. Sampurna Aahar evam Poshan Vigyan, Dr. Anita Singh
9. Jaiv Rasayaniki, Dr. Pratima Vyas

**M.A./M.Sc. Ist Semester**  
**Home Science : Food and Nutrition**  
**Paper-III : Food Science & Experimental Cookery**

Course Code- FNA130703T

Credits - 4

M.M.- 25+75=100

**Objective :**

This course is designed to:

- (i) Provide an understanding of composition of various food stuffs
- (ii) Familiarise students with changes occurring in various food stuffs as a result of processing and cooking.
- (iii) Enable students to use the theoretical knowledge in various applications and food preparations.

**Unit I**

**Introduction to Food Science:**

- Evaluation of the food industry and Allied industries, preparation development of food science as a discipline.

**Polysaccharides, Sugars and Sweetness:**

- Starch: Structure, gelatinization, methods for following gelatinization changes, characteristics of some food starches. Effect of ingredients and conditions on gelatinization modified food starches.
- Sugars and Sweetener : Sugars, Syrups, Sugar Alcohols, Sugar products.

## **Unit II**

### **Cereals and Cereals Products-**

- Cereal grains structure and composition
- Cereal products
- Flours & flour quality
- Extruded foods, breakfast cereals, wheat germ, puffed and flaked cereals.

### **Pulses and Legumes:**

- Structure, composition, processing Toxic constituents
- Fruits :
- Structure, Fresh and dried, preparation of raw and cooked fruits.

## **Unit III**

### **Vegetables:**

- Classification, structure, methods of cooking, changes occurring during cooking and factors effecting colour and nutrition value of cooking products.
- **Processed Foods:**
- **Milk and milk products :**
- Composition, Physical and properties, Denature, Effects of processing and storage, Dairy products.

## **Unit IV**

### **Meat : Fish, Poultry & Sea Foods-**

Structure, Composition types, tenderizing and effect of cooking.

### **Eggs**

Composition, Structure, Quality and Cooking of eggs

### **Fats, Oils and related products-**

Sources, Composition, effects of composition on fat properties, functional properties of fats and uses in food preparation.

### **Enzymes and leavening agents-**

Nature types and their action.

## **References-**

### **1. Food factors and principles-**

1. N Shakauntala Manay Shadaksharaswamy  
Fundamentals of food and nutrition (Fourth Edition)
2. Sumati R. Mudambi & M. V. Raja Gopal
3. Food Science 05<sup>th</sup> edition- Potter, N. and Hotchkirs, J. H.  
(1990)
4. Present trends in Nutrition- C. Gopalan
5. Sampurna Aahar evam Poshan Vigyan, Dr. Anita Singh

6. Bhartiya khadyano Ke Poshak Mulya, Dr. Anita Singh, Star Publication, Agra
7. Nutritive Value of Indian food, C. Gopalan
8. Paak Kala Kaushal evam Swasth Vyanjano ka vikas, Dr. Anita Singh, Dr. Akriti Mishra, Pratham Sansakaran, 2022, Star Publication, Agra
9. Food Science, B. Srilankshami, IVth Edition, New Age International Publishers, 2018
10. Aahar Vigyan, Dr. Devina Sahay, IInd Edition, 202, New Age International Publishers.
11. Food Facts and Principles, N. Shakuntala Manaya & M. Shadaksharaswamy, IVth Edition, 2023, New Age International Publishers.

**M.A./M.Sc. Ist Semester**  
**Home Science : Food and Nutrition**  
**Paper-IV Research Methods**

Course Code- FNA130704T

Credits - 4

M.M.- 25+75=100

**Objective :**

- (i) To understand the significance of statistics and research methodology in Home Science research.
- (ii) To understand the types, tools and methods of research and develop the ability to construct data gathering instruments appropriate to research design.
- (iii) To understand and apply the appropriate statistical techniques for the measurement scale and design.

**Unit-**

1. Social Research- Concept, Nature, Types of Researches in Home Science.  
  
Methods of Social Research : Induction, deduction, Qualitative, Quantitative, Historical, Comparative and Evaluation and Selection of the Research Problems, Participatory Research.
2. Hypothesis: Concept, Types and Significance,  
  
Research Design : Concept, types and Significance  
  
Sampling : Concept Types and Significance
3. Source of Data Collection – Primary and Secondary, Field and Documentary.

Tools of Data Collection : Interview guide, interview schedule, observation and Questionnaire.

Methods of Data Collection- Interview, questionnaire, Observation, Case study and projective Techniques.

#### 4. Measurement and scaling

Processing of Data

Analysis and interpretation of Data report writing

### **References-**

1. Bhandarkar, P. L. and Wilkinson T.S. : Methodology and Techniques of Social Research, Himalaya Publishing House Mumbai.
2. C.R. Kothari, Research Methodology
3. C.R. Kothari, Shodha Paddyati
4. Manju Patni : Anusandhan Vidhiyan, Star Publications, Agra
5. Mukherjee, R., The Quality of Life, Valuation in Social Research, Saga Publications, New Delhi
6. Jain, Gopal, Research Methodology, Methods, tools and techniques, Mangal Deep Publication, Jaipur (1998)
7. Srivastava, D. N., Anusandhaan Vidhiya, Sahitya Prakashan, Agra
8. Paras Nath Rao, Anusandhaan Parichay.
9. Anita Singh, Dr., Statistics and Computer Application, Star Publication, Agra.

**M.A./M.Sc. Ist Semester**  
**Home Science : Food and Nutrition**  
**Practicals**

Course Code- FNA130705P

Credits - 4

M.M.- 25+75=100

1. To determine the blood group and Rh Factor in a given sample.
2. Determine the sugar and albumin present in human urine.
3. Estimation of nutrients in food stuffs- Protein, fat, starch, calcium & ascorbic acid.
4. To prepare the model of any one- Amino Acid, Fatty acid and carbohydrates.
5. To observe changes during cooking on different food items.
6. Experimental cookery.

**M.A./M.Sc. IInd Semester**  
**Home Science : Food and Nutrition**  
**Paper-I Advance in Food Microbiology**

Course Code- FNA30801T

Credits - 4

M.M.- 25+75=100

**Objective :**

1. Gain deeper knowledge of role of micro-organisms in human and environment.
2. Understand the importance of micro-organism in food spoilage and to learn advanced, techniques used in food preservation.

**Theory Contents-**

**Unit I**

**Introduction to historical developments-** In food preservations, spoilage, infections & legislation

**Introduction to important micro organisms in food-** their primary sources in foods, morphology, cultural characteristics and biochemical activities.

**Factors affective growth of micro organism in food-** Intrinsic & extrinsic parameters that effect microbial growth.

**Methods of isolation & detection of micro organisms in food-**

- Conventional method
- Rapid method (newer technology)

- Immunological methods : Florescent, Antibody, RIA ELISA

## **Unit II**

### **Spoilage of different groups of foods-**

- Cereals & cereals products
- Vegetable & fruits
- Meat & meat products
- Egg and poultry
- Fish & other sea foods
- Milk & milk products
- Canned food

## **Unit III**

### **Food preservation-**

Physical method- drying, freeze-drying, cold storage, heat treatment, irradiation, high pressure processing.

Chemical preservation & natural antimicrobial compound.

Biologically based preservation system & probiotic bacteria

### **Food borne diseases**

- Bacterial food borne disorders
- Viral food borne disorders

## **Unit IV**

### **Food adulteration & Food safety**

- Indicators of food safety & quality microbial criteria of food & their significance.
- The HACCP SYSTEM & food safety used in controlling microbiological hazards.
- Role of members- fermented food & genetically modified foods.

### **References-**

1. Pelezar, M.I. & Reid, R.D. (1993), Microbiology, McGraw Hill book company, New York 5<sup>th</sup> ed.
2. Atlas, M. Ronald (1995), Principles of Microbiology, 1<sup>st</sup> edition Mosby year book inc. Missouri, USA
3. Frazier, W.C. (1988), FOOD MICROBIOLOGY MCGRAW HILL INC. 4<sup>th</sup> ed.
4. Jay, James M., (2000), Modern, J. Microbiology, 2<sup>nd</sup> ed. CBS Pub.
5. Adams, M.R. & M.G. Mass (1995), Food Micro, 1<sup>st</sup> ed, New Age International (P) Ltd.
6. Sukshma Jaivikiya, Dr. Anita Singh, 1<sup>st</sup> edition, Swachhata evam Suraksha, 2011, Star Publications, Agra.

**M.A./M.Sc. IInd Semester**  
**Home Science : Food and Nutrition**  
**Paper-II Public Nutrition**

Course Code- FNA130802T

Credits - 4

M.M.- 25+75=100

**Objectives :**

This course will enable the students to:

- (i) To develop a holistic knowledge base and understanding of the nature of important nutrition problems and their prevention and control for the disadvantaged and upper socio-economic strata in society.
- (ii) Understand the course/determinants and consequences of nutrition problems in society.
- (iii) Develop skills to plant and use IEC.
- (iv) Be familiar with various approaches to nutrition and health interventions, programmes and policies.

**Theory Contents-**

**Unit- I**

**(i) Concept of Public Nutrition-**

Relationship between health and nutrition, Role of public nutritionists in the health care delivery system.

**(ii) Primary Health Care of the Community-**

- National Health Care Delivery System,

- Determinants of Health status
- Indicators of Health

**(iii) Population Dynamics-**

National Population Policy, Small Family Concepts and Characteristics Family Planning.

**(iv) Nutritional Status-**

Determinants of nutritional status of individual and population.

**Unit- II**

**Major Nutritional Problems:**

Etiology, prevalence, clinical manifestation preventive and therapeutic measures of macro and micro-nutrients deficiencies. Other nutritional problems like-

Lathyrism, Dropsy, aflatoxicosis, alcoholism and florosis, over weight, obesity and chronic degenerative diseases.

**Unit- III**

**Improving Health & Nutrition : IEC Approach**

- (i) Concept, Scope, Elements, Models, Process, Approaches and Barriers of Communication.
- (ii) Introduction, aims, objectives and importance of IEC for improving Health and Nutrition.

**Unit- IV**

**Approaches and Strategies for Improving Nutritional Status and Health**

- (i) Health base interventions, food based interventions including fortification and genetic improvement of foods, supplementary feeding, Nutrition education for behaviour change.

(ii) Food and Nutrition security.

(v) National food and nutrition policy, plan of action and programme.  
Programme design, planning, implementation and evaluation.

### **References-**

1. Text book of Preventive and social medicine, new edition, Park and Park.
2. Dietetics, B. Srilakshmi, VIII<sup>th</sup> edition, 2021, New Age International, Publications, New Delhi.
3. Aahar Vigyan Evam Poshan, Dr. Anita Singh, Star Publications, Agra.
4. Aahar Evam Poshan, Dr. Vrinda Singh
5. Upcharatmak Poshan, Dr. Anita Singh, Star Publication, Agra
6. Bhartiya Khaddyano ke Poshan Mulya, Dr. Anita Singh, Star Publication, Agra
7. Nutritive Value of Indian foods, C. Gopalan, New Delhi Publication
8. Nutrition and Dietetics with Indian Case Studies, Shubhangini A. Joshi, M.C. Gram Hill Publication.
9. Prasar Shiksha Evam Sanchar, Dr. Manju Patni & Harpalani, Star Publication, Agra.
10. Prasar Shiksha, Dr. Geeta Pushp Shaw, & Jayas Sheela Shaw, Agrawal Publication, Agra.
11. Prasar Shiksha, Dr. Vrinda Singh, Panchsheel Publication, Agra
12. Community Health Nursing, Guide Book, 1<sup>st</sup> Edition, N.R. Brothers, Indore.

**M.A./M.Sc. IInd Semester**  
**Home Science : Food and Nutrition**  
**Paper-III Assessment of Nutritional Status**

Course Code- FNA130803T

Credits - 4

M.M.- 25+75=100

**Objectives :**

The course is designed to:

- Orient the students with all the important state-of-the-art methodologies applied in nutritional assessment and surveillance of human groups.
- Development specific skills to apply the most widely used methods.

**Contents:**

**Theory:**

**Unit-I**

1. Nutritional assessment as a tool for improving the quality of life of various segments of the population including hospitalized patients.

**Unit-II**

2. Current methodologies of assessment of nutritional status, their interpretation of the following:
  - Food consumption
  - Anthropometry
  - Clinical & Laboratory

- Rapid Assessment & PRA
- Functional indicators such as grip strength, respiratory fitness, Harvard Step test, Squatting test.

### **Unit-III**

3. Nutritional Surveillance- Basic concepts, uses and setting up of surveillance systems.

### **Unit-IV**

4. Monitoring and Evaluation.

### **References-**

1. Jelliffe, D. B. and Jelliffe, E.F.P. (1989), Community Nutritional Assessment, Oxford University Press.
2. Shubhangini A. Joshi, Nutrition and Dietetics with Indian case study.
3. B. Srilakshmi, Dietetics, New Age International (P), Ltd., Publishers, New Delhi.
4. Dr. Prabha Bist & Dr. Preeti Bora, Poshan Stihiti ka Mulyankan, Star Publication, Agra.
5. Dr. Anita Singh, Nutritive Value of Indian Foods, Star Publication, Agra.
6. Nutrient Requirements and Recommended Dietary Allowances for Indians, A Report of the Indian Council of Medical Research.

**M.A./M.Sc. IInd Semester**  
**Home Science : Food and Nutrition**  
**Paper-IV Statistical & Computer Application**

Course Code- FNA130804T

Credits - 4

M.M.- 25+75=100

**Objectives :**

- To understand the role of statistical and computer applications in research.
- To apply statistical techniques to research data for analyzing & interpreting data meaningfully.

**Unit-I : Statistical Analysis:**

- Conceptual understanding of Statistical measures.
- Measurement of central tendency.
- Measurement of variation.
- Skewness and Kurtosis.
- Properties and uses of Binomial and normal distribution.

**Unit-II : Testing of Hypothesis:**

- Type I and Type II errors.
- Levels of significance.

**Unit-III : Parametric- Small and Large Sample Test:**

- Chi square test
- Independence of Attributes 2x2 and RxC contingency tables.

**Unit-IV : Student 't' test:**

Correlation, Coefficient of correlation.

**References:**

1. Mukherjee, R., The Quality of Life, Valuation of Social Research, Sage Publications, New Delhi.
2. Mukherjee, R., Samajik Shodh Evam Sankhiki, Sage Publications, New Delhi.
3. Stranss, A. and Corbin, J., Basis of Qualitative Research, Grounded Theory Procedures and Techniques, Sage Publications, New Delhi.
4. Ojas & Srivastava, Introduction to Computer Application, Sahitya Bhavan, Agra.
5. Anita Singh, Dr. Statistics and Computer Application, Star Publication, Agra

**M.A./M.Sc. IInd Semester**  
**Home Science : Food and Nutrition**  
**Practicals**

Course Code- FNA130805P

Credits - 4

M.M.- 25+75=100

1. Identification of some important microorganism from permanent slides.
2. Demonstration of available rapid methods & diagnostic kits use in identification of microorganism and visit at least two food processing unit.
3. Development of low cost nutritive recipies suitable for various vulnerable groups.
4. Planning and implementation of a project: Identification of a problem area for IEC. Preparation of suitable IEC, material for one to one, group and mass communication including implementation, monitoring and evaluation.
5. Training in all assessment technique applicable for individuals and community.
6. Nutrition Education in Rural Community to improve Nutritional Status. (Field work)

**M.A./M.Sc. IIIrd Semester**  
**Home Science : Food and Nutrition**  
**Paper-I Maternal and Child Nutrition**

Course Code- FNA130901T

Credits - 4

M.M.- 25+75=100

**Objectives :**

This course is designed to enable the students to:

- (i) Understand physiological changes in pregnancy and lactation.
- (ii) Get acquainted with growth and development changes from conception till adolescence.
- (iii) Understand the inter-relationship between nutrition and growth and development during life cycle.

**Theory Contents-**

**Unit- I**

1. Current Nutrition and Health status of woman and children in India.
2. Changing concepts and controversies in maternal and child nutrition.
3. Importance of maternal Nutrition.
  - Importance prior to and during pregnancy.
  - Pre-requisites for successful outcome. Effect of under nutrition on mother-child dyad including pregnancy outcome and maternal and child health- short term and long term.

- Physiology and endocrinology of pregnancy and embryonic and fetal growth and development.
- Nutritional requirements during pregnancy.
- Adolescent pregnancy
- Pregnancy and AIDS
- Intra-uterine growth retardation.
- Complications of pregnancy and management and importance of antenatal care.
- Congenital malformation, fetal alcohol syndrome and gestational diabetes mellitus.

## **Unit-II**

### **4. Lactation-**

- Development of mammary tissue and role of hormones. Physiology and endocrinology of lactation- synthesis of milk components. Let down reflex, role of hormones, lactational amenorrhea, effect of breast feeding on maternal health.
- Human milk composition and factors affecting breastfeeding and fertility, management of lactation. Prenatal breastfeeding skill education. Rooming in, problems- sore nipples, engorged breast, inverted nipples etc.
- Exclusive breastfeeding, baby friendly hospitals initiative, Breast feeding in the age of AIDS

**Unit-III**

5. Infant physiology and the preterm and LBW infants: Implications for feeding and management.
6. Growth and development during infancy, childhood and adolescence.
7. Feeding of infants and children and dietary management.

**Unit-IV**

8. Malnutrition in mothers and children : etiology and management (in brief).
9. Concept of small family, methods of family : planning, merits and demerits.
10. Policies and programmes for promoting maternal and child nutrition and health.

**References-**

1. Park, K., (2000), Park's Textbook of preventive and social medicinal Census reports.
2. National Plan of Action of Nutrition (1995), Food & Nutrition WCD, Govt. of India.
3. National Nutrition Policy (1993), Department of WCD, Govt. of India.
4. B. Srilakshami, Dietetics, New Sage International (P) Ltd., Publishers, New Delhi.
5. Anita Singh, Dr., Aahar Vigyan Evam Poshan, Star Publication, Agra.

6. C. Gopalan, Nutritive Value of Indian Foods, New Delhi.
7. Barker, D.I.P., Mothers, Babies and Health in later life, Churchill Livingstone.
8. Anita Singh, Dr. Bhartiya Khaddyano Ke Poshan Mulya, Star Publication, Agra.
9. Vrinda Singh, Aahar Evam Poshan, Panchsheel Publication, Jaipur.
10. Food facts and Principles, N. Shakuntala Manaya & M. Shadaksharaswamy, IVth Edition, 2023, New Age International Publishers.

**M.A./M.Sc. IIIrd Semester**  
**Home Science : Food and Nutrition**  
**Paper-II Geriatric Nutrition**

Course Code- FNA130902T

Credits - 4

M.M.- 25+75=100

**Objectives :**

The course is designed to:

- Familiarise the students with the multifaceted aspects of aging.
- Make the students component for nutritional and health care of the elderly.

**Theory Contents-**

**Unit- I**

1. The Ageing process-physiological, biochemical and body composition changes.
2. Theories of ageing.

**Unit- II**

1. Socio-Psychological aspects of ageing- special problems of elderly women.

**Unit- III**

1. Nutritional requirements of the elderly and dietary arrangement to meet nutritional needs.

**Unit- IV**

1. Chronic degenerative diseases and nutritional problems of the elderly then etiopathogenesis management, prevention and control.

2. Policies and programmes of the government and NGO sector pertaining to the elderly.

### **References-**

1. Kumar, V. (1996), Ageing- Indian Perspective and Global Scenario. International Symposium of Gerontology and Seventh Conference of the Gerontology (India).
2. B. Srilakshmi, Dietetics, New Age International (P) Limited, Publisher, New Delhi.
3. Vrinda Singh, Aahar Evam Poshan, Panchsheel Publication, Jaipur.
4. Bagchi, K. and Puri, S. (ed) (1999), Diet and Aging-Exploring Some facts, Sec. for Gerontological Research, New Delhi and Help Age India, New Delhi.
5. Sharma, O.P. (ed) (1999), Geriatric Care in India-Geriatrics and Gerontology : A Textbook, M/s ANB Publisher.
6. Binstock, R. H. and E. Shanes (Eds) (1986), Handbook of Aging and Social Sciences V. N. Reinhold Co., New York.
7. Chowdhry Paul, D. (1992), Aging and the Aged, Inter India Publication, New Delhi.

### **Journals-**

1. Gerontology
2. Age Aging
3. Age

**M.A./M.Sc. IIIrd Semester**  
**Home Science : Food and Nutrition**  
**Paper-III Problems in Human Nutrition**

Course Code- FNA130903T

Credits - 4

M.M.- 25+75=100

**Objectives :**

The course is aimed at providing and understanding of:

- Nutritional problems/nutrition- related diseases prevalent among the affluent and the less privileged groups, with reference to their incidence, etiology and public health significance.
- Biochemical and clinical manifestations, preventive and therapeutic measures of the same.

**Theory Contents-**

**Unit-I :**

1. Historical background, prevalence, etiology biochemical and clinical manifestations, preventive and therapeutic measures for the following.

- PEM
- Vitamin A deficiency
- Nutritional Anemias

**Unit-II :**

- IDD
- Rickets, Osteomalacia and osteoporosis
- Fluorosis

**Unit-III :**

Historical background, prevalence, etiology, biochemical and clinical manifestations, preventive and therapeutic measures for-

- Obesity and overweight
- Diabetes mellitus

**Unit-IV :**

- CHD
- Cancer

**References-**

1. McCollum, E.V. (1957), History of Nutrition, Houghton Mcfflin Co.
2. Beaton, G.H. and Bengoa, J.M. (Eds.) (1976), Nutrition in Preventive Medicine, WHO.
3. Gopalan, C. (Ed) (1993), Recent Trends in Nutrition, Oxford University Press.
4. Bamji, M.S., Rao, P.N. and Reddy, V. (Eds) (1996), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd.
5. UNICEFF's State of the World's Children.
6. WHO Reports, Monographs and Technical Report Series.
7. B. Srilakshmi : Dietetics, New Age International (P) Ltd., Publisher, New Delhi.
8. Vrinda Singh, Aahar Evam Poshan, Panchsheel Publication, Jaipur.

9. Park & Park, Text Book of Preventive and Social Medicine, New Delhi.

**Journals:**

- World Review of Nutrition and Dietetics, Karger.
- Annual Reviews of Nutrition, Palo Alto, California, U.S.A.
- Nutrition Update Series.
- The Journal of Nutrition

**M.A./M.Sc. IIIrd Semester**  
**Home Science : Food and Nutrition**  
**Paper-IV Scientific Writing**

Course Code- FNA130904T

Credits - 4

M.M.- 25+75=100

**Objectives :**

- To be able to appreciate and understand importance of writing scientifically.
- To develop competence in writing and abstracting skills.

**Theory Contents-**

**Unit-I :**

**Scientific writing as a means of communication**

- Different forms of scientific writing
- Articles in journals
- Research notes and reports
- Review articles
- Monographs
- Dissertation
- Bibliography
- Book chapter and articles

**Unit-II : Outlines:**

- Concept, Importance, objectives, types.

**Unit-III : General principle of writing**

- Preparing a text for submission and publication
- Drafting
- Proof reading
- Brevity and precision
- Concepts of preface
- Appendix
- Notes (end and footnotes), glossary
- Prologue and epilogue
- Bibliography (annotated) and references cited
- Review and index

**Unit-IV : Dissertation/Research Reports/Thesis**

- Introduction
- Review of Literature
- Research design
- Results and discussion
- Summary
- Abstracts
- References/bibliography
- Justification and recommendation

**References-**

1. Dr. Manju Patni, Vagyanik Lekh, Star Publications, Agra.
2. Prof. M.P. Gupta, Anusandhan Sandarshika, Sharda Pustak Bhavan, Allahabad.
3. Stenberg, R.J., The Psychologist's companion, A Guide to Scientific Writing for Students & Researchers, Cambridge, Cup.

**M.A./M.Sc. IIIrd Semester**  
**Home Science : Food and Nutrition**  
**Practicals**

Course Code- FNA130905P

Credits - 4

M.M.- 25+75=100

1. To prepare a scrape book on maternal and child nutrition.
2. Development of low cost receipes for pregnant ladies, lactating mothers, infants, childhood and adolescents.
3. Planning and preparation of diets for the elderly in healthy and sick condition.
4. Case studies on an elderly person.
5. Therapeutic diets for multiple disease conditions like- PEM, Vitamin 'A' deficiency IDD, overweight & obesity, diabetes, CHD and Cancer.

**M.A./M.Sc. IVth Semester**  
**Home Science : Food and Nutrition**  
**Paper-I Clinical and Therapeutic Nutrition**

Course Code- FNA130001T

Credits - 4

M.M.- 25+75=100

**Objectives :**

The course will enable students to:

- Understand the etiology, physiologic and metabolic anomalies of acute and chronic disease and patient need.
- Know the effect of the various diseases on nutritional status and nutritional and dietary requirements.
- Be able to recommend and provide appropriate nutritional care for prevention and treatment of the various diseases.

**Contents:**

**Unit-I**

- Nutritional screening and assessment of nutritional status of hospitalized and outdoor patients. Identification of high risk patients. Assessment of patient needs based on interpretation of patient data-clinical, biochemical, bio-physical, personal etc.
- New trends in delivery of nutritional care and dietary counseling.

**Unit-II**

- Diet, nutrition and drug interaction, effect of drugs on ingestion, digestion, absorption and metabolism of nutrients. Effect of food, nutrients and nutritional status on drug dosage and efficacy.

- Nutritional support- recent advances in techniques & feeding substrates.

### **Unit-III**

Complication, prevention and recent advances in the medical nutritional management of:

- Weight imbalances
- Cardio vascular disorders
- Diabetes mellitus and other metabolic disorders.
- GIT Disorders
- Stress and trauma

### **Unit- IV**

Complication, prevention and recent advances in the medical nutritional management of:

- Cancer
- Neurological disorders
- Musculo- skeletal disorders
- Immuno- deficiency disorders.
- Genetic disorders and inborn errors of metabolism.
- Infections and AIDS
- Respiratory problems

**References-**

1. Mahan, L.K. and Escott, Stump, S. (2000), Krause's Food Nutrition and Diet Therapy, 10<sup>th</sup> Edition, W.B. Saunders Ltd.
2. Garrow, J.S. James, W.P.t. and Ralph, A. (2000), Human Nutrition and Dietetics, 19<sup>th</sup> Edition, Churchill Rivingstone.
3. Williams, S.R. (1993), Nutrition and Diet Therapy, 7<sup>th</sup> Edition, Times Mirror/Mosby College Publishing.
4. Guyton, A.C. and Hall, J.E. (1999), Textbook of Medical Physiology, 9<sup>th</sup> Edition, W. B. Saunders Co.
5. Park & Park, Text book, Preventive and Social Medicine, New Delhi, New Edition.
6. B. Srilakshmi, Dietetics, New Age International (P.) Limited, Publisher, New Delhi.
7. Vrinda Singh, Aahar evam Poshan, Panchsheel Publication, Jaipur

**M.A./M.Sc. IVth Semester**  
**Home Science : Food and Nutrition**  
**Paper-II Nutrition for Health and Fitness**

Course Code- FNA130002T

Credits - 4

M.M.- 25+75=100

**Objectives :**

The course will enable students to:

- Understand the components of health and fitness and the role of nutrition in these.
- Make nutritional, dietary and physical activity recommendations to achieve fitness and well-being.
- Develop ability to evaluate fitness and well-being.

**Contents:**

**Unit-I**

1. Definitions, Components and assessment criteria of age: specific times and health status.
2. Holistic approach to the management of fitness and health: Energy input and output diet and exercise. Effect of specific nutrients on work performance and physical fitness, nutrition, exercise, physical fitness and health inter relationship.

**Unit-II**

1. Nutrition in sports : Sports specific requirement. Diet manipulation programme and post-game meals, Assessment of different nutrigenic

aids and commercial supplements, diets for persons with high energy requirements stresses, fracture and injury.

2. Water and electrolyte balance : Losses and their replenishment during exercise and sports events effect of dehydration, sports drinks.

### **Unit-III**

1. Significance of physical fitness and nutrition in the prevention and management of weight control, obesity, diabetes meletus, CV disorders, bone heath a cancer.
2. Nutrition and exercise regimes for management of obesity. Critical review of various dietary regimes for weight and fat reduction, prevention of weight cycling.

### **Unit-IV**

1. Nutrition and exercise regimes for pre and postnatal fitness.
2. Alternative systems for health and fitness like ayurveda, yoga, dimidiation, vegetarianism and traditional diets.

### **References-**

1. Mohan, L.K. and Escott, Stump, S. (2000), Krouse's food nutrition and Diet Therapy, 10<sup>th</sup> Edition, W.B. Saunders Ltd.
2. Sizer, F. and Lubitvey, E. (2000), Nutrition- Concepts and controversies, Edition, WadsWorth Thomson learning.
3. Shils, M.E., Olson, J.A., Shike, N. and Ross, A.C. (Ed.) (1999), Modern nutrition in Health and Disease, 9<sup>th</sup> Edition, Williams and Wilkins.

4. B. Srilakshmi, Dietetics, New Age International (P.) Limited, Publisher, New Delhi.
5. Vrinda Singh, Aahar evam Poshan, Panchsheel Publication, Jaipur
6. Shubhangini A. Joshi, Nutrition and Dietetics with Indian case studies.

**M.A./M.Sc. IVth Semester**  
**Home Science : Food and Nutrition**  
**Paper-III Sensory Evaluation**

Course Code- FNA130003T

Credits - 4

M.M.- 25+75=100

**Objectives :**

This course aims to:

- Provide adequate theoretical background and understanding about sensory evaluation of food.
- Enable students to use various sensory methods for evaluating variety of foods.
- Enable students to analyse and interpret sensory evaluation data.

**Contents:**

**Unit-I**

1. Introduction to sensory analysis and uses of sensory tests.
2. Neural networks in sensory perception.
3. General testing conditions.
4. Selection of test subjects and training of panel.

**Unit-II**

Types of tests-

5. Discrimination/difference tests: Paired test, triangle test and duo-trio test; tests for multiple samples, difference from control/reference.

- Quantitative Difference tests: ranking, numerical scoring test, magnitude estimation.
- Descriptive tests: Rating for sensory profile, consensus profiling, conventional profiling, free choice profiling.
- Threshold tests.
- Acceptance test: Monadic, paired and sequential monadic.

### **Unit-III**

6. Descriptive analysis, concept alignment and selection of terms.
7. Designing of questionnaire and/or evaluation scorecard.

### **Unit-IV**

8. Experimental design and data analysis
9. Statistical applications and interpretations.
10. Consumer Acceptability using sensory evaluation.

### **References-**

1. Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992), Guidelines for Sensory Analysis in Food Product Development and Quality Control, Chapman and Hall, London.
2. Amerine, M.A.; Pangborn, A.M.; Roessler, E.B. (1965), Principles of Sensory Evaluation, Academic Press, New York.
3. Kapsalis, J.G. (1987), Objective Methods in Food Quality Assessment, CRC Press, Florida.
4. Martens, M.; Dalen, G.A.; Russwurm, H. (eds) (1987), Flavour Science and Technology. John Wiley and Sons, Chichester.

5. Moskowitz, H.A. (eds) (1987), Food Texture, Instrumental and Sensory Measurement, Marcel Dekker Inc. New York.
6. Lawless, H.T. and Klein, B.P. (1991), Sensory Science Theory and Applications in Foods, Marcel Dekker Inc.
7. Jellinek, G. (1985), Sensory Evaluation of Food Theory and Practice, Ellis Horwood, Chichester.
8. Piggott, J.R. (ed) (1988), Sensory Analysis of Foods, Elsevier Applied Science, London.
9. Mllgaard, M.; Civille, G.V.; Carr, B.T. (1987), Sensory Evaluation Techniques, Vols. I and II, CRC Press, Florida.
10. Moskowitz, H.R. (1983), Product Testing and Sensory Evaluation of Foods, Marketing and R&D approaches, Food and Nutrition Press, Connecticut.
11. Moskowitz, H.R. (1985), New Directions for Product Testing and Sensory Analysis of Foods, Food and Nutrition Press, Connecticut.
12. O'Mahony, M. (1986), Sensory Evaluation Practices, Academic Press, London.
13. Thomson, D.M.H. (1988), Food Acceptability, Elsevier Applied Science, London.
14. Watts, S.M., Ylimaki, G.L., Jeffery, L.E. and Elias, L.G. (1989), Basic Sensory Methods for Food Evaluation. The International Development Research Centre, Ottawa, Canada.
15. Askar, A. and Treptow (1993), Quality Assurance in Tropical Fruit Processing, Springer- Verlag, New York.

16. ASTM (1968 to 1981), Special Technical Publications, American Society for Testing and Materials, Philadelphia.
17. Ball. A.D. and Buckwell, G.D. (1986), Work Out Statistics: 'A' level, MacMillan, London.
18. BSI (1975 to 1989) BS 5098 & BS 5929: Publications of British Standards Institution, London.
19. Resurrecion, A.V.A. (1998), Consumer Sensory Testing for Product Development, Aspen Publishers Inc., Guthersburg, Maryland, USA.
20. BIS 6273 (1972) Guide for Sensory Evaluation of foods, Optimum Requirement, Part I, Bureau, of Indian Standards, Manate Bhavan, New Delhi.

**M.A./M.Sc. IVth Semester**  
**Home Science : Food and Nutrition**  
**Paper-IV Food Safety and Quality Control**

Course Code- FNA130004T

Credits - 4

M.M.- 25+75=100

**Objectives :**

This course will enable students to:

Know the importance of quality assurance in food industry.

Know the various tests and standards for quality assessment and food safety.

Know the various tests used to detect food adulterants.

Be familiar with the fundamentals that should be considered for successful quality control programme.

**Contents**

**Unit-I**

Introduction to quality assurance and food safety assurance. Current concepts of quality control.

Quality Costs: Measurement and Analysis.

**Unit-II**

Quality assurance programme: Quality plan, documentation of records, product standards.

Product and purchase specifications, process control and HACCP, hygiene and housekeeping, corrective action, quality and programme and total quality process.

### **Unit-III**

#### Product Evaluation:

- Sampling for product evaluation and line control  
Statistical quality and process control
- Specifications and food standards. International, National -  
Mandatory, Voluntary
- Sample preparation
- Reporting results and reliability of analysis
- Tests for specific raw food ingredients and processed. Foods  
including additives:
  - a. Proximate principles
  - b. Nutrient analysis
  - c. Quality parameters and tests of adulterants

### **Unit-IV**

- Packaging- Concept, Definition, Significance, classification.
- Law and Regulations- FDA, PFA, packaging commodity rules.  
Weight and Measurement Act etc.

### **References-**

1. Early, R. (1995), Guide to Quality Management Systems for the  
Food Industry, Blackie, Academic and Professional, London.
2. Gould, W.A. and Gould, R.W. (1988), Total Quality Assurance  
for the Food Industries, CTI Publications Inc. Baltimore.

3. Pomeranz, Y. and MeLoan, C.E. (1996), Food Analysis: Theory and Practice, CBS Publishers and Distributor, New Delhi.
4. Askar, A. and Treptow, H. (1993), Quality Assurance in Tropical Fruit Processing, Springer - Verlag, Berlin.
5. World Health Organisation (1998), Guidelines for drinking water quality, 2<sup>nd</sup> Edition, Vols. 1, 2 & 3, Geneva.
6. Marth. E.H. (1978), Standard Methods for the Examination of Dairy Products 14<sup>th</sup> ed or edition. Interdisciplinary Books and Periodicals, Washington, D.C.
7. Ranganna, S. (1986), Handbook of Analysis and Quality Control for Fruit and Vegetable Products, 2<sup>nd</sup> edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
8. Hagstad, H.V. and Hubbert, N. T. (1986), Food Quality Control, Foods of Animal Origin, Iowa State University Press, AMES.
9. Nielsen, S.S. (1994), Introduction to the Chemical Analysis of Foods, Jones and Barttet Publishers, Boston.
10. James, C.S. (1995), Analytical Chemistry of Foods, Blackie Academic and Professional (Chapman and Hall), Madras.
11. Bryan, F.L. (1992), Hazard Analysis Critical Control Point Evaluations, A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage, World Health Organisation, Geneva.
12. Kirk, R.S. and Sawyer, R. (1991), Pearson's Composition and Analysis of Foods, Longman Scientific and Technical, 9<sup>th</sup> Edition, England.

13. Food and Agricultural Organisation (1980), Manuals of Food Quality Control, 2 Additives Contaminants Techniques, Rome.
14. Bureau of Indian Standards: Specifications and Standard Methods.
15. Herschderfer (1987), Quality Control in Food Industry, Food Science and Technology, A series of Monographs, Academic Press, London.

**M.A./M.Sc. IVth Semester**  
**Home Science : Food and Nutrition**  
**Practicals**

Course Code- FNA130005P

Credits - 4

M.M.- 25+75=100

1. Commonly used tests for diagnosis of various disease system wise. Interpretation of patient data and diagnostic test and drawing up of patient diet prescription, using a case study approach.
2. Planning and preparation of diets for patients with common multiple disorders & complications and discharge diet plans.
3. To current reviews on new trends for physical fitness.
4. Visit to health clubs.
5. Planning a sensory experiment-
  1. Designing the questionnaire and score card.
  2. Identifying descriptors.
  3. Designing sensory testing facilities. Permanent and temporary
6. Conducting the test-

Preparing samples, presenting samples, using reference samples, reducing panel response error, consumer oriental tests, shelf life studies, product matching, product mapping and Taint investigation and prevention.
7. To detect adulteration in different foods.
8. To be familiar with tests used for quality control.

**M.A./M.Sc. IVth Semester**  
**Home Science : Food and Nutrition**  
**Dissertation**

Course Code- FNA130006R

M.M.- 100

The M.A./M.Sc. Home Science, Food & Nutrition Dissertation have to be submitted at the end of the final year. The research project exposure helps students to gain some real-time experience on what they're doing or learning and how to do that.