

**Sadhu Ram Chand Murmu University of Jhargram  
Jhargram, West Bengal**



Syllabus  
of  
Master of Science (M.Sc.)  
in  
Nutrition and Public Health

Under Semester System  
Course Duration: 2 years, 4 Semesters  
[W.e.f. : 2022-2023]

**Nutrition and Public Health  
Programme Structure**

Semester	Course Code	Course Title	Full Marks	Credit
<b>I</b>	NPH-101	Fundamentals of Nutritional Science	40+10	4
	NPH -102	Nutritional Human Physiology	40+10	4
	NPH 103	Nutritional Biochemistry	40+10	4
	NPH -104	Fundamental Public Health	40+10	4
	NPH -195	Health and Nutritional Status Assessment	50	4
	NPH -196	Food Chemistry and Analysis	50	4
	<b>Total</b>		300	24
<b>II</b>	NPH -201	Food style, life style and Health	40+10	4
	NPH -202	Advanced Food Science	40+10	4
	NPH -203	Research Methodology and Nutritional Statistics	40+10	4
	NPH -204	Epidemiology, Social science and Health	40+10	4
	NPH -295	Review report and Statistical Computation	50	4
	NPH -296	Community Survey, Assignment on Public Health and Nutrition	50	4
	<b>Total</b>		300	24
<b>III</b>	NPH -301	Environment, hygiene and Public health	40+10	4
	NPH -302	Therapeutic Nutrition	40+10	4
	NPH -303	Food Microbiology and Food Hygiene	40+10	4
	NPH -304	Health system research and recent advances in public health	40+10	4
	NPH -395	Nutritional Diet Therapy	50	4
	NPH -396	Analysis of Food Microbiology	50	4
		<b>Total</b>		300
<b>IV</b>	NPH -401	Social medicine and Rural Health	40+10	4
	NPH -402	Public Health and Environment	40+10	4
	NPH -403	Health education, Communication and Health Programme	40+10	4
	NPH -404	Demography and Family welfare	40+10	4
	NPH -405	Practical(Project)	50	4
	NPH -406	Practical (Internship)	50	4
	<b>Total</b>		300	24
<b>Grand Total</b>			1200	96

Theory :50 Marks, Written – 40 Marks, Internal Assessment- 10 Marks

Theory :25 Marks, Written – 20 Marks, Internal Assessment- 05 Marks

Practical: 50 Marks

**FIRST SEMESTER  
THEORY**

**Code: NPH 101: Fundamentals of Nutritional Science**

**Full Marks -50 Credit-4**

- 1. Historical perspective of Nutrition Science:** International and national scenario, Discovery of conventional and nonconventional nutrients with experimental evidences, Recent discoveries in nutrition field.
- 2. Major terminology and their definitions:** Nutrition, Nutrient, Nutritional status, Malnutrition, Public Nutrition, RDA, Optimal nutrition, Poor Nutrition, Food, Food pyramid, Food chain, Fortification, Fermentation, Bionutrition, Biofortification, Functional food, Foodomics, Nutraceutical, Nutrigenomics, Diet, Dietetics, etc.
- 3. International and National Agencies in Nutrition:** WHO, FAO, UNICEF, FDA, CARE, ICMR, ICAR, NIN, NFI, FNB, CFTRI, NNMB, DFRB, NSI, CSSM, etc.
- 4. Nutritional Requirements and RDA:** Human nutrition requirements, methods of nutrition requirements, methods of nutrition requirement, principles and factors of RDA, determination of RDA, National and International recommendations of RDA.
- 5. Human Energy Requirements:** Different points of energy requirement, methods and factors of energy requirement, BEE, REE, BMR and SDA.
- 6. Human Nutritional Requirements for Different age groups:** Infant, Preschool children, School going children, adolescent boys and girls, adult male and female, pregnant and lactating mothers, geriatric / elderly persons,
- 7. Nutrition Requirement for Special Conditions:** Sports and fitness, High Altitude, Space, Deep Sea Nutrition,
- 8. Nutritional Status:** Definition, Status assessment methods-Direct( Anthropometry, Biochemical estimation, Biophysical or radiological examination, Clinical examination, Functional assessment, Dietary assessment) and indirect(Vital health statistics, Population dynamics, Growth chart, etc.).

Reference Book:

1. Roday S. Food Science and Nutrition. 3<sup>rd</sup> edition, Publisher: OUP India.
2. MCGUIRE M. Nutritional Sciences From Fundamentals To Food. 3rd edition. Publisher: CENGAGE LEARNING
3. SabaN, Balwan WH. Fundamentals of Nutrition and Food Sciences. 2019. Publisher: Book Enclave; First edition
4. B. Srilakshmi. Nutrition Science. Publisher: New Age International Publisher

**Code: NPH 102: Nutritional Human Physiology**

**Full Marks -50 Credit-4**

- 1. Cellular Functions:** Functional aspects of cellular organelles, cell membrane transport, membrane receptors, fundamentals of signal transduction.
- 2. Digestive system:** Digestive and Absorptive functions - Role of liver, pancreas and gall bladder and their dysfunction - Motility and hormones of GIT. Regulation of food intake – role of hunger and satiety centres, effect of nutrients.
- 3. Nervous System:** Function of neuron - conduction of nerve impulse, synapses, and role of neurotransmitters - Gastro intestinal reflexes
- 4. Endocrine system:** Hormones on carbohydrates, protein, fat metabolism, Hormone signalling system at genomic and non-genomic level
- 5. Respiratory system:** Role of lungs in the exchange of gases. Transport of oxygen and CO<sub>2</sub>. Buffer systems. Cardio-respiratory response to exercise and physiological effects of training.
- 6. Circulatory and Cardio Vascular system:** Blood - formation, composition, clotting and haemostasis. Formation and function of plasma proteins. Erythropoiesis. Blood groups and histocompatibility. Blood indices - Use of blood for investigation and diagnosis of specific disorders, Structure and function of heart and blood vessels - Regulation of cardiac output and blood pressure, heart failure, hypertension.
- 7. Excretory system :** Role of kidney in maintaining pH of blood -Water, electrolyte and acid base balance – diuretics. Endocrine role of Kidney.

**8. Immune system:** Cell mediated and humeral Immunity - Activation of WBC and production of antibodies. Role in inflammation and defence, Autoimmunity, Immunodeficiency, Hypersensitivity, Structure of Ab.

Reference Book:

1. Patil RV, Makari H.K, Gurumurthy H, Sowmya S.V. A Textbook of Human Physiology. 2009.
2. Pennella V. Physiology of human nutrition. Kindle Edition.
3. Subrahmanyam S, Madhavankutty K. A Textbook of Human Physiology. Publisher: S Chand & Co Ltd
4. Guyton and Hall. Textbook of Medical Physiology. 13<sup>th</sup> Edition.

**Code: NPH 103: Nutritional Biochemistry      Full Marks -50      Credit-4**

**1. Proteins and amino acids:**

a. **Amino acids**- Classification and structure, properties and functions. Formation of peptide linkages

b. **Proteins**- Structure and organization, physico-chemical properties, classification and functions.

2. **Carbohydrates:** Monosaccharide and related compounds, disaccharides, polysaccharides. Inter conversion of hexoses, sugar derivatives of biomedical importance. Artificial sweeteners, Dietary fibre.

3. **Lipids:** Classification, chemical structure, and properties of fatty acids, Triglycerides, phospholipids and derivatives, cholesterol and derivatives. Dietary fats, biological functions of lipids, glycolipids. Methods to determine crude fat and fatty acids. Lipoproteins: Types, Structure and physicochemical properties.

4. **Nucleic acids:** Components, structure and level of organization, Physicochemical properties, biological importance, DNA replication and enzymes in DNA replication, Genetic Code, Protein synthesis.

**5. Dietary Fiber**

6. Water

7. **Fat soluble Vitamins:** Vitamin A, Vitamin D, E & K. **Water soluble vitamins:** Vitamin C, Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, Vitamin B6.

8. **Enzymes:** Regulation of enzyme activity. Role of Coenzymes and cofactors in enzyme activity. Factors affecting enzyme activity Enzyme inhibition, Isoenzymes, immobilized enzymes, clinical significance of enzyme assays

9. **Bioenergetics and oxidative metabolism:** Energy producing and utilizing systems, Sources of and fates of acetyl CO A, The Kreb's cycle, structure of mitochondria, Electron transport chain, oxidative phosphorylation.

10. **Macro minerals:** Calcium, Phosphorus Magnesium, Sodium, Potassium chloride.

11. **Micro minerals:** Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluoride.

12. **Ultra trace minerals:** Arsenic, Boron, Nickel, Silicon, Vanadium & cobalt: Functions, Toxicity, interaction with other nutrients. Cofactors, Antioxidants.

Reference Book:

1. Sharma D.C, Sharma D. Nutritional Biochemistry. Publisher: CBS Publishers & Distributors.
2. Ronnins D. Nutritional Biochemistry and Metabolism. 2022. Publisher: Kaufman Press.
3. Singh B.K.P. Nutritional Biochemistry. 2018. Publisher: Amiga Press Inc.
4. Satyanarayana U, Chakrapani U. Biochemistry. Publisher: Elsevier.

**Code: NPH 104: Fundamental Public Health****Full Marks -50 Credit-4**

1. **Concept of Health and Public Health:** Definition and concept of health and Public Health, Core functions and essential services, Health problems of developed and developing countries Health problems in India.
2. **Emotions:** Relation of nutrition with mental health, effect of emotion on health and disease, control of emotion.
3. **Population :** Population dynamics - Natality, Mortality, Survivorship and age distribution. Community structure, Major and Minor community, Relationship between species and number (Abundance, Density, Frequency, Relative abundance, Dominance, Dominance index, Species diversity)Community boundary.
4. **Disease Control and Prevention:** transmission of disease, nature of communicable and infectious disease, infection, contamination, disinfection, epidemiological principles of disease control.
5. Different tire of Health care system
6. Communicable, Transmission of diseases and non-communicable diseases
7. Nutrition and Hard immunity
8. Organised sector with reference to Centre, State, District and Block level structures and local bodies and Panchayati Raj, Organisation and functions of community health centres and primary health centres
9. Health Manpower- Public health manager, non-clinical epidemiologist, mother health advisor, child health advisor and health professional workers.
10. Primary Health care and concept, Alternative systems of medicine, like Ayurveda, Homeopathy, etc, Holistic Approach
11. Non – Governmental Organisations (NGOs) and Private Voluntary Organisations (PVOs), Unorganised Sector

Reference Book:

1. Birkhead GS, Morrow CB. Turnocks Public Health What It Is And How It Works.2020. Jones and Bartlett Publishers, Inc
2. Schneider MJ. Introduction to Public Health.2020. Publisher: JONES & BARTLETT.
3. Muthu VK. A Short Book of Public Health. 2<sup>nd</sup> edition. Publisher: Jaypee Brothers Medical Publishers.
4. Turnock BJ. Essentials of Public Health. 2015. Publisher: Jones and Bartlett.

**PRACTICAL****Code: NPH 195: Health and Nutritional Status Assessment Full Marks -50 Credit-4**

1. Nutritional Anthropometry: Height, weight, circumference of chest, Mid –upper-arm-circumference body fat and Weight for age, height for age, weight for height, Body Mass Index (BMI,) Waist - Hip Ratio (WHR), Ponderal Index, Dugdale’s Index and Kanawati Index, with interpretations.
2. Determination of diurnal and postural variations of pulse rate, blood pressure, respiratory rate, Spo<sub>2</sub> of a subject.
3. Estimation of hemoglobin percentage Hb%, TC,DC, CT, BT from blood samples.
4. Identification with reasons of histological slides (Liver, Kidney, Lung, Small intestine, Stomach, Thyroid, Adrenal, Pancreas, Testis, Ovary, Bone and Muscles of mammals.
5. Preparation of Nutrition & health assessment questioners and assessment of body compositions with the help of software / apps (computer / mobile).

**Code: NPH 196: Food Chemistry and Analysis Full Marks -50 Credit-4**

1. Determination of percentage of carbohydrate in food stuff.
2. Determination of ascorbic acid, vitamin A content in food stuff.
3. Determination of calcium, phosphorus, iron, copper in different food stuff.
4. Determination of Ash content of food stuff.
5. Determination of Moisture content of food stuff.
6. Determination of Saponification value, iodine value
7. Estimation of Proteins, Cholesterol, glucose, bilirubin, urea, creatinine and triglyceride from blood samples.
8. Assay of SGOT, SGPT, Catalase, SOD from blood samples.

**SECOND SEMESTER  
THEORY**

**Code: NPH C-201(CBCS): Food style, life style and Health Full Marks -50 Credit-4**

1. Basic concept of health, impact of nutrition on health, positive health, negative health
2. **Concept of life style:** Definition, types, determinants, stress and life style, life style diseases, transformation of unhealthy life style to healthy life style.
3. **Concept of food style:** Definition, types, determinants, unhealthy food style and diseases, food style modification
4. **Life style and Health:** Impact of healthy life style on health promotion and disease prevention and early recovery from disease.
5. **Food style and Health:** Impact of healthy food style on health promotion, disease prevention and early recovery from disease.
6. **Food habits and Immunity power:** Nutrient as immune modulators.
7. **Life style and food style for controlling infectious, contagious and metabolic diseases.**

Reference Book:

1. Nutrition and Health: The Vegetarian Way, PUBLISHER: STERLING PAPERBACKS, EDITION: 2013
2. Perfect Health - Body Diet & Nutrition - The Complete Guide for Body & Mind, Publisher: V&S Publishers, 1st Edition, Tanushree Podder

**Code: NPH 202: Advanced Food Science Full Marks -50 Credit-4**

1. **Food:** Food and food groups, food pyramid, food in relation to health, organic food, food quality evaluation, supplementary food, physicochemical changes in food.
2. **Functional Foods:** Basic concept, classification with examples, health benefits, etc.
3. **Nutraceuticals:** Basic concept, classifications with examples, natural and commercial nutraceuticals, bioactive compounds with specific health benefits.
4. **Prebiotics and Probiotics:** Basic concepts, classifications with examples, health benefits, etc.
5. **Foodomics:** Nutrigenomics, nutrimetabolomics, and nutriproteomics

**Nutrigenomics:** Fundamental of gene expression study, Nutrient-gene interaction, Role of  $\omega$ -3 fatty acid on gene expression, Role of vit- D on gene expression, Role of retinoic acid on gene expression.

**Nutrimetabolomics:** Role of nutrient on carbohydrate, protein and fat metabolism.

**Nutriproteomics:** Nutrient on protein synthesis, western blot study, Protein structure and molecular weight determination, fundamental.

**6. Genetically modified foods:** Concept, available GM foods in India. Fundamental techniques for GM food preparation. Food fortification through genetical modification.

**7. Food Fortification:** Needs, objectives, principles and rationale, selection and basis of fortificants. Fortifying products: Malting and germination of grains – process, characteristics, nutritional benefits and uses Fortifying beverages, candies, snack products. Salt, Sugar, Oils and other health foods fortification.

**8. Food Toxicology:**

Sources of hazardous substances in Food-Mycotoxin, Natural Toxin, Environmental Toxin, Industrial toxin, Agricultural Toxin, Adulterants.

Principles of Toxicology Classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity. Evaluation of toxicity: Risk vs. benefit: Experimental design and evaluation: Prospective and retrospective studies: Controls: Statistics (descriptive, inferential): Animal models as predictors of human toxicity: Legal requirements and specific screening methods: LD50, ED50 and TD50: In vitro and in vitro studies; Clinical trials.

Natural Toxins in Food: Natural toxins of importance in food- Toxins of plant and animal origin; Microbial toxins (e.g. Algal toxins, bacterial toxins and fungal toxins). Natural occurrence, toxicity and significance. Food poisoning; Mycotoxicosis of significance. Determination of toxicants in foods and their management, Sea food toxin- PSP, DSP

Reference Book:

1. Advances in Food Science and Nutrition, Volume 2, Visakh P. M. (Editor), Laura B. Iturriaga (Editor), Pablo Daniel Ribotta (Editor).
2. Advances in Food Science and Nutrition (Volume – 1), Deepali Bajpai, Hemraj Dwivedi, 2021, Scripown Publications.
3. Advances in Food Science and Nutrition, Dr. Anju Singh, Agrotech Press (2019).

**Code: NPH 203: Research Methodology and Nutritional Statistics**

**Full Marks -50 Credit-4**

**Research Methodology and Statistics:** Meaning, objectives, types, criteria of a good research, significance of research, defining a research problem, principles of formulating a research design, dissertation or thesis presentation guidelines, research ethics, plagiarism.

1. **Sampling:** need for sampling, steps in sampling design, advantages of sampling, characteristics of a good sample, types of sampling-probability sampling, non probability sampling.
2. **Data collection and analysis:** continuous and discontinuous data, Methods of data collection, Frequency Distribution Table and graphical presentations( Polygon, ogive, bar and pie-diagram).Descriptive statistics: central tendency -mean, median, mode, percentiles, quartiles, Dispersion- Variance, Standard deviation and standard error, Skewness, Kurtosis.
3. **Statistical Testing Inference:** Statistical testing of hypothesis and inference, significance of testing, Alternative hypothesis, Null hypothesis, level of significance, probability theory Type I error, Type II error, t-test, Z-test, ANOVA and F-test, Chi Square Test.
4. **Correlation and Regression:** Definitions, types, correlation of coefficient by Product-moment, Spearman's rank. Assumptions and computation of simple linear regression.

Reference Book:

1. Research Methodology: Methods and Techniques , New Age International Pvt Ltd Publishers; 4th ed, Dr. C. R. Kothari, Gaurav Garg.

2. Fundamental Of Research Methodology And Statistics, Y.K. Singh, Publisher : NEW AGE; First edition.
3. A Textbook of Biostatistics, New Age International Private Limited; First edition B Annadurai.

**Code: NPH 204: Epidemiology, social science and Health Full Marks -50 Credit-4**

1. Definition and concepts of Epidemiology, approaches and methods, Concepts of Health and disease, Role of Genetics in health and disease, level of prevention, Types of epidemiology, uses of epidemiology, etiology, pathogenesis, prevention and control of communicable diseases like malaria, cholera, tuberculosis, leprosy, Diarrhoea, ARI, Poliomyelitis, viral hepatitis, Measles, dengue, rabies, AIDS etc.
2. Epidemiological measures: Rates - ratio - proportions (incidence, prevalence, risk and risk factors, relative risk, odds ratio, attributable risk). Standardization of rates (direct/indirect). Association and causation (spurious, direct/indirect). Screening for disease (types and uses, sensitivity, specificity, positive and negative predictive values). Koch Postulates, Endemic, epidemic and pandemic disease, Acute and chronic disease, Communicable and non-communicable disease, Zoonosis, Epizootic and enzootic disease, Vector borne and Nosocomial diseases
3. Non-communicable diseases like coronary heart disease, hypertension, diabetes mellitus, cancer etc.
4. Definition and scope of social and behavioral sciences in Health, Concept and significance of social structure and social organization, Culture and behavior related to Health and Disease, Political and Economical aspects of Health
5. Techniques of social sciences research relevant to health fields, Health systems research, operational research, mathematical models, Research related to health economics, medical geography.
6. Occupational disorders like, pneumo-coniosis, hearing loss, accidents, dermatosis etc.

Reference Book:

1. Norell SE (1998). Workbook of epidemiology. Oxford: University Press, New York.
2. Owen AY and Frankle RT (1986). Nutrition in the community, The Art of delivering services, 2<sup>nd</sup> edition, Times Mirror/Mosby.
3. Park K (2021). Park's textbook of Preventive and Social Medicine, 20<sup>th</sup> Edition, M/s Banarasidas bhanot, Jaipur.
4. Roday S (1999). Food hygiene and sanitation. 1<sup>st</sup> edition, Tata McGraw Hill, New Delhi.
5. McGraw Hill companies.
6. Berg A (1973). The Nutrition factor, The Brooking Institute, Washington.
7. Bonita R, Beaglehole R, Kjellstrom (2006). Basic Epidemiology. 2<sup>nd</sup> edition.



8. Frank G.C (2008). Community nutrition applying epidemiology to contemporary practice. 2<sup>nd</sup> edition. Jones and Bartlett Publishers.
9. Gibney M.J, Margetts B.M, Kearney J.M, Arab I (Eds) (2004).Public Health Nutrition, NS Blackwell publishing.

### **PRACTICAL**

#### **Code: NPH 295: Review report and Statistical Computation Full Marks -50 Credit-4**

Review report with viva-voce (10+05 marks): Any topic relevant to the curriculum.

Statistical Computations (Sum-20, LNB-10 and Viva-voce-05):

Computation of mean, median, mode, percentiles and quatriles of grouped and ungrouped data

Computation of Variance, standard deviation and standard error of mean

Test of significance: Students t-test – a) for Independent group b) paired group, Z-test, Chi square test, ANOVA and F-test.

Computation of correlation coefficient: Product-moment and Spearman's rank correlation.

Computation of simple linear regression.

#### **Code: NPH 296: Community Survey, Assignment on Public Health and Nutrition Full Marks -50 Credit-4**

Survey Report on Nutritional & public heal status in rural and urban community people. Impact of ICDS and Mid Day meal programmes.

Survey on food resources, traditional and modern food processing practices and marketing in the rural and urban communities.

### **THIRD SEMESTER THEORY**

#### **Code: NPH C-301(CBCS): Environment, hygiene and Public health**

**Full Marks -50 Credit-4**

1. **Concept of environment, hygiene and public health and their relation.**
2. **Environmental pollution:** Basic concept, type of pollutant- primary, secondary, degradable, non-degradable.
3. **Air Pollution and Human health disorder:** Gaseous pollutant, particulate pollutant.
4. **Water pollution and human health:** Heavy metal pollution, pesticide and fertilizer pollutant on public health.
5. **Noise pollution and public health:** Noise pollution level, auditory and non-auditory effect of noise, traffic noise index and public health disorders.
6. **Food pollution and Health:** Food toxicants, food adulterants.
7. **Sanitation and hygiene of food:** Milk hygiene, meat hygiene, Fish hygiene, hygienic handling of food – public health impact.

8. **Food borne diseases:** Pathogenesis and control- public health impact.
9. **Food standard indices:** ISI, AGMARK, FSSAI, BIS, prevention of food adulteration act-Importances on public health.

Reference Book:

1. Begon M, Harper J.L, Townsend C.R (2006). Ecology: Individuals, Populations and communities. 4<sup>th</sup> ed. Blackwell science.
2. Leveque C (2003). Ecology : from Ecosystem to Biosphere. Science Publishers. Inc.
3. Mukherjee B (1996). Environmental Biology. Tata McGraw-Hill Publishing Comp. Ltd.
4. Odum, E.P and Barret G.W (2005). Fundamentals of Ecology. 5<sup>th</sup> ed. Thompson Brooks/Cole.
5. Ricklefs R.E and Miller G.L (2000). Ecology. 4<sup>th</sup> ed. W.H. Freeman and Company.
6. Santra S (2005). Environmental Science. New Central Book Agency (P) Ltd.
7. Smith R.L and Smith T.M (2001). Ecology and Field Biology. Benjamin Cummings Pearson Education.
8. Stiling P (2002). Ecology- Science and Applications. 2<sup>nd</sup> ed. Prentice Hall of India.

**Code: NPH 302: Therapeutic Nutrition**

**Full Marks -50 Credit-4**

1. **Introduction to diet therapy:** Definition, purpose, adjuncts to diet therapy, dietary supplements, supplement pyramid, role of doctor ,nurse and dietician in feeding the patient.  
**Dietary Counselling and patient education**
2. **Diet in infections and fevers:** Causes, Types, Metabolic changes in fever, general dietary considerations, dietary management in tuberculosis.
3. **Diet in Digestive Tract Disease:** Diarrhoea, Constipation, Sucrose deficiency ,Lactase Deficiency, haemorrhoids, short bowel syndrome, flatulence.
4. **Diet in endocrine disorders:** Diabetes, Hyperlipidemia, obesity, Hypothyroidism, Hyperthyroidism, Addison's disease, Cushing syndrome.
5. **Diet in Cardiovascular disease:** Atherosclerosis, Hypertension, Myocardial infarction, coronary heart disease (Ischaemic heart disease), congestive heart failure.
6. **Diet in burn, trauma and fractures:** Nutritional requirement of wound healing, Diet in pre operative and post operative condition, burns, trauma, Nutritional management of fractures.
7. **Disease due to metabolic disorder:** Osteoarthritis, Rheumatoid arthritis.
8. **Diet in Disease of Nervous System:** Nutritional Polyneuropathy, Alzheimer's Disease, Parkinson Disease, Burning feet Syndrome, Epilepsy.
9. **Diet in Pulmonary Disease:** Chronic obstructive pulmonary disorder, emphysema, bronchitis, Cystic fibrosis, Interstitial lung disease.
10. **Diet in Liver and renal diseases Disease :** Cirrhosis of liver, viral hepatitis, jaundice, hepatic coma, Nephritis, renal failure, renal calculi.
11. **Nutrition in Critical Care:** Enteral and parenteral nutrition, monomeric and oligomeric diet, F-100 and F-75 diet, Mode of therapy, transitional feeding.

Reference Book:

1. Dietetics , New Age International Private Limited; Seventh edition, 7<sup>th</sup> ed. B Srilakshmi
2. Nutrition And Diet Therapy, Carroll A. Lutz ,Karen Rutherford Przytulski, 3<sup>rd</sup> ed.
3. Oxford Handbook of Nutrition and Dietetics , Angela Madden, Joan Webster gandy, Angela Madden

**Code: NPH 303: Food Microbiology and Food Hygiene Full Marks -50 Credit-4**

1. **Food Contamination:** food as substrate for microorganisms, general characteristics of bacteria, molds, yeast and yeast like fungi, sources of contamination-animals, sewage, soil, water, air, fruits, contamination during handling and processing, culture media, methods of isolation of microorganisms.
2. **Destruction of Microbes:** Growth phases of bacteria, number and kinds of microorganisms present in water, purification of water, primary methods employed in destruction of bacteria, role of heat, sterilization, radiation, chemical agents in destruction of microbes.
3. **Coliform and Non-Coliform Bacteria:** detection, classification, difference.
4. **Food Fermentation:** Bread, Wines, Malted Beverages, Vinegar, Fermented vegetables, fermented dairy products, fermented meat and fish, tea, coffee, cacao, oriental fermented foods, effect of fermentation on nutritional value.
5. **Food Spoilage:** definition and causes of spoilage ,microorganisms responsible for spoilage-cereals, meat, egg, vegetables, fruits, milk, fish, poultry, canned food ,seafood, decomposition, putrefaction, decay.
6. **Food Borne Illness:**bacterial,viral,parasitic-characteristics,symptoms,sources,mode of action, diagnosis, treatment, prevention, toxins, prion, mycotoxins, enterotoxins, aflatoxins.
7. **Microbiology of Food:** microflora present in milk, grading of milk, pasteurization of milk, milk curdling, milk borne diseases.

Reference Book:

1. Food Hygiene and Sanitation , Sunetra Roday , McGraw Hill Education; 2nd edition.
2. Food Microbiology Sanitation and Hygiene, Dr. Praveen Reddy. P, Akinik Publications, 2020
3. Fundamentals of Food Hygiene, Safety and Quality , Alok Kumar, Publisher : Dreamtech Press.

**Code: NPH 304: Health system research and recent advances in public health  
Full Marks -50 Credit-4**

1. Concept of Health system research and its ways, Health care service quality assessment by qualitative research method.
2. Questioner of health system research- formulation, types, criteria of good questioner.
3. Health Service quality monitoring and evaluation: Types, method and advantages- Reduction in medical error and improvement of patient's safety.
4. Health committees and Development of health services in independent India constitutional provision, federal structure and social security.
5. National Health Policies (1983,2002,2017), Population policy, Nutrition policy.
6. Important Health Legislation in India, Policy on Indian Systems of Medicine
7. Health Infrastructure in India- Public, private and charitable, public private partnership (PPP).
8. Health financing and health insurance, civil society and social movement in health.
9. Health for all approaches- Primary Health care (1978) to Universal Health coverage, Millennium Development Goals (MDG) and Sustainable Development Goals (SDG).

Reference Book:

1. Public Health Management Principles And Practice, 2Nd Edition , Lal S, CBS Publishers and Distributors.
2. Public Health And Health Services Research In Traditional Complementary And Integrative Health Care, Editor-in-chief Jon Adams, World Scientific Europe Ltd.
3. Comparative Effectiveness Research in Health Services, Adrian Levy (Editor), Boris Sobolev, Springer; 1st ed. 2016.

**PRACTICAL**

**Code: NPH 395: Nutritional Diet Therapy**

**Full Marks -50 Credit-4**

1. Therapeutic diet preparation for metabolic diseases:  
Therapeutic diet chart preparation for Diabetes, Hypertension, Atherosclerosis, Nutritional anemia.
2. Therapeutic diet preparation for Gastro Intestinal Diseases:  
Therapeutic diet chart preparation for Diarrhea, Dysentery, Flatulence, Jaundice ,Hepatitis  
Irritable bowel Syndrome, Inflammatory bowel disease, Constipation, Colitis, Ulcer.
3. Therapeutic diet preparation for rheumatic diseases: Artharitis. Osteoarthritis.
4. Therapeutic diet chart preparation for cancer and food allergy
5. Therapeutic diet chart preparation for critical care conditions like Sepsis, trauma, burns, pre and post-surgical conditions
6. Therapeutic diet chart preparation for Respiratory and Renal diseases.

**Code: NPH 396: Analysis of Food Microbiology**

**Full Marks -50 Credit-4**

1. Preparation of liquid media (broth) and solid media for routine cultivation of bacteria
2. Preparation of slant and stab
3. Pure culture techniques: Spread plate, pour plate and streak plate
4. Isolation and enumeration of bacteria from natural sources: water, soil, air and food samples.
5. Determination of bacterial load of different food sources by standard plate count method
6. Simple staining of bacteria and study of cell types; differential staining: Gram staining, endospore staining and acid-fast staining
7. Biochemical tests for characterization: Catalase, Nitrate reduction, Indole production, Methyl red and Voges–Proskauertest
8. Sugar fermentation test.

**FORTH SEMESTER  
THEORY**

**Code: NPH 401: Social medicine and rural health**

**Full Marks -50 Credit-4**

1. **Definition and scope of social and behavioral science related to health and disease, Concept and significance of social structure and social organization.**
2. **History of Social Medicine and community health :** History of public health and its milestones, Comprehensive health care, social development and health, Dimensions and determinants of health, Concepts and indicators of health and well being natural history of disease, levels of prevention, globalization and its impact on health, roles and responsibility of state, community and private sector in health.
3. **Social sciences and health:** Definition, scope, concepts and significance of social, economic, cultural and behavioral factors on health and disease, social theories of causation of disease, Implications of social structure and socio-economic status for health, Political and economic aspects of health, health perceptions and behavior, health economics, qualitative research methodology, social work approach in health care.
4. **Sanitation & water supply:** Problem in environmental sanitation, Introduction to rural ecology and environment, housing ventilation, drinking water disposal of human, animal waste.
5. **Drinking water:** Physicochemical and microbiological analysis of the quality of water, Methods of infection of water and mode of transmission of water-borne disease, Rural water supply schemes and their implementation, Various appropriate technologies for providing potable drinking water.
6. **Rural waste Management:** Necessity of systematic collection and disposal of waste, Brief description of sewage disposal system sewerage system.
7. **Snakes and snake bite management:** Poisonous and non-poisonous snakes, snake venoms and their properties, snake-bites and snake-bite management.

Reference Book:

1. Verma S.B, Jiloka S.K, Pathak A.C, Rural health care and housing, Deep & Deep Pub. New Delhi.
2. Ghosh G.K. Water of India (Quality and Quantity), APH Publishing, New Delhi.
3. Kumar M.D. Water management in India, Gaya Publishing House, New Delhi.
4. Sinha R.K, Sinha A.K, Waste Management, INA Shri Publisher, Jaypur.
5. Ramulu Sree U.S. Management of water resources in Agriculture, New Age International Publisher, N.Delhi.
6. Sharma S. Health problems of Rural population in India, APH Publishing corporation N. Delhi.

**Code: NPH 402: Public Health and Environment Full Marks -50 Credit-4**

**1. Ecosystem:**

Concept of ecosystem, Structure and function of ecosystem, Food chain and food web, Natural and Man-made ecosystem, with examples, Environmental sanitation –impact on health.

**2. Eco-toxicology and Environmental Health:**

Principles of environmental health and human ecology

Water pollution: Water-borne diseases (Biological and Chemical)

Water purification, Water quality –criteria and standards: Physical parameters, Inorganic constituents, Microbiological aspects

Air pollution: Sources of air pollution, Air pollutants: Carbon monoxide, sulphur dioxide, lead, carbon dioxide, hydrogen sulphide, hydrocarbons, cadmium, ozone, oxides of nitrogen, polycyclic aromatic hydrocarbon, particulate matter

Effects of air pollution (Health aspects and Social and economic aspects); Prevention and control of air pollution.

### **3. Waste disposal and waste management:**

Biomedical wastes and waste management Housing sanitation, Fair sanitation

### **4. Sewage:**

Definition, Health aspects, composition of sewage, Aim of sewage purification, Modern sewage treatment

### **5. Pesticides in public health**

Isolation and development of pesticides of plant and animal origin, Use of pesticides – History of Insecticides– Definition of various terms – Advantages of chemical control and its utility in vector control, Classification of insecticides, Chemical Pesticides, Biolarvicides, Insect growth regulators, Mode of action of pesticides

### **6. Health management- Environmental Linkages**

Environmental and health impact assessment Current practice and problems in Health Impact Assessment (HIA) and Environmental Impact Assessment (EIA).

Reference Book:

1. Health And Environment. 2018. Diamond Pocket Books.
2. Anthony K. Air, the Environment and Public Health. Publisher: Cambridge University Press
3. Goldstein R L, Goldstein K, Dwelle T. Introduction to Public Health Promises and Practice. 2014. Publisher: Springer.
4. Johnson BL, Lichtveld MY. Environmental Policy and Public Health. 2<sup>nd</sup> edn.

## **Code: NPH 403: Health education, Communication and Health Programme**

**Full Marks -50 Credit-4**

### **1. Information, Education and Communication:**

Basic concept of information, Sources and uses of health and nutrition, concept, process and types of communication, functions of health nutrition communication, practices of health and nutrition communication and Concepts and techniques of Information, Education and Communication including counseling methodology.

2. **Health education, communication and information- technology:** Methods, modes and barriers of communication, planning, management and organization of health education programmes.
3. **Strategies of health education and communication at rural sector to W-W strategy and C-P strategy.**
4. **Role of media in health education, E-health and m-health.**
5. **Health Programmes:** Integrative Child Development Services (ICDS), Mid- day-meal (MDM) programme, Clinical Management- Severe Acute Malnutrition (CM-SAM), State level Nutrition programmes, Vit –A prophylaxis, iron and folic acid supplementation, Double fortification of salt (DFS) with iron and iodine, National Centre for Disease control (NCDC), National Rural Health Mission (NRHM), National Urban Mission (NUHM), National Vector Borne Disease Control Programme (NVBDCP), Revised National Tuberculosis Control Programme (RNTCP), Anemia

prophylaxis programme, Food for work programme, Iodine deficiency Disease control programme, Universal immunization programme, Reproductive and child health programme etc.

6. Objectives and Organization of important agencies, like WHO, UNICEF, FAO, ILO, Indian Red Cross Society, UNFPA, World Bank, Asia Development Bank, Ford Foundation, CARE, Rockefeller Foundation, etc. and their role in Health care activities in India.

Reference Book:

1. Priya S. Health Education & Communication Skills. Vora medical publication.
2. Lenka C. Nutrition Communication for Health Promotion. Publisher: Rubicon Publications
3. Dash M, Dash N. Health Education. 2008. Publisher: Atlantic.

**Code: NPH 404: Demography and family welfare      Full Marks -50      Credit-4**

1. Concept, Methods of Demography, Different steps in Demographic cycle, Transition of different phases in demography, Determinant of Demography.
2. Birth rate, death rate, General Fertility Rate, TFR, GMFR, ASFR, TMFR, Vital Statistics and their significance
3. Objectives and needs of welfare services, classification of services. Types of programmes for women, child and family welfare. Status of women and children in India.
4. Problems and issues related to women in India: Female foeticide; female infanticide; gender discrimination in nutrition, healthcare and education; female mortality; child marriage; trafficking of women; domestic violence; harassment of women at work ; provisions for women in the Indian constitution
5. Approaches and methods of contraception / family planning programme.
6. Family welfare and Planning.
7. Reproductive and child health.
8. Mother Child Health Care System: Components, strategies adopted, assessment, upgradation approaches.
9. Important legislation for women's welfare: Maternity benefit scheme, pension schemes for widows. Rights of women.

Reference Book:

1. Devi, L. Encyclopaedia of Child & Family Welfare. Vol (I-VI), Anmol Publications Pvt. Ltd., New Delhi.
2. Rowbotham, S. (1992). Feminism and social action. New York: Routledge.
3. Majumdar P.K (2010). Fundamentals of Demography. Rawat Publications., India
4. Sharma R.K (2020). Demography and Population Problems. Atlantic Publishers & Distributors Pvt Ltd., India.
5. Srivastava S (2013). Women and Family Welfare. Arjun Publishing House., India

6. Sarkar B. Education and Family Welfare. Daya Publishing House. India

10. Park K (2021). Park's textbook of Preventive and Social Medicine, 20<sup>th</sup> Edition, M/s Banarasidas bhanot, Jaipur

## **PRACTICAL**

**Code: NPH 495: Project (Report Preparation and Submission-25 marks, PPT Presentation-10 marks and Interaction/Viva-15 marks)**  
**Full Marks -50 Credit-4**

An independent research project work undertaken by student under the guidance of a teacher, can either be a survey or Laboratory oriented research. The research should be submitted at the end of session in the form of a dissertation. The project work can be undertaken at University departments, affiliated research institutions, food industries or other institutions with prior approval

**Code: NPH 496: Internship at any Food Industry/ Research Institute / Health care Centre.(Report Submission- 25 marks, PPT Presentation-10 and Interaction / Viva- 15 marks)**  
**Full Marks -50 Credit-4**

Students are required to perform internship in hospitals / foods service institutions / Clinics and they have to submit a report on the internship training during examination. Evaluation of internship shall be made on the basis of report and viva-voce examination.