

# **NATIONAL EDUCATION POLICY-2020**



**Syllabus Structure  
of  
M.Sc. HOME SCIENCE (FOODS and NUTRITION)  
2023-24**

**Sri Dev Suman Uttarakhand University  
Badshahithol, Tehri (Garhwal)**

*Sri Dev Suman Uttarakhand University Badshahithaul (Tehri Garhwal)*

**M.Sc. Home Science (Foods and Nutrition) - NEP -2020**

The objectives of the present M.Sc. Home Science (Foods and Nutrition) course are:

- M.Sc. Home Science programs aim to deepen students' understanding of the various aspects of Home Science through advanced coursework and research. Students gain specialized knowledge in their chosen area of concentration, such as food and nutrition.
- Throughout the program, students are encouraged to think critically, analyze complex problems, and propose innovative solutions. They develop problem-solving skills that can be applied to real-life situations related to nutrition.
- The programs often emphasize the development of leadership and management skills. Graduates are equipped with the ability to plan, organize, and execute projects, whether it's managing a research study, designing a community program, or leading a team in a professional setting.
- Communication skills, both written and oral, are vital in the field of Home Science. M.Sc. programs typically provide opportunities for students to enhance their communication abilities through presentations, seminars, research papers, and collaborative projects.

**GENERAL INSTRUCTIONS**

- The duration of the course Master of Science in Home Science (Foods and Nutrition) shall be of two years.
- In each year, students have to opt for the papers according to the University norms.
- Passing marks for the theory paper and practical is 36 per cent.
- 80 % attendance of the student is mandatory in the course.
- Each theory and practical papers will be of 100 marks, which includes 75 marks external and 25 marks for internal evaluation.

**INSTRUCTIONS FOR PRACTICAL**

- 80 % attendance of the student is mandatory in the practical.
- Practical record file must be maintained by the student. Record file must be duly signed by the concerned teacher of the department.
- The students have to submit the practical record file to the Department/ College, for record documentation.
- The practical exam will be held on the date fixed by the University.
- The sum of practical exam marks will be forwarded to University jointly by the external and internal examiner.

**Structure of the Question Paper : As per University norms**

**Proposed Syllabus for M.Sc. HOME SCIENCE (FOODS & NUTRITION)**  
**under**  
**NATIONAL EDUCATION POLICY- 2020**

		Subject 1	Subject 2	Subject 3	Subject 4	Practical	Subject 5	Research project/ industrial training/ survey work	Minimum Credits for the year	(Cumulative minimum credits ) required for award of certificate/ Diploma/ Degree
		Major 1	Major 2	Major 3	Major 4	Major	Minor	Major		
		4/5/6 credits	4/5/6 credits	4/5/6 credits	4/5/6 credits	4/5/6 credits	3 credits	4 credits		
year	sem	Own Faculty	Own Faculty	Own Faculty	Own Faculty	Own Faculty	Own/ Other Faculty	Inter/Intra Faculty related to main subject		
1	1	Advanced Human Nutrition	Advanced Food Science	Food Preservation & Processing	Research Methods and Statistics	(Practical) Food Processing and Preservation Technology	Nutrition through Life Cycle  *	Research project/ industrial training/ survey work	28	<b>Bachelor (Research) in Home Science (52)</b>
	2	Food Sanitation and Hygiene	Clinical Nutrition -I	Advanced Human Physiology	Public Health Nutrition	(Practical) Physiology of Human Body and Nutrition Education		Research project/ industrial training/ survey work	24	
2	3	Food microbiology and Food Safety	Clinical Nutrition - II	Assesment of Nutritional Status	Nutrition in Emergencies and Disasters	(Practical) Assesment of Nutritional Status and Clinical Nutrition	--	Research project/ industrial training/ survey work	24	<b>Master in Home Science (Foods and Nutrition) (48)</b>
	4	Institutional Food Management	Food Analysis	Food Chemistry	Nutritional Epidemiology	(Practical) Food Service Management & Food Analysis	--	Research project/ industrial training/ survey work	24	

### SEMESTER-VII

Course Code	Course Title	L-T-P	Credits
BHS-701	Advanced Human Nutrition	4-0-0	4
BHS-702	Advanced Food Science	4-0-0	4
BHS-703	Food Processing & Laws	4-0-0	4
BHS-704	Research Methods and Statistics.	4-0-0	4
BHS-705	<b>Practical</b> (Food Processing and Preservation Technology)	0-0-4	4
BHS-706	Nutrition through Life Span* (Minor Elective)	4-0-0	4
BHS-707	Seminar	0-0-4	4
	<b>Total</b>	<b>28</b>	<b>28</b>

### SEMESTER-VIII

Course Code	Course Title	L-T-P	Credits
BHS-801	Food Sanitation and Hygiene	4-0-0	4
BHS-802	Clinical Nutrition- 1	4-0-0	4
BHS-803	Advanced Human Physiology	4-0-0	4
BHS-804	Public Health Nutrition	4-0-0	4
BHS-805	<b>Practical</b> (Physiology of human body and nutrition education.)	0-0-4	4
BHS-806	Survey	0-0-4	4
	<b>Total</b>	<b>24</b>	<b>24</b>

### SEMESTER-IX

Course Code	Course Title	L-T-P	Credits
MFN-901	Food Microbiology and Food Safety	4-0-0	4
MFN-902	Clinical Nutrition- 2	4-0-0	4
MFN-903	Assessment of Nutritional Status	4-0-0	4
MFN-904	Nutrition in Emergencies and Disasters	4-0-0	4
MFN-905	Practical (Assessment of Nutritional Status)	0-0-4	4
MFN-906	Dissertation	0-0-4	4
	<b>Total</b>	<b>24</b>	<b>24</b>

## SEMESTER-X

<b>Course Code</b>	<b>Course Title</b>	<b>L-T-P</b>	<b>Credits</b>
MFN-10-01	Institutional Food Management	4-0-0	4
MFN-10-02	Food Analysis	4-0-0	4
MFN-10-03	Food Chemistry	4-0-0	4
MFN-10-04	Nutritional Epidemiology	4-0-0	4
MFN-10-05	<b>Practical</b> (Food Service Management & Food Analysis )	0-0-4	4
MFN-10-06	Industrial Training	0-0-4	4
	<b>Total</b>	<b>24</b>	<b>24</b>

## **(BHS-701) Advanced Human Nutrition**

### **Course Outcomes-**

Students will learn about food and its relationship to health, development, and disease. Topics covered include: Components of food (carbohydrates, fats, proteins, vitamins and minerals), their digestion, absorption, transport, and metabolism, their sources in foods, effects of deficiency or excess, and the biological roles they play in the body.

Units	Course details
Unit 1	<b>Energy:</b> Energy content of foods. Body composition, Physiological fuel value, Measurement of Energy Expenditure: BMR, RMR, Thermic effect of feeding and physical activity, RDA Estimating energy requirement for individuals and groups, Food groups, Balanced diet, Exchange list
Unit 2	<b>Carbohydrates:</b> Type, Source, Function, Dietary requirements and physiological significance. Glycaemic index of foods. <b>Proteins:</b> Type, Source, Function, Dietary requirements. Evaluation methods and improvement of protein quality. PEM.
Unit 3	<b>Lipids:</b> Type, Source, Function, Dietary requirements, EFA, Transport of lipoprotein, Prostaglandins. <b>Water:</b> Regulation of intra and extra cellular volume, Electrolyte balance, Osmolality, Water balance and its regulation, Oral dehydration therapy. <b>Vitamins:</b> Type, Source, Function, Dietary requirements, Deficiency and Toxicity of Fat soluble and Water soluble vitamins.
Unit 4	<b>Minerals:</b> (Note: for each nutrient sources, bio availability, metabolism, function, RDI, deficiency and toxicity, interactions with other nutrients are to be discussed). Macro minerals: calcium, phosphorus, magnesium, sodium, potassium and chloride. Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride. Trace minerals: selenium, cobalt, chromium.

### **Reference Books**

- Bamji, M.S., Rao, N.P & Reddy, V. (1996). Textbook of Human Nutrition. Oxford & IBH Publishing Co. (P). Ltd. Delhi.
- Gopalan, G. RamaShastri B.V & Balasuvramnian, S.C. (2000). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad 500-007, India.
- Sri Lakshmi, B. (2000). Nutrition Science. New Age International (P) Ltd. Pub. New Delhi
- Swaminathan, M. (2009). Textbook of Food and Nutrition. Bappco publishers, Bangalore.

## (BHS-702) Advanced Food Science

### Course Outcomes-

- Understand advanced concepts in food science and their applications in the food industry.
- Demonstrate knowledge of food chemistry, biochemistry, processing, and preservation techniques.
- Evaluate and analyse emerging trends and technologies in food science.
- Apply critical thinking and problem-solving skills to address complex issues in food science.

Units	Course details
Unit 1	<b>Introduction to Food Science.</b> Effect of cooking and processing techniques on nutrients, Sensory evaluation of food. <b>Cereals, Millets and Pulses:</b> Composition and nutritive value, Cereal cookery, Effect of cooking, processing and storage in nutritive value. Methods for improving nutritional quality of foods-fermentation, germination, supplementation, fortification.
Unit 2	<b>Vegetables and Fruits-</b> Type, Composition, Nutritive value, Effect of cooking, processing and storage on pigments and nutritive value, Post-harvest changes. <b>Milk and milk products-</b> Nutritional composition, Properties, Processing, Storage and Packaging. Effects of heat, acid and enzyme on its quality, Milk Cookery. <b>Sugar:</b> Type, Function and Nutritional composition of sugar. Sugar cookery.
Unit 3	<b>Egg-</b> Structure and Nutritional composition of egg, Evaluation of egg quality, Egg cookery. <b>Flesh Food-</b> Type, Structure and Nutritional composition, Effect of cooking, processing and storage in nutritive value. Ageing, Tenderization, Curing.
Unit 4	<b>Fats and Oils-</b> Type, Nutritive value and Function. Its role and importance. <b>Beverages and Spices-</b> Classification and Importance. Food toxins, Food Additives, Adulterants, Preservatives, Packaging.

### Reference Books-

- Manay, M. and Manay, S.N. (2014). Food Facts and Principles. New Age International (P) Limited, New Delhi.
- Meyer, .L.H (1987). Food Chemistry. CBS Publishers.
- Srilakshmi, B. (2015). Food Science. New Age International (P) Limited, New

## **(BHS-703) Food Processing & Laws**

**Objectives-** The course aims to provide students with knowledge and understanding of various aspects related to food processing techniques, food safety regulations, and laws governing the food industry.

### Course outcomes:

- Students will have the understanding food processing techniques. Gain knowledge of different food processing methods and technologies.
- Gain an understanding of food laws and regulations at the local, national, and international levels.
- Learn about food labeling requirements, including nutritional labeling, ingredient listing, and allergen declarations. Explore regulations related to food additives, food contaminants, and food packaging.
- Understand the role of regulatory authorities in enforcing food safety standards and ensuring compliance.

Units	Course details
Unit 1	Fundamentals of Food Processing- Concept, classification and principles of food preservation and Prospects for future growth in India.
Unit 2	Food adulteration, foods commonly adulterated, common adulterants and their classification and harmful effects, methods for detection of some adulterant.
Unit 3	Food Safety, Laws and Standards – <ul style="list-style-type: none"> <li>• Hazard Analysis and Critical Control Points (HACCP)</li> <li>• Good Manufacturing Practices (GMP).</li> <li>• Good Hygienic Practices (GHP).</li> <li>• International Organisation for Standardization (ISO).</li> <li>• Essential Commodities Act.</li> <li>• Codex Alimentarius</li> <li>• World Trade Organisation (WTO).</li> <li>• Technical Barrier to Trades (TBT).</li> <li>• Sanitary Phyto-Sanitary (SPS) rules</li> </ul>
Unit 4	Food Safety, Laws and Standards – <ul style="list-style-type: none"> <li>• Bureau of Indian Standards (BIS).</li> <li>• Food Safety and Standard (Amendment) Bill 2020.</li> <li>• AGMARK, Food Safety and Standards Act, 2006 (FSSA).</li> <li>• Prevention of Food Adulteration Act (PFA).</li> <li>• Milk and Milk Products Order (MMPO).</li> <li>• Meat Food Products Order (MFPO).</li> <li>• Fruits Products Order (FPO).</li> <li>• Food safety and standard Regulation 2011.</li> </ul>

### **Reference Books**

1. Sareen S. Gropper, Jack L. Smith, James L. Groff (2009). Advanced Nutrition and Human Metabolism, 5<sup>th</sup> Edition, Thomson Wordsworth Publication, USA.
2. Shils, M.E., Olson, J., Shike, M. and Roos, C (2006). Modern Nutrition in Health and Disease, 9<sup>th</sup> edition Williams and Williams. A Beverly Co. London.
3. Carolyn D. Berdanier, Janos Zempleni (2009). Advanced Nutrition Macronutrients, Micronutrients and metabolism. CRC Press Taylor & Francis Group, LLC.



## **(BHS-704) Research methods and statistics**

**Objective:** To develop the skills on statistical methods and to understand data analysis for writing up a dissertation/ thesis/research article.

### **Learning Outcomes:**

- Students will have a thorough understanding the arrangement of data to draw an analytical conclusion.
- The students will know the importance of various methods to design the research work. Students will have a thorough understanding on relation, deviation and accuracy of their experimental data.
- The students will know the importance of research work and have some contribution towards science.

Units	Course details
Unit 1	Research: - meaning, concept, definition, need of research. Research approach: - Problem oriented and interdisciplinary. Types of research: - historic survey, experimental and case study.
Unit 2	Definition and identification of research problem:- problem identification, hypothesis formulation, basic assumption and limitation of research problem.
Unit 3	Sampling: - types of sample, selection of sample, Data Collection Techniques:- Cross sectional, longitudinal, questionnaire, survey, case studies, interview schedule, observation, lab- techniques.
Unit 4	Editing of Statistical Data; -classification, tabulation and frequency distribution of data. role of statistics in research. Measure of central tendency: mean, median, mode. Measure of dispersion: standard deviation. Probability, normal distribution and use of normal distribution and probability tables. t-test for small sample, use of computer for analysis of data and Report Writing.

### **Reference books**

- Bandarkar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of Social Research, Himalaya Publishing House, Mumbai.
- Copper, H.M. (2002). Intergrating research : A guide for literature reviews (2nd Edition). California: Sage
- Harman, E & Montages, I. (Eds.) (2007). The thesis and the book, New Delhi : Vistar.
- Mukherjee, R. (1989): The Quality of Life: Valuation in School Research, Sage Publications, New Delhi.
- Fellows, P. J. (2016). Food Processing Technology: Principles and Practice, Fourth Edition, Woodhead Publishing.
- Kiron Prabhakar (2016). A Practical Guide to Food Laws and Regulations, Bloomsbury Professional, India.

## **(BHS-705) Practical (Food Processing and Preservation Technology)**

### **Course outcomes:**

- Acquire practical skills in various food preservation techniques such as canning, freezing, drying, and fermentation.
- Understand the principles of food quality control and packaging in food preservation.
- Apply appropriate food preservation methods for different types of food products.
- Evaluate the effectiveness of food preservation techniques in maintaining food quality and safety.

Units	Course details
Unit 1	Blanching and browning control Preparation of vegetable preserves (pickle)
Unit 2	Dehydrated products – vegetables dices tray drying, osmotic dehydration of seasonal fruit. Fruit pulping / juice / beverage preparation Preparation and standardization of traditional Indian fermented foods
Unit 3	<b>A. Product Development and Standardization</b> <ul style="list-style-type: none"><li>• Cereal and Pulse Based Foods</li><li>• Fruit Juices, Squash and Jams</li><li>• Pickles, Ketchup, Sauce</li><li>• Weaning Foods</li><li>• Convenience foods, RTS, and RTE foods</li><li>• Healthy Bakery foods</li></ul>
Unit 4	<b>Marketing of a Food Product</b> <ul style="list-style-type: none"><li>• Selection of a Product, Preparation, Standardization, and Cooking</li><li>• Selection of Packaging Material, Labeling, Cost Calculation, and Marketing</li><li>• Presentation of Report</li></ul>

## **(BHS-706) Nutrition through Life Cycle\* (Minor Elective)**

### **Course outcomes:**

- Identify and explain the nutritional requirements and considerations at different stages of life.
- Apply the principles of maternal, child, adolescent, adult, and elderly nutrition in practice.
- Evaluate the impact of nutrition on health and development at different life stages.
- Develop nutritional interventions and strategies for optimizing health and well-being across the life cycle.

Units	Course details
Unit 1	Principles of meal planning: Food group and food exchange list, factor affecting meal planning and food related behaviour, method of assessment of nutrient requirements, dietary guidelines for Indians, RDA.
Unit 2	Nutrition during childhood : Growth and development, growth reference/ standards, RDA, nutritional guidelines, nutritional concerns and healthy food choices for infants, preschool children, school children and adolescence.
Unit 3	Nutrition during adulthood: RDA, physiological changes, nutritional guidelines nutritional concerns and healthy food choices for adults and elderly.
Unit 4	Nutrition during pregnancy and lactation: RDA, physiological changes, nutritional guidelines nutritional concerns and healthy food choices for pregnant and lactation mothers.

### **Reference Books**

- Nutrition and Dietetics: B. Srilakshmi, New age international.
- Life Cycle Nutrition: Sari Edelstein, Jones and Bartlette Publishers Inc
- Fundamentals of Food, Nutrition and Diet Therapy: Sumati R Mudambi and MVRajagopal, New age international
- Textbook of Human Nutrition: Anjana Agarwal and Shobha A Udipi, Jaypee brothers Medical Publishers(P) Ltd.
- Textbook of Nutrition and Dietetics: Kumud Khanna, Sharda Gupta and *et.al.*

## **Seminar**

Seminars are an excellent way for M.Sc. Foods and Nutrition students to learn about new developments in the field, network with professionals, and gain new skills. Students are expected to prepare a presentation on current research in the fields of Food and Nutrition, Dietetics, and food and nutrition policy, Food hygiene, sanitation, etc.

## **(BHS-801) Food Hygiene and Sanitation**

### Learning Outcomes:

- Understand the principles of food safety, hygiene, and sanitation.
- Identify common microbiological hazards in food and their prevention measures.
- Implement Good Manufacturing Practices (GMP) and Hazard Analysis Critical Control Points (HACCP) for ensuring food safety.
- Demonstrate knowledge of foodborne illnesses and their prevention strategies.
- Comply with food safety regulations and guidelines.

Units	Course details
Unit 1	Meaning and principle of food hygiene and sanitation. Sources of water supply and contamination: treatment of water for Quality control.
Unit 2	a. Food Hygiene - Contamination of food from various sources (Plant and animal foods, man and animal, sewage, soil, air and water and their hazards). b. Food Spoilage- perishable, semi- perishable and non- perishable foods. c. Source, incubation period, mechanism of action, prevention and control of- d. Food poisoning caused by Bacteria: <i>Botulism intoxication, staphylococcus poisoning, salmonella and clostridiumperfringens</i>
Unit 3	. Food Born illness- Food born infection and food born intoxications. Food born infection – source, incubation period, mechanism of action, prevention and control.
Unit 4	Sanitary equipments and utensils, sanitary storage of foods, Sanitary procedures for preparing and holding food: General Principles.

### Reference Books

- Roday, S.2011. Food hygiene and sanitation with case studies. Tata Mc Grewhill Education.425p.
- Adams M.K. and Moss M.O.2000. Food Microbiology, New Delhi: Panima Corp.
- Longree K.L. and Blaker G.C.192. Sanitary Techniques in Food Service. New York: John Wiley and Sons.

## **(BHS-802) Clinical Nutrition- 1**

**Objective:** To develop the skills for human health science, to learn about diets and eating that is complimentary to different health conditions or illnesses.

**Learning Outcomes:**

- Students will have a thorough understanding that includes a general description of a clinical disorder, relevant data (laboratory, anthropometric and pharmacology).
- The students will know the importance of diet often recommended for clients who have a range of conditions from food allergies, to heart disease and cancer etc.
- Students will have a thorough understanding on recommended diet for optimal health and to maintain an appropriate level of nutrients in the body.

Units	Course details
Unit 1	<b>Introduction to Clinical Nutrition and Dietetics;</b> Definition and role of dietitian in Health Care; The Nutritional Care Process (NCP) - Nutrition assessment, Nutrition diagnosis, Nutrition intervention, Nutrition monitoring and evaluation, Documentation
Unit 2	Types of therapeutic diets. Mode of feeding- oral feeding, tube or enteral feeding, peripheral vein feeding, total parenteral nutrition.
Unit 3	Food allergies and food intolerance- diagnosis process, treatment, management and prevention. Nutritional management of eating disorders- anorexia nervosa, bulimia nervosa, binge eating, management of eating disorders.
Unit 4	Nutrition during - <ul style="list-style-type: none"><li>• stress,</li><li>• Surgery</li><li>• Burns- classification</li><li>• Trauma</li><li>• Sepsis.</li></ul> Basic concepts of Nutrient and drug interaction, effect of drugs on nutritional status, drug and drug interaction, clinical significance and risk factors for drug-nutrient interaction, guidelines to lower risk and wise use of drugs.

### **Reference Books**

- Anderson L., Dibble M. V., Turkki P. R., Mitchel H. S. & Rynbergen H. 1982. Nutrition in Health and Disease. JB Lippincott Co.
- ICMR 1998. Recommended Dietary Allowance for Indians. ICMR.
- Khanna K., Gupta S., Seth R. & Puri S. 1997. Text Book of Nutrition and Dietetics. Phoenix Publ.
- Srilakshmi B. 2002. Nutrition Science. New Age International.
- Swaminathan M. 1988. Principles of Nutrition and Dietetics. BAPPCO.

## **(BHS-803) Advanced Human Physiology**

**Objective:** To develop the skills on role of human body parts sustainable life.

**Learning Outcome:**

- Students will have a thorough understanding the normal function within living creatures.
- The students will know the importance of mechanical, physical, and biochemical function of humans and serves as the foundation of modern medicine.

Units	Course details
Unit 1	<b>Cell structure and function:</b> levels of cellular organization and functions organelles, tissue, cell membrane and intercellular communication, regulation of cell multiplication. <b>Respiratory system:</b> exchange of gases, transport of oxygen and CO <sub>2</sub> , role of hemoglobin and buffer system.
Unit 2	<b>Circulatory system:</b> structure and system of heart and blood vessels, heart beats, blood and blood groups. Blood pressure and hypertension
Unit 3	<b>Digestive system:</b> structure and function, secretory, digestive and absorptive function, role of liver and pancreas. <b>Endocrine System-</b> Location, secretion and function of various endocrine glands. Male and Female Reproductive organ and their function.
Unit 4	<b>Sense organs:</b> structure and function, Role of skin, eye, ear, nose and tongue. <b>Excretory system:</b> structure and function of nephron, urine formation, role of kidney in maintaining PH of blood.

### Reference Books

- Wilson, K.J.W and Waugh, A. (1996): Ross and Wilson Anatomy and Physiology in Health and Illness 8<sup>th</sup> Edition, Churchill Livingstone.
- Jain, A.K.: Textbook of Physiology. Vol.I and II. Avichal Publishing Co., New Delhi.
- McArdle, W.D., Katch, F.I. and Katch V.L.(1996): Exercise Physiology. Energy, Nutrition and Human Performance, 4<sup>th</sup> Edition, Williams and Wilkins, Baltimore.
- Datta, Chandrani Sanyal (2006): Essentials of human physiology: AITBS.
- Marieb, Elaine N. (2004): Pearson Human anatomy & physiology, 6th ed.
- Donnersberger, Anne B. Jones & Bartlett, (2005): 8th ed. Laboratory textbook of anatomy and physiology.

## **(BHS-804) Public Health Nutrition**

**Objectives:** To develop the skills on the complex and changing exposure to nutrition throughout the life cycle as a critical determinant of health and a key field of study for those committing themselves to public health both internationally and nationally.

**Learning Outcome:**

- Students will have a thorough understanding to quantitative and qualitative methods, program development and evaluation, health disparities, health behavior change and health policy.
- The students will know the importance to support the careers of aspiring public health researchers and actively encourage applications for further NGO survey.

Units	Course details
Unit 1	<p>Public health nutrition – Concept and scope</p> <ol style="list-style-type: none"> <li>1. Health - definition, dimensions, determinants and indicators of health and nutrition (IMR, CBR, Fertility rate, MMR, U5MR), Vital link between health and nutrition.</li> <li>2. Concept of adequate nutrition and malnutrition.</li> <li>3. Health care facility - role of public nutritionists in the health care delivery system.</li> <li>4. Primary Health Centre - Concept, functions, organization, current status in India and delivery of service, Taluk level hospital, and immunization. Anganwadi - its management, duties of public nutritionist in anganwadis. Demographic profile - population trends in India, density of population, demographic transition, population structure, sex ratio, family size, literacy and education, morbidity rate and life expectancy.</li> </ol>
Unit 2	<p>Nutritional Assessment - methods for assessing nutritional status (Direct methods- Anthropometry, biochemical, clinical, dietary and functional methods of assessments. Indirect methods - demography, population dynamics and vital statistics). Assessment of nutritional status of individuals and population. Significance of nutritional assessment of community.</p>
Unit 3	<p>Prevalence of malnutrition in India - Common nutritional problems - causes and preventive measures - PEM, VAD, IDA, IDD, VDD, Obesity and fluorosis. Approaches and strategies for improving nutritional status and health</p>
Unit 4	<ol style="list-style-type: none"> <li>1. Intervention Programmes –</li> <li>2. Nutrition policy and programmes.</li> <li>3. Role of national and international organizations to combat malnutrition.</li> <li>4. Health based interventions.</li> <li>5. Food based interventions.</li> <li>6. Perspectives in food and nutrition security – basic concepts, production, distribution, access, availability, losses and consumption, food and nutrition security at national, household and individual levels.</li> <li>7. Food Security Programmes- Public Distribution System (PDS), Antyodaya Anna Yojana (AAY), Annapurna Scheme, Food for Work Programme.</li> </ol>

## Reference Books

- Sheila Chander Vir (2012) Public health nutrition in developing countries. Vol I&II. Woodhead Publishing India Pvt. Ltd. New Delhi.
- Park K (2011). Park's Textbook of Preventive and Social Medicine, 21st Edition. M/s Banarasidas Bhanot Publishers, Jabalpur, India
- Bamji MS, Krishnaswamy K and Brahmam GNV (Eds) (2009). Textbook of Human Nutrition, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi
- Kaufman and Mildred (2006). Nutrition in promoting the public's health. Jones and Bartlett Publishers. USA.
- Edelstein and Sari (2006). Nutrition in public health, 2<sup>nd</sup> edition. Jones and Bartlett Publishers. USA.
- Michael J. Gibney , Barrie M. Margetts, John M. Kearney and Lenore Arab (2005). Public Health Nutrition. Blackwell Publishing company. USA.
- Schneider and Mary-jane. Introduction to public health (2006). Jones & Bartlett Publishers. USA.
- Spark and Arlene (2007). Nutrition in public health. CRC Press. USA



## **(BHS-805) Practical (Physiology of Human Body and Nutrition Education.)**

**Objective:** To develop the skills on role of human body parts sustainable life.

**Learning Outcome:**

- Students will have a thorough understanding the normal function within living creatures.
- Students will have a thorough understanding to quantitative and qualitative methods, program development and evaluation, health disparities, health behavior change and health policy.

Units	Course details
Unit 1	Visit in nearby pathology lab to observe the determination of blood composition, blood group, blood glucose level and haemoglobin.  Visit to nearby hospital/primary health centre /aganwadi centres to examine first aid in wounds, shock, burn, heat bite, artificial respiration and bed making for the patient.
Unit 2	Survey at least 20 families to assess their nutritional status.  Assessment of nutritional status : Anthropometric Methods: Techniques employed height, weight, body mass index, skin fold measurements, Mid arm upper circumference. Dietary methods: Construction of 24 hour recall questionnaire, food frequency questionnaire and clinical signs and symptoms related questionnaire.
Unit 3	Evaluation of data and report Writing.
Unit 4	Preparation of nutrition education material on the basis of Evaluation of survey.  Selection and use of instructional material chart, posters, calenders, flip charts, pamphlets

### **Reference Books**

- Ganong WF (2014). Review of Medical Physiology, 24<sup>th</sup> ed. McGraw Hill.
- Auther, J. Vendors (2014) Human Physiology Mechanism of body function McGraw Hill Book Co.
- Gibson, R.S. 1990. Principles of Nutritional Assesment. Oxford Publishing co.
- Melran, D.S. 197 Nutrition in the community. John wiley and sons. London.
- Sehgal, S. and Raghuvanshi, R.S. 2008. Text book of Community Nutrition. Publication ICAR new Delhi.

### **(BHS-806) Survey**

A nutritional survey at a community exposure for students can be a valuable tool for improving nutrition in the community. It can help to increase awareness of nutrition, identify areas where improvement is needed, track trends in nutrition, compare community nutrition to national standards, educate students about nutrition, and involve students in the process of improving nutrition.

## **(MFN-901) Food microbiology and food safety**

### **Course Outcomes:**

- Students will have a thorough understanding of various factors responsible for food spoilage.
- The students will know the specifications of various contamination sources and disease developed in certain processed products.
- Students will have a thorough understanding of importance of hygiene and sanitation in during food processing.

Units	Course details
Unit 1	Introduction to food microbiology. Micro-organisms of importance in food- bacteria, yeast and moulds, morphology, primary sources and biochemical activities. Factors affecting the growth of micro-organism
Unit 2	<b>Food spoilage.</b> <ul style="list-style-type: none"><li>• Spoilage of different group of food.</li><li>• Cereal and cereal products.</li><li>• Vegetables and fruits.</li><li>• Milk products.</li><li>• Canned food.</li><li>• Meat, fish &amp; poultry</li></ul>
Unit 3	<b>Food preservation-</b> physical methods and chemical methods. <b>Food borne disease:</b> bacterial and viral food borne illness, Food born parasites, mycotoxine.
Unit 4	Methods of isolation and detection of micro- organism (only principles in brief) Immunological methods- fluorescent, antibody, radio-immunoassay, ELISA. Chemical methods- thermostable nuclease and PCR (polymers chain reactions)

### **Reference Books**

- Food Microbiology: A Practical Approach by Michael J. Boor.
- Food Microbiology and Food Safety by David A. Beuchat.
- Fundamental Food Microbiology by Michael P. Doyle and James B. Shah.
- Modern Food Microbiology by M.W. Speck.
- Food Microbiology: Fundamentals and Frontiers by Michael P. Doyle, Robert W. Doyle, and Marvin P. Bryant.
- Food Microbiology by William C. Frazier

## (MFN-902) Clinical Nutrition- 2

**Objective:** To develop the skills for human health science, to learn about diets and eating that is complimentary to different health conditions or illnesses.

**Course Outcomes:**

- Apply advanced principles of clinical nutrition in medical settings.
- Assess the nutritional status of patients using appropriate assessment methods and tools.
- Develop and implement personalized medical nutrition therapy for various diseases and conditions.
- Provide nutrition counseling and education to patients. Stay updated with current research and evidence-based practices in clinical nutrition.

Units	Course details
Unit 1	Pathogenesis and Clinical diagnosis in various Diseases: <b>Nutrition Deficiency diseases:-</b> Anemia, Protein Energy Malnutrition(PEM), Vitamin A deficiency Disease, Iodine Deficiency Disease, Calcium and Vitamin D Deficiency Disease.
Unit 2	Obesity and underweight. Heart Disease: CAD and Hypertension, Atherosclerosis. Liver Disease : Hepatitis, Cirrhosis, Fatty liver
Unit 3	GIT Disease- Oesophagitis, Peptic ulcer, Diarrhoea, Constipation, Gastritis, Ulcerative
Unit 4	Kidney Disorder- Acute and chronic Renal Failure and renal calculi. <b>Rheumatic disorders:</b> Arthritis- osteo and rheumatoid arthritis, Gout: Symptoms, causes,treatment, prevention.

### Reference Books

- Anderson L., Dibble M. V., Turkki P. R., Mitchel H. S. & Rynbergen H. 1982. Nutrition in Health and Disease. JB Lippincott Co.
- ICMR 1998. Recommended Dietary Allowance for Indians. ICMR.
- Khanna K., Gupta S., Seth R. & Puri S. 1997. Text Book of Nutrition and Dietetics. Phoenix Publ.
- Srilakshmi B. 2002. Nutrition Science. New Age International.
- Swaminathan M.1988. Principles of Nutrition and Dietetics. BAPPCO.

## **(MFN-903) Assessment of Nutritional Status**

### **Course Outcomes:**

- Demonstrate proficiency in assessing nutritional status using anthropometric, dietary, biochemical, and clinical assessment methods.
- Interpret and analyse nutritional assessment data accurately. Identify and evaluate nutritional deficiencies or excesses based on assessment results.
- Use nutritional assessment data to develop personalized nutrition plans. Monitor and evaluate the effectiveness of nutrition interventions based on changes in nutritional status.

Units	Course details
Unit 1	Nutritional assessment as a tool for improving the quality of life of various segments of the population including hospitalized patients.
Unit 2	Current methodologies of assessment of nutritional status, their interpretation & comparative application of following: <ul style="list-style-type: none"><li>• Food consumption</li><li>• Anthropometry</li><li>• Clinical &amp; laboratory</li><li>• Rapid assessment &amp; PRA</li><li>• Function indicators such as grip strength, respiratory fitness, Harvard step test, squatting test.</li></ul>
Unit 3	Nutritional surveillance- basic concepts, uses & setting up of surveillance system.
Unit 4	Monitoring & evaluation.

### **Reference Books**

- Nelson, David L. and Michael M. Cox. Principles of Biochemistry. W.H. Freeman & Co.
- Biochemistry By Dr. U. Satyanarayana, U Chakrapani (z Lib.org)

## (MFN-904) Nutrition in Emergencies and Disasters

### Course Outcomes:

- Understand the unique nutritional challenges in emergency and disaster situations.
- Design and implement nutrition response plans in emergency settings.
- Identify strategies to ensure food security and address nutritional needs during crises.

Units	Course details
Unit 1	Natural/manmade disaster resulting in emergency situation. Drought, flood, earth quake, cyclone, war, civil and political emergencies Factors giving rise to emergency situation in these disasters
Unit 2	Nutritional problems in emergencies in vulnerable groups. <ul style="list-style-type: none"> <li>• Causes of malnutrition in emergency situation.</li> <li>• Major deficiency disease in emergencies.</li> <li>• Protein- energy malnutrition.</li> <li>• Specific deficiency.</li> </ul>
Unit 3	Communicable diseases: surveillance and treatment. <ul style="list-style-type: none"> <li>• Control of communicable disease in emergencies- Role of immunization and sanitation.</li> </ul>
Unit 4	Nutritional relief and rehabilitation <ul style="list-style-type: none"> <li>• Assessment of food need in emergency situations.</li> <li>• Food distribution strategy- Identification and reaching the vulnerable group.</li> <li>• Mass and supplementary feeding.</li> <li>• Local food in rehabilitation.</li> <li>• Organization of mass feeding/ general food distribution.</li> <li>• Feeding centers.</li> <li>• Evaluation of feeding programmes.</li> <li>• House hold food security and nutrition in emergencies.</li> </ul> Public nutrition approach to tackle nutritional problems in emergencies.

### Reference Books

- Nutrition in Emergencies: A Guide for Program Managers
- Nutrition in Emergencies: A Guide for Program Managers by the Food and Agriculture Organization of the United Nations.
- Nutrition in Humanitarian Emergencies: A Practical Guide by the International Federation of Red Cross and Red Crescent Societies.

## (MFN-905) Practical- Assessment of Nutritional Status

### Course Outcomes:

- Demonstrate proficiency in assessing nutritional status using anthropometric, dietary, biochemical, and clinical assessment methods.
- Interpret and analyse nutritional assessment data accurately. Identify and evaluate nutritional deficiencies or excesses based on assessment results.

Units	Course details
Unit 1	Assesment of nutritional status of an individual( Children,/ Adolescence/ Pregnant and lactating women/ old Age/ community using anthropometry and dietry survey Preparation of schedule Survey work Analysis of data Writing a report.
Unit 2	Visit to a local health care centre to identify clinical signs and symptoms of nutritional problems.
Unit 3	Visit to ICDS blocks Development of AV aids- Radio script, Popular articles chart, poster, leaflet etc
Unit 4	Planning, implementing and evaluation of nutrition education for a target group.

### Reference Books

- Gibson, R.S.1990. Principles of Nutritional Assesment.Oxford Publishing co.
- Melran, D.S. 197 Nutrition in the community. John wiley and sons. London.
- Sehgal, S. and Raghuvanshi, R.S. 2008. Text book of Community Nutrition. Publication ICAR new Delhi.

## (MFN-906) Dissertation

Students will work on specific project attached to a supervisor and submit a thesis at the end of the semester. The assessment will be based on the midterm evaluation, evaluation of final report and viva-voce examination.

## **(MFN-10-01) Institutional Food Management**

**Objectives:** To develop the skills on the principles of catering management, be aware of the differing methods of food service and implications for the nutritional quality and safety of food.

**Course Outcomes:**

- Students will have a thorough understanding to study the history of hospitality, career opportunities and the different areas of hospitality.
- The students will know the importance to support practical management skills, such as scheduling, hiring, wage and salary regulations, safety in the workplace and job performance evaluation.

Units	Course details
Unit 1	<p><b>Food Services-</b> Concept, Principle and Objective, Type of food services (hospital, hostel, school meal, industrial canteen, commercial hotels).</p> <p>Food Service management- Menu planning, Receipt of food and its storage, Principles and Techniques in quantity food production.</p> <p>Food Services in hospitals- Requirement of equipments for food preparation, Distribution, Storage and Services.</p>
Unit 2	<p><b>Theories of Management and Approaches-</b> Classical Theory, neo classical approach, Quantitative approach, MBO approach, System approach, Behavioral and Human relation approach, Contingency approach, JIT approach, TQM approach.</p>
Unit 3	<p>Developing objective and goals- Definition, Importance, Types of goal, Policies, Procedures, Rules.</p> <p>Principles and procedures of management-Definition of management, Organization Interaction at work , Principles, Functions of management, Role and responsibilities.</p>
Unit 4	<p><b>Tools of management</b> –Definition, classification, Organization chart, Structure, Function, Work improvement techniques.</p> <ul style="list-style-type: none"> <li>• Personnel management -Definition, Scope, Concept of personnel management, Approaches of personnel management,</li> <li>• Personnel policies, Training, Placement, Promotion, Personnel records, Work appraisals.</li> <li>• Financial Management-Definition, Scope of financial management, Management accounting, Budgeting, Costing, Cost control, Accounting. Financial management in food service Institutions-Methods of food purchasing, Inventory management, Maintaining quality in food production and services.</li> <li>• Hygiene and sanitation in preparation and serving area – Personal hygiene, Types, Sources of contamination, Prevention, Safety measures, Methods of controlling infestation, Methods of dish washing.</li> </ul>

**Reference Books**

- Sethi, M. (2008). Institutional Food Management. New Age International (P) Ltd.
- Bansal, T. (2011). Hotel facility and planning. Oxford publishing, New Delhi

## **(MFN-10-02) Food Analysis**

**Objective:** To develop the skills on the quantification technique of various components, allergens present in food products.

**Course Outcomes:**

- Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis.
- The students will know the importance of various methods to identify any malfunction aspect of food.

Units	Course details
Unit 1	Principles of Proximate Analysis- Moisture, Ash, Crude Fat, Crude Fibre, Crude Protein and Carbohydrates by difference.
Unit 2	Principles and methods of Food Analysis. Determination of Starch, reducing and non-reducing sugar. Test for unsaturation of fats, rancidity of fats.
Unit 3	Quantitative analysis of Protein by Biuret method, Ninhydrin method, Lowry's method. colorimetric methods of analysis of fat soluble and water soluble vitamins
Unit 4	Principles and methods for estimation of Minerals: Titrimetric and Gravimetric methods. Methods for determining physical and rheological properties of food.

### **Reference Book**

Nielsen, S.S.(2003). Food Analysis, Third Ed., Kluwer Academic/Plenum Publishers, New York.



## (MFN-10-03) Food Chemistry

### Course outcomes:

- Students will be able to demonstrate a sound knowledge of the chemical properties of food components (water, carbohydrates, proteins, lipids, vitamins, minerals, flavours, pigments and additives).
- Relate the properties and structures of chemical components and ingredients to the functional and chemical properties of foods.
- Identify the classification and chemistry of major and minor components of food.
- Explain the relation between chemistry of food components and their functions.
- Revise the various changes that occur in food components naturally as well as due to processing and their good and ill effects.
- Discuss the presence and role of additives and toxic substances in food and ways to modify them.

Units	Course details
Unit 1	Introduction to Food Chemistry: Definition and composition of food. Water: Structure of water, Type of water, Sorption phenomenon, Water activity, Role in packaging and shelf life. Carbohydrates: Classification, Structure of important polysaccharides (starch, cellulose, hemicelluloses, pectin, gums), Modified cellulose and starches. Chemical reactions of carbohydrates – oxidation, reduction, acid and alkali.
Unit 2	Lipids: Classification and Physico-chemical properties of lipids. Refining of crude oils, Hydrogenation and Winterization. Vegetable and animal fat. Frying and Shortening. Flavor changes in fats and oils, Lipid oxidation, Factors affecting lipid oxidation. Proteins: Classification, Properties of protein (electrophoresis, sedimentation, and denaturation), Functional properties of protein (solubility, viscosity, gelation, emulsification and foaming).
Unit 3	Vitamins and Minerals: Role of vitamins and minerals in food industry, Effect of various processing treatments and fortification of foods.
Unit 4	Food enzymes- Nature, Classification, Properties of Food enzyme, Enzyme activity in different food systems, Hydrolyses and Lipases, Utilization in Food Chemistry. Browning reaction in foods.

### **Reference Books:**

- Damodaran, S., Parkin, K.L. and Fennema, O. R. (2007). Fennema's Food Chemistry, fourth edition, published by CRC Press.
- Meyer L.H. (2003). Food Chemistry, Reinhold Pub. Corp.
- Nielsen, S.S.(2003). Food Analysis, Third Ed., Kluwer Academic/Plenum Publishers, New York.

## **(MFN-10-04) Nutritional Epidemiology**

**Objectives:** The course will enable students to apply the best epidemiological study which fit with status que in their nutritional projects.

**Course outcomes:**

- Students will be able to discuss methodological issues in the use and interpretation of nutritional methods. Apply methodological principles when implementing research studies or interpreting the scientific literature
- .Describe the nature and origin of error in nutritional data, reliability and validity of measures, and methodological steps to address problems/limitations.
- Able to discover dietary assessment errors and deviation.

Units	Course details
Unit 1	Introduction to Epidemiology, Nutritional epidemiology and Epidemiological Research. Meaning, Definition, purpose and principle of Epidemiology.
Unit 2	Public Health implication of nutritional epidemiology. Types of study- epidemiological studies, ecological studies, cross-sectional studies, cohort studies, case- control studies, experimental studies. Study design- sampling, study size and power Measurement of exposure and outcome Measuring diet-disease (exposure-outcome) association and interpretation.
Unit 3	Nutritional epidemiology- Measurements Vital statistics and Use of Vital Statistics in epidemiology
Unit 4	National Goals, Policies, Schemes and programme related to nutrition and health. Nutrition related health goals and millennium Development Goal (MDG). National Rural Health Mission (NHRM) Health care Delivery system in India. Universal Immunization Programme. Initiative for prevention of disease. National Food Security Act (NFSA)2013.

**Reference Books:**

- Nutritional Epidemiology, 3rd Edition by Walter Willett.
- Epidemiology: A Text in Clinical Science, 7th Edition by Rothman, Greenland, and Lash.
- Modern Nutrition in Health and Disease, 14th Edition by Shils, Shike, Ross, Caballero, Cousins, and Ross.

## **(MFN-10-05 ) Food Service Management & Food Analysis** **(Practical)**

### **Course outcomes:**

- Understand the principles of food service management. This includes understanding the different aspects of food service operations, such as menu planning, food preparation, customer service, and financial management.
- Apply the principles of food service management to real-world situations. This means being able to use the knowledge and skills learned in the classroom to solve problems and make decisions in a food service setting.
- Develop teamwork and communication skills. This is essential for working effectively in a food service environment, where you will be interacting with a variety of people, including customers, staff, and suppliers.
- Demonstrate proficiency in food safety and sanitation procedures. This is essential for ensuring the safety of food served to customers.
- Develop an understanding of the food service industry. This includes understanding the different types of food service operations, the challenges facing the industry, and the future trends.

Units	Course details
Unit 1	Plan and prepare a menu Manage a food service operation Provide customer service Analyze financial data.
Unit 2	Standardization of Recipes of Snacks and meals for portion and cost. Running a canteen for atleast 20 persons. Conduct a food safety audit
Unit 3	Planning, Preparation and service for special occasions
Unit 4	Visit to a nearby Food Service institutions/ hotel institution.

### **Reference Books**

- Sethi, M. (2008). Institutional Food Management. New Age International (P) Ltd.
- Bansal, T. (2011). Hotel facility and planning. Oxford publishing, New Delhi

## **Industrial Training**

Industrial training can be a valuable experience for students who are interested in a career in the food industry. It can help students to gain practical experience, learn about different aspects of the food industry, network with professionals, develop transferable skills, and gain a competitive edge in the job market.