DEPARTMENT OF FOODS AND NUTRITION

M.Sc. (NEP) – REGULAR

(PUBLIC HEALTH NUTRITION)

NEP STRUCTURE FOR FOODS AND NUTRITION POSTGRADUATE COURSE

(MAJOR: PHN - GRANT IN AID ROGRAMME)

	Semester I	
COURSE TYPE	**PHN**	**Credit**
MAJOR	Core Principles of Human Nutrition	4 (4+0)
MAJOR	Recent trends In Food Science	4 (3+1)
MAJOR	Biochemistry and Metabolism	4 (4+0)
MAJOR (BKS)	Resilient Food System	4 (4+0)
MDC	Human Physiology	4 (4+0)
SEC	Food Formulation and Product Development	2 (1+1)
	TOTAL	**22**
	Semester II	
MAJOR	Research Methods in PHN	4 (3+1)
MAJOR	Global Nutrition	4 (4+0)
MAJOR	Nutrition Program Planning and Management	4 (3+1)
MAJOR (Vocational)	Field Practice in Public Health Nutrition	4 (1+3)
MDC	Communication for Development and Advocacy	4 (3+1)
SEC	Nutrition for special conditions	2 (2+0)
	TOTAL	**22**

SEMESTER – I

(PUBLIC HEALTH NUTRITION)

Syllabus of Courses

<table>
<tr><td></td><td colspan="3">The Maharaja Sayajirao University of Baroda
Faculty of Family and Community Sciences
Department of Foods and Nutrition
Fatehgunj, Vadodara 390002</td><td colspan="2">ACADEMIC YEAR
2026-2027</td></tr>
<tr><td colspan="6">M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)</td></tr>
<tr><td>YEAR</td><td>I</td><td rowspan="2">Course Type: Major
Course Number:
Course Title: Core Principles of Human Nutrition</td><td>Credit</td><td>4 (4+0)</td></tr>
<tr><td>Semester</td><td>I</td><td>Hours</td><td>60</td></tr>
<tr><td>OBJECTIVES</td><td colspan="4">1. To acquire insights into recent advancements on the influence of nutrients on growth, development and health.
2. To gather latest information on the biological functions of macro and micronutrients and how they affect food and nutrition guidelines.
3. To understand the function of nutrients as defined by their chemistry, interrelations among nutrient functions, and mechanistic approaches in the analysis of nutrient disease relationships, and recent advances in the basic sciences related to nutrient function.
4. To gain proficiency with health and nutrition evaluation indicators and comprehend their significance and interpretations.
5. To develop analytical skills by understanding the newer insights available in published, peer reviewed literature, case studies, Position Statements and public policy documents.</td></tr>
<tr><td colspan="6">COURSE CONTENT / SYLLABUS</td></tr>
<tr><td>UNIT-I</td><td colspan="3">Energy
a) Central control of energy: CNS regions involved in the regulation of food intake, neurotransmitters and cells involved in appetite regulation
b) Non Homeostatic control of energy intake: difference between homeostatic and non homeostatic CNS signals, Neurotransmitters involved
c) Energy expenditure: Components of energy expenditure (BMR , TEF & Physical activity)
d) Physical Activity guidelines, tools for data collection – calculations of Energy Expenditure
e) Undernutrition & Overweight/ Obesity: Definition, clinical and Biochemical changes in metabolism and adaptations
f) Recent advances for estimating RDA for energy intake based on ICMR-NIN guidelines for Indians.</td><td colspan="2">08 hrs.</td></tr>
<tr><td>UNIT-II</td><td colspan="3">Macronutrients – Carbohydrates
a) Carbohydrates
i. Review of Structure, classification and food sources of carbohydrates, sugar alcohols, Digestion, absorption transport mechanisms and cellular uptake
ii. Assessment of glucose homeostasis
iii. Fructose metabolism and health effects
iv. Glycemic Index, Glycemic Load
v. RDA for Sugars & Carbohydrates
b) Fibre
i. Definition and Classification of different types of fibre including resistant starch
ii. Physiological effects of dietary fibre on energy metabolism,
iii. CVD, insulin response, Colon Cancer
c) Insulin Resistance (IR)and Diabetes Mellitus (DM)
i. Definition of IR& type 2 DM</td><td colspan="2">10 hrs.</td></tr>
</table>

	ii. Action of insulin iii. Understanding the demands of energy by the cell via AMP activated protein kinase and silent information regulator iv. Diagnostic tests to evaluate IR & DM v. Metabolic syndrome & DM vi. Low birth weight and NCD's (Altered programming pathways and their consequences)	
UNIT-III	**Lipids an Overview** a) Review of Digestion, absorption, transport of lipids and delivery to cells b) Different classes of lipids and lipid and apolipoprotein composition of different lipoproteins c) Role of gut in lipid homeostasis d) Endogenous pathway of lipid metabolism e) Pathogenesis of CVD & role of dietary fat on serum lipoproteins f) Diabetic dyslipidemia g) Lipids & Regulation of gene expression h) Essential fatty acids, Eicasanoids, functions, biological significance especially in inflammation i) trans fatty acid & its health implications, transfat free India j) Human requirements, assessment indicators and guidelines for heart health k) Discussion on Review/meta analysis of the papers on omega 3 fatty acids, trans fatty acids, DHA l) Recent advances for estimating RDA for visible fat intake based on ICMR-NIN guidelines for Indians.	10 hrs.
UNIT-IV	**Proteins** a) Review of Basic concepts, digestion, absorption, transport of proteins, Structure of proteins & classification of amino acids b) Fate of absorbed amino acids, synthesis and degradation process c) Calorie restriction, protein metabolism and BCAA d) Protein requirements and quality of proteins: Methods used to determine human protein requirements e) Non protein compounds: their biological importance f) Recent advances for estimating RDA for protein based on ICMR-NIN guidelines for Indians.	10 hrs.
UNIT-V	**Fat Soluble Vitamins** **a) Vitamin A** i. Vitamers and International Units ii. Metabolism and storage of vitamin A and pro vitamin A carotenoids iii. Factors affecting carotenoids bioavailability and role of carotene dioxygenase iv. Plasma retinol binding protein v. Metabolic functions of Vitamin A & Carotenoids vi. The antioxidant function of carotenoids vii. Newer insights in Vitamin A fortification and supplementation viii. Vitamin A, Growth, Infection, morbidity and Immunity ix. Deficiency, Assessment, Indicators & RDA x. Toxicity of Vitamin A & teratogenicity xi. Interactions of vitamin A with drugs and other nutrients **b) Vitamin D** i. Vitamers and International Units ii. Absorption and Metabolism iii. Synthesis of Vitamin D in the skin iv. Metabolism to Calcitriol v. Regulation of Vitamin D metabolism& biological functions	08 hrs.

	vi. Vitamin D deficiency: Rickets and Osteomalacia vii. Strategies to combat Vitamin D deficiency viii. Newer perspectives of Vitamin D in Human Nutrition ix. Interaction with drugs and other nutrients x. Deficiency, assessment, indicators for Vitamin D status xi. Toxicity of Vitamin D xii. Osteoporosis: Causes, consequences & guidelines for management xiii. Discussion: Role of Vitamin D beyond bone health, observations emerging from review and meta analysis **c) Vitamin E** i. Vitamers and units of activity ii. Absorption and metabolism iii. Metabolic functions of vitamin E iv. Vitamin E deficiency, requirements and assessment indicators v. Toxicity vi. Interaction with other nutrients **d) Vitamin K** i. Vitamers ii. Dietary sources, bacterial synthesis and metabolism iii. Metabolic functions of vitamin K iv. Other vitamin K dependent proteins v. Vitamin K deficiency and requirements vi. Vitamin K and neonates vii. Toxicity and drug interactions	
UNIT-VI	**Water Soluble Vitamins: Ascorbic Acid & B Complex vitamins (B1, B2, B3, B6, B12, Folic acid, Biotin, Pantothenic acid)** a) Historical perspective /Landmarks b) Metabolism: digestion, absorption, transport, utilization, excretion c) Metabolic functions d) Fortification and Supplementation e) Deficiency & requirements f) Toxicity & drug interactions g) Assessment indicators	06 hrs.
UNIT-VII	**Minerals** **a) Minerals (Calcium, Phosphorous, Iron, Iodine, Copper, Zinc and Fluoride)** i. Sources, digestion, absorption, transport and utilization ii. Factors influencing bioavailability iii. Homeostasis iv. Metabolic functions v. Deficiency & Requirements vi. Toxicity & drug interactions vii. Assessment indicators & RDA viii. Micronutrient interactions ix. Success stories of fortification: Vehicles, form, dose, etc x. Iron, Physical work capacity and cognition xi. Iodine, growth & cognition xii. Zinc, growth & diarrhoea xiii. Deficiency, Assessment, Indicators xiv. Toxicity levels xv. Supplementation, fortification and dietary approaches to combat IDA & IDD xvi. Discussion**:** Observations emerging from Review papers/Meta-analysis, technical report on Micronutrient malnutrition	08 hrs.

	b) Minerals (Sodium and Potassium) i. Role of Sodium and Potassium in electrolyte balance ii. Role of Sodium in hypertension iii. Deficiency, assessment , indicators iv. WHO guidelines on Sodium & Potassium v. Discussion: WHO shake the salt habit vi. Antioxidants: Vitamins, Minerals, Enzyme – mechanism and clinical implications	

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2.	Nutrition in Public Health. Principles, policies and practice. 2nd edition. Arlene spark, Lauren M dinourJanelObenchain. CRC press, Taylor & Francis group, USAISBN 13:978-4987-6661-6, 2015.
3.	Human Energy requirements (2004). Report of a joint FAO/WHO/UNU Expert consultation, Rome,
4.	WHO report on Global action plan for the reduction of non communicable diseases,2013, Geneva
5.	Susan A. Lanham–New, Ian A. MacDonald and Helen M. Roche, Nutrition and Metabolism (The Nutrition Society Textbook), Second Edition- 2011. Wiley-Blackwell.
6.	Martha H. Stipanuk and Marie A. Caudill, Biochemical, Physiological, and Molecular Aspects of Human Nutrition, Third Edition- 2013. Elsevier
7.	Nutrient Requirements & Recommended Dietary Allowances for Indians (1990, Reprinted 2008) 2nd Edition - 2010) By B.S. NarasingaRao, B. Sivakumar)
8.	WHO (2016) SHAKE the Salt habit The SHAKE TECHNICAL PACKAGE for Salt Reduction.
9.	2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease. A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines
10.	Diabetes and Hypertension: A Position Statement by the American Diabetes Association; 2017
11.	Noncommunicable Diseases Progress Monitor 2017. World Health Organization; 2017
12.	Treatment of Diabetes in Older Adults: An Endocrine Society Clinical Practice Guideline; 2019
13.	http://www.framinghamheartstudy.org/
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15.	Global Action Plan for the Prevention and Control of Noncommunicable diseases 2013-2020. World Health Organization; 2013
16.	https://fssai.gov.in/cms/eat-right-india.php
17.	Healthy diets for all: A key to meeting the SDGs. Global Panel on Agriculture and Food Systems for Nutrition. Policy Brief No.10; 2017
18.	Large Scale Food Fortification in India- The Journey So Far and Road Ahead. FSSAI 2017
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20	Hill N, Fallowfield J, Price S and Wilson D. Military nutrition: maintaining health and rebuilding injured tissue. Philos Trans R Soc Lond B Biol Sci. 2011, 366(1562):231-240
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22	Space Food and Nutrition. An Educator's Guide with Activities in Science and Mathematics. NASA; 1999
23	Bhide G and Mandlik S. (2018), Nutritional Guidelines for sportspersons Jaypee Brothers Medical Pub;ishers Pvt. Ltd, New Delhi, India
24	Dan Benardot. Advanced Sports Nutrition 2nd Edition; 2018
25	Nutrition for Athletes, A practical guide to eating for health and performance, Prepared by the Nutrition Working Group of the International Olympic Committee based on an International Consensus Conference held at the IOC in Lausanne in October 2010Revised and Updated in April 2012
26	https://www.unicef.org/nutrition/index_emergencies.html

27	The management of nutrition in major emergencies. WHO, UNHCR, IFRC, WFP; 2000
28	Guideline on Sodium intake for adults and children. WHO; 2012
29	Guideline on Potassium intake for adults and children. WHO; 2012
	Journals
	1. American Journal of Clinical Nutrition 2. British Journal of Nutrition 3. Human Nutrition & Dietetics 4. Journal of Nutrition 5. European Journal of Clinical Nutrition 6. Indian Journal of Medical Research 7. Circulation

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Family and Community Sciences** **Department of Foods and Nutrition** **Fatehgunj, Vadodara 390002**	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

Year	**I**	**Course Type: Major**	**Credit**	**4 (3+1)**
Semester	**I**	**Course Number:** **Course Title: Recent Trends in Food Science**	**Hours**	**45**

OBJECTIVES:	1. Discuss advanced processing techniques and product development approaches in plant-based foods (cereals, millets, pulses, fruits and vegetables). 2. Explain processing technologies, quality evaluation and functional applications of animal-based foods (milk, meat, poultry, fish and eggs). 3. Examine the nutritional, functional and technological roles of oils, nuts and super seeds in food systems. 4. Evaluate processing, quality and regulatory aspects of alcoholic, non-alcoholic and specialty beverages (tea, coffee, cocoa/chocolate). 5. Critically appraise emerging trends, sustainability issues and future innovations in food science and technology.

COURSE CONTENT / SYLLABUS

UNIT-I	**Advanced Processing of Plant-Based Foods** a) Cereals & Millets: Parboiling, malting; low GI, gluten-free and multigrain formulations; nutritional significance and global perspective b) Pulses & Legumes: Milling, germination, fermentation; functionality (protein isolates, concentrates, hydrolysates); applications in plant-based foods and meat analogues. c) Fruits & Vegetables: Post-harvest physiology; advanced preservation (HPP, irradiation, MAP); nutrient retention; by-product and waste utilization.	09 hrs
UNIT-II	**Milk and Dairy Innovations** a) Structure and composition of milk. b) Processing: pasteurization, homogenization, UHT, membrane processing. c) Innovations: probiotic yogurts, functional dairy beverages, lactose-free products, whey-based foods. d) Casein, whey proteins and bioactive peptides in health promotion.	07 hrs
UNIT-III	**Meat, Poultry, Fish and Eggs** a) Meat & Poultry: Composition; post-mortem changes; processing (chilling, freezing, curing, smoking, canning, irradiation); value-added products (RTE meats, sausages); microbial safety & HACCP. b) Fish: Freshness characteristics; spoilage (microbiological, physiological, biochemical); preservation and processing; functional products (omega-3 enriched oils); cooking methods. c) Eggs: Quality evaluation & grading; deterioration and storage; processing (freezing, drying); effect of heat on proteins; foaming properties (beating, stability, influencing factors).	10 hrs
UNIT-IV	**Oils, Nuts and Seeds** a) Extraction, refining and processing of edible oils.	06 hrs

	b) Super seeds: Chia, flax, hemp, sunflower, pumpkin, watermelon seeds and basil– composition, bioactive compounds (omega-3 fatty acids, lignans, polyphenols, plant proteins), health benefits and applications in bakery, beverages and nutraceutical products. c) Oleogels: preparation, properties and applications in fat replacement.	
UNIT-V	**Beverages** a) Alcoholic Beverages: fermentation (beer, wine, spirits), maturation, innovations and health concerns. b) Non-Alcoholic Beverages: fortified, probiotic, sports and energy drinks and plant-based alternatives. c) Processing of Specialty Beverages: i. Tea – types (green, black, oolong, herbal), withering, rolling, fermentation, drying and quality evaluation. ii. Coffee – harvesting, fermentation, roasting, grinding, brewing methods and flavour chemistry. iii. Cocoa & Chocolate – fermentation, drying, roasting, conching, tempering and applications in functional foods. d) Nutraceutical and functional beverage trends. e) Quality, safety and regulatory aspects of beverages.	08 hrs
UNIT- VI	**Emerging Trends and Future of Food Science** a) Climate-resilient crops and novel food sources (e.g. insects, algae, lab-grown meat). b) Sustainability and circular economy in food systems. c) Future innovations: 3D food printing, smart/intelligent packaging, AI in food systems. d) Global perspectives on functional foods and nutraceuticals.	06 hrs

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19.	WHO & FAO. (2019). Sustainable healthy diets: Guiding principles. World Health Organization.

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Journals	
1.	*Food Chemistry* (Elsevier)
2.	*Journal of Food Science and Technology* (Springer / AFSTI, India)
3.	*Comprehensive Reviews in Food Science and Food Safety* (Wiley, Institute of Food Technologists)
4.	*Critical Reviews in Food Science and Nutrition* (Taylor & Francis)
5.	*Journal of Functional Foods* (Elsevier)
6.	*Meat Science* (Elsevier)
7.	*LWT – Food Science and Technology* (Elsevier)
8.	*Trends in Food Science & Technology* (Elsevier)
9.	*Journal of Dairy Science* (Elsevier)
10.	*Food Chemistry* (Elsevier)
11.	*Journal of Food Science and Technology* (Springer / AFSTI, India)
12.	*Comprehensive Reviews in Food Science and Food Safety* (Wiley, Institute of Food Technologists)
13.	*Critical Reviews in Food Science and Nutrition* (Taylor & Francis)

For Practical

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)				
Year	**I**	**Course Type: MAJOR**	**Credit**	**4 (3+1)**
Semester	**I**	**Course Number: Course Title: Recent Trends in Food Science**	**Hours**	**30**

COURSE CONTENT / SYLLABUS

UNIT-I	**Fermentation of Foods** a) Preparation of fermented products from different food groups (e.g., idli/dosa batter, curd/yogurt, sauerkraut/pickled vegetables, milk).	04 hrs
UNIT-II	**Milk and Milk Products** a) Effect of heat on milk b) Effect of heat and acid on the proteins of milk c) Effect of added substance on the stability of milk	
UNIT-III	**Egg Quality Evaluation, Egg Foam and Culinary Applications** a) Candling and measurement of yolk index and Haugh unit b) Stages of egg foam formation. c) Preparation of soufflé, meringue, sponge cake, or fluffy omelette. d) Study of factors influencing foam stability (sugar, acid, fat).	12 hrs
UNIT-IV	**Texturized Foods / Meat Alternatives** a) Preparation and sensory evaluation of a dish using texturized vegetable proteins (soy chunks, soy nuggets, meat analogue).	04 hrs
UNIT-V	**Fruits & Vegetables** a) Minimal processing and preparation of a functional product (e.g., fruit leather, dehydrated vegetable chips, candied fruits)	04 hrs

Syllabus of Courses

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M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)			
YEAR	I	**Course Type: Major**	CREDIT	4 (4+0)
Semester	I	**Course Number: Course Title: Biochemistry and Metabolism**	HOURS	60

OBJECTIVES:	1. To understand the delivery and function of cellular nutrients and metabolism in human body. 2. To understand the major metabolic pathways of various nutrients, their regulatory mechanisms in normal, sub clinical and clinical conditions. 3. To apply the knowledge of biochemistry and clinical biochemistry to human nutrition. 4. To develop the ability and skills to understand metabolic aberrations in various diseases and communicate scientifically in the form of oral presentation using ICT

COURSE CONTENT / SYLLABUS

UNIT-I	**Enzymes (Kinetics and Control), Oxidative Phosphorylation and Molecular Endocrinology** a) **Enzymes** i. Classification of enzymes ii. Kinetics: role of various modulators iii. Enzyme specificity: the active site and mechanism of catalysis iv. Coenzymes: structure and function v. Inhibition of enzymes &Clinical significance vi. Allosteric control and regulation of enzyme activity vii. Clinical applications of enzymes b) **Oxidative Phosphorylation** i. Electron transfer reactions in mitochondria ii. ATP synthesis iii. Regulation of oxidative phosphorylation c) **Molecular Endocrinology** i. Hormonal cascade system ii. Biosynthesis, inactivation and degradation of hormones iii. Hormonal action at the cellular level iv. Signalling Pathways, Signal transduction, Protein Kinase systems, Secondary Messengers v. Neurotransmitters	9 hrs.
UNIT-II	**Carbohydrate Metabolism** a) Structure and properties of carbohydrates b) Digestion, absorption and intestinal transport of carbohydrates c) Transport of glucose across various cells d) Carbohydrate Metabolism: major metabolic pathways and their regulation at various levels (Enzyme, Hormone, Organ) i. Glycolysis ii. TCA Cycle iii. Gluconeogenesis (coordinated regulation of glycolysis and gluconeogenesis) iv. Glycogenesis v. Glycogenolysis (coordinated regulation of glycogen synthesis and breakdown)	15 hrs.

	vi. HMP Shunt vii. Uronic acid pathway viii. Glycoconjugates: Glycoproteins, Proteoglycans and Glycolipids ix. Clinical Correlations i) Glycogen storage diseases ii) Lactose intolerance iii) Galactosemia iv) Diabetes mellitus v) Lactoacidosis vi) Pyruvate kinase deficiency and hemolytic anemia vii) Hypoglycemia and alcohol intoxication viii) Essential fructosuria and fructose intolerance ix) Glucuronic acid: significance of glucuronide formation x) Glucose 6 phosphate dehydrogenase and erythrocytes	
UNIT-III	**Lipid metabolism** a) Structure and properties of lipids b) Digestion, mobilization and transport of lipids (Lipoprotein metabolism) c) Lipid metabolism: i. Utilization of fatty acids for energy production ii. Synthesis of fats iii. Storage of fatty acids as triacylglycerols iv. Cholesterol metabolism v. Prostaglandins and thromboxanes vi. Phospholipids vii. Sphingolipids d) Clinical correlations i. Leptin and obesity ii. Genetic deficiencies in carnitine palmitoyl transferase iii. Genetic deficiencies in the acyl CoA dehydrogenases iv. Diabetic ketoacidosis v. Lipoproteinemias vi. Fatty liver vii. Atherosclerosis	15 hrs.
UNIT-IV	**Amino acid oxidation and production of urea; Nucleotides and Nucleic Acids** a) **Amino acid oxidation and production of urea** i. Structure and properties of amino acids ii. Metabolic fates of amino groups iii. Nitrogen excretion and the urea cycle iv. Pathways of amino acid degradation v. Clinical correlations i) Deficiencies of urea cycle enzymes i) Phenylketonuria ii) Disorders of tyrosine metabolism iii) Hyperhomocysteinemia and atherogenesis iv) Inborne errors of metabolism b) **Liver Biochemistry** i. Primary function ii. Integrating Carbohydrate Metabolism, Protein Metabolism & Lipid Metabolism iii. Biotransformations c) **Nucleotides and Nucleic Acids** i. Biosynthesis and degradation of purine and pyrimidine nucleotides ii. DNA metabolism: replication, mutation, repair and recombination iii. RNA metabolism	15 hrs.

	iv. Clinical correlations i) Lesch–Nyhan syndrome ii) Gout iii) Hereditary Orotic Aciduria iv) Mutations of mitochondrial DNA: aging and degenerative diseases v) Mutations and the etiology of cancer	
UNIT-V	**Protein Metabolism** a) Structure and properties of proteins b) The process of protein biosynthesis : Gene expression, c) Transcription, Translation, Post-translational modification. d) Inhibitors of protein biosynthesis e) Clinical correlations i. Thalassemia ii. Cystic fibrosis iii. Haemoglobin & Bile	6 hrs.

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3.	Rodwell VW, Bender D, Botham KM, Kennley PJ, Weil PA. Harper's Biochemistry Illustrated Biochemistry. 31st Edition, 2018. Published by McGraw Hill Education.
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7.	Kuchel PW and Ralston GB. Schaum's outlines of Biochemistry. 3rd edition, 2011. Published by Tat McGraw Hill, New Delhi.
8.	Denise R. Ferrier, Biochemistry (Lippincott's Illustrated Reviews Series) Seventh Edition 2017
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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002		**ACADEMIC YEAR 2026-2027**	
M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)				
YEAR	I	**Course Type: Major (BKS)**	CREDIT	**4 (4+0)**
Semester	I	**Course Number: Course Title: Resilient Food Systems**	HOURS	**60**

OBJECTIVES:	1. To familiarize students with the structure and functioning of food systems at global, national, and local levels. 2. To build conceptual clarity on evolving paradigms of food security, nutrition security, food sovereignty, and food systems transformation. 3. To equip students with skills to measure and interpret dietary diversity using standard tools. 4. To promote critical understanding of sustainability dimensions within food systems. 5. To provide an overview of policy and governance frameworks in India and intersectoral coordination in advancing food and nutrition security. 6. To develop systems thinking and analytical skills for mapping food system pathways. 7. To encourage evaluation of innovative and transformative approaches for sustainable and planet healthy food system.

COURSE CONTENT / SYLLABUS

UNIT-I	**Introduction to Sustainable Food Systems**	15 hrs.

a) **Conceptual Foundations**

i. **Definition of Food Systems** – Scope and importance.

ii. **Core Components** – Production, processing, distribution, consumption, and waste.

iii. **Drivers and Outcomes** – Biophysical, socioeconomic, cultural, and policy drivers shaping outcomes.

iv. **The Food System Wheel** – Integrative framework for understanding interactions.

b) **Governance and Policy Dimensions**

Role and Engagement of Key Ministries in India – Ensuring availability, access, affordability, diversity, sustainability, and resilience of food systems:

i. **Ministry of Agriculture & Farmers Welfare (MoAFW)** – Production, crop diversification, sustainability.

Ministry of Consumer Affairs, Food & Public Distribution A.

Fundamental concepts and the role of sanitation in food quality and public health.

a) **(MoCAF&PD)** – PDS, procurement, affordability.

b) **Ministry of Health & Family Welfare (MoHFW)** – Nutrition programs, food safety (FSSAI).

c) **Ministry of Women & Child Development (MoWCD)** – ICDS, POSHAN Abhiyaan, women and child nutrition.

d) **Ministry of Food Processing Industries (MoFPI)** – Food transformation, fortification, value addition.

e) **Ministry of Rural Development (MoRD)** – Livelihoods, SHGs, wage support for food access.

f) **Ministry of Education (MoE)** – Mid-Day Meals (PM-POSHAN), nutrition education.

	g) **Ministry of Environment, Forest & Climate Change (MoEFCC)** – Climate, biodiversity, sustainability of production systems. **h) NITI Aayog** – Convergence, monitoring, policy think-tank role.	
	Perspectives, Frameworks, and Transformation of Food Systems	
	a) Perspectives on Food Systems i. **Global and National Food Systems** – Structures, policies, governance, and trade. ii. **Industrial Food Systems –** Characteristics, opportunities (efficiency, reach), risks (ultra-processed foods, health, environmental costs). iii. **Local Food Systems & Nutrition Anthropology –** Cultural traditions, indigenous foods, seasonal diets, community-driven solutions. iv. **Tailoring Food System Investments –** Context-specific approaches for resilience and sustainability.	
UNIT-II	**Food Systems Transformation and Sustainability**	20 hrs.
	a) **Evolution of Concepts** – Food Security → Nutrition Security → Food Sovereignty → Food Systems Transformation. b) **Healthy Diets for All** – Foundation of well-being and sustainable societies. c) **Measurement Tools** – HDDS, WDDS, MAD for assessing diet quality and adequacy. d) **Sustainability Challenges** – e) Environmental: Climate change, biodiversity, land, water, GHG emissions (food miles) f) Economic: Livelihoods, fair pricing, circular economy, value chains g) Social & Equity: Gender, indigenous knowledge, tribal food systems h) Nutrition: Safe diets, Dietary diversity, sustainable diets, food loss and waste i) Value added Sustainable Food system Development j) **Global Relevance to SDGs** **Indian Examples** a) **National level:** NFSA (2013), POSHAN Abhiyaan, Mid-Day Meal Scheme. b) **Industrial:** Rise of processed snack foods and FoPNL regulation by FSSAI. c) **Local:** Tribal diets in Gujarat and Assam; millet revival in Karnataka and Odisha. d) **Transformation initiatives:** International Year of Millets (2023), Eat Right India movement. **Pathways for Transformation** a) Climate-smart agriculture, sustainable intensification b) Urban agriculture, school gardens, food forests c) Investment in R&D for climate-resilient crops and systems - Flood- & drought-tolerant rice, Dual-stress rice with efficiency gains, Heat-tolerant, disease-resistant wheat, d) Education and behavior change among consumers – food purchasing and consumption behaviour, Sustainability-Oriented Choices, food waste reduction e) Integration of food systems in climate and health policies	
UNIT-III	**Key Theories and Frameworks**	05 hrs.
	a) FAO's Framework for Sustainable Food Systems b) HLPE Food Systems Framework c) Doughnut Economics (Kate Raworth) d) Food Systems Thinking, Agroecological approach e) One Health, Planetary Health Diet (EAT–Lancet)	
	Developing Sustainable Food Systems	

UNIT-IV	**a) Measuring Food System Sustainability** i. Indicators: Environmental footprint, dietary carbon footprint, land use, water use – Indian food system, regional food system, global food system ii. Food Systems Dashboard iii. Life Cycle Assessment (LCA) methods **b) System Mapping** i. What is food mapping? i) Mapping food production → processing → distribution → consumption → waste. Example: The journey of rice/wheat through FCI, PDS, and retail. ii. **Stakeholders in Food Systems** - Farmers, cooperatives, processors, traders, consumers, NGOs, policymakers. ii) Example: How stakeholders work together in India's **Mid-Day Meal Scheme**. **c) Policies and Food System Reform** i. How subsidies, procurement, and government schemes shape the system. i) Example: Subsidy shift from rice/wheat to **millets** under National Food Security Mission. **d) Technology and Innovation** i. Digital tools for farmers (Kisan apps, e-NAM). ii. Climate-smart farming, natural farming (Zero Budget Natural Farming). **e) Capacity Building** i. Why farmer training and extension services matter. ii. Role of SHGs, Krishi Vigyan Kendras, and local innovations.	15 hrs.
UNIT-V	**Future Scenarios and Policy Action**	05 hrs.
	a) Futures thinking: foresight, scenario building, planetary boundaries b) The Food Systems Countdown Initiative (FSCI) c) Role of youth, women, communities d) Building resilience: circular food systems, regenerative agriculture e) Case Study – Indian Context i. India's policy momentum - initiatives like International Year of Millets 2023 ii. National Mission on Sustainable Agriculture (NMSA), iii. Zero Budget Natural Farming (ZBNF) and iv. Eat Right India. v. Local and regional supply chains, millet-based diets and state-led procurement reforms	

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2.	Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, United Nations Children's Fund, World Food Programme, & World Health Organization. (2024). *The state of food security and nutrition in the world 2024* (SOFI report). FAO. https://www.fao.org/publications/sofi
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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002		**ACADEMIC YEAR 2026-2027**	
M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)				
YEAR	**I**	**Course Type: Major**	**CREDIT**	**4 (4+0)**
Semester	**I**	**Course Number: Course Title: Human Physiology**	**HOURS**	**60**
Objectives	1. To provide students with an in-depth understanding of cellular signaling mechanisms, and the advanced kinetics of nutrient transport across plasma membranes. 2. To detail the molecular mechanisms of hormone secretion (such as insulin) and the role of various organs and tissues 3. To explore the physiological adaptations occurring during pregnancy, lactation, and aging, as well as the body's cardiovascular, renal, and metabolic responses to exercise and acute stress			
COURSE CONTENT / SYLLABUS				
UNIT-I	**Cellular & Molecular Physiology** a) Cell Signaling & Nutrient Sensing: Mechanism of G-protein coupled receptors (GPCRs) and intracellular signaling (mTOR pathway, AMPK) in response to amino acids and glucose. b) Transport Mechanisms: Advanced kinetics of nutrient transport across the plasma membrane (SGLT, GLUT, and PEPT transporters). c) The Gut Microbiome-Physiology Axis: Interaction between gut microbiota, the mucosal immune system, and systemic metabolic health. d) Bioenergetics: Mitochondrial function, oxidative phosphorylation, and the physiological consequences of mitochondrial dysfunction			10 hrs.
UNIT-II	**Advanced Gastrointestinal & Absorptive Physiology** a) Neuro-hormonal Control of Digestion: Integrated action of Gastrin, CCK, Secretin, and Ghrelin; the Enteric Nervous System (ENS). b) The Exocrine Pancreas & Biliary System: Advanced regulation of enzyme secretion and bile acid enterohepatic circulation. c) Intestinal Permeability: The physiology of "Tight Junctions" and the impact of fiber- derived SCFAs. d) Absorption Pathophysiology: Physiological basis of malabsorption syndromes (Celiac, Short Bowel Syndrome etc.) e) Gut-Brain Axis: The physiological signaling of hunger and satiety via the Vagus nerve and gut peptides (PYY, GLP-1). f) Biliary Physiology: Advanced enterohepatic circulation of bile salts and its role in cholesterol homeostasis.			10 hrs.
UNIT-III	**Endocrine & Metabolic Integration** a) Pancreatic Endocrine Function: Molecular mechanism of insulin secretion and glucose-stimulated insulin release (GSIS). b) Adipose Tissue as an Endocrine Organ: Physiology of Leptin, Adiponectin, and pro-inflammatory cytokines in obesity. c) Energy Homeostasis: Hypothalamic regulation of appetite (the POMC/AgRP circuit). d) Calcium & Bone Metabolism: Integrated role of PTH, Vitamin D, and Calcitonin in bone remodeling and renal handling of minerals.			10 hrs.

UNIT- IV	**Cardiovascular, Hematological, Renal, and Respiratory Physiology** a) Cardiovascular Hemodynamics: Nutrient-induced changes in blood flow; the physiology of endothelial function and nitric oxide. Cardiac Electrophysiology & Output b) Advanced Hematology: Erythropoiesis and iron metabolism; the physiology of hemostasis and the impact of Vitamin K and Omega-3 fatty acids on coagulation cascades. Role of lymphatic system in lipid transport (chylomicrons) and immune surveillance c) Renal Handling of Nutrients: Advanced glomerular filtration and tubular reabsorption of electrolytes and glucose; the Renin-Angiotensin-Aldosterone System (RAAS). d) Acid-Base Balance: The physiological role of the lungs and kidneys in maintaining blood pH through bicarbonate and phosphate buffers. e) Physiology of Exercise: Metabolic shifts between carbohydrate and lipid oxidation during varied intensities.	18 hrs.
UNIT V	**Clinical Physiology & Life Cycle Transitions** a) Pregnancy & Lactation: Physiological adaptations in maternal metabolism and the mechanics of milk synthesis/ejection. b) Aging & Sarcopenia: Physiological changes in muscle protein synthesis and digestive efficiency in the elderly. c) Metabolic Response to Stress: Systemic Inflammatory Response Syndrome (SIRS) and the "hypermetabolic" state in trauma/burns. d) Neurophysiology of appetite, Taste and Reward: The dopaminergic system and its role in food addiction and hedonic eating.	12 hrs.

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1.	Hall, J. E., & Hall, M. E. Guyton and Hall Textbook of Medical Physiology. (The "Gold Standard" for advanced systems physiology).
2.	Gropper, S. S., & Smith, J. L. Advanced Nutrition and Human Metabolism. (Crucial for bridging physiology and nutrition).
3.	Barrett, K. E. Ganong's Review of Medical Physiology. (Excellent for neuro-endocrine and GI sections).
4.	Blaustein, M. P., et al. (2019) Cellular Physiology and Neurophysiology.
5.	Melmed, S., et al. (2020). Williams Textbook of Endocrinology. (The definitive resource for endocrine physiology).
6.	Holt, E., et al. (2021). Basic Endocrinology for Students and Practitioners.
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10.	MountcastleVB(1979), (2008). Overview of Medical Physiology
11.	Guyton AC (1985). Functions of Human body
12.	Guyton AC & Hall JB (1996). Text book of Med. Physiology.
13.	Wilson KJW & Waugh A (1996). Ross and Wilson. Anatomy and Physiology in Health and illness
14.	Mc Ardle WD, Katch FI, Katch VL (1996). Exercise physiology- Nutrition & Human performance
15.	Mc Ardle WD, Katch FI, Katch VL Essentials of Exercise Physiology-3rd Edition-Google books
16.	Nutritional Genomics: The Impact of Dietary Regulation of Gene Function on Human Disease 1st Edition- by Wayne R. Bidlack , Raymond L. Rodriguez
17.	Jain AK (1999). Text book of Physiology Vol 1& 2
18.	Bijlani RL (1997). Understanding Medical Physiology
19.	Harrisons-On line- Text book of Physiology. Medical Review of Physiology
20.	Schmidt & Nelson. Physiology of mammals.

21.	Kronenberg H, Melmed S, Polonsky KS, Larsen P Reed. (2010).
22.	Williams Textbook of Endocrinology (11thed.).
23.	Williams Pathophysiology (2007) Saunders
24.	Gross L (2007). New Human genome-Individualised Genomics.
25.	Collins FS (2003). New goals for human genome
	Reference Journals
26.	Journal of Biological Chemistry (For molecular signaling pathways).
27.	Frontiers in Endocrinology (Nutritional Endocrinology section).
28.	Journal of Clinical Investigation: Selected reviews on the "Endothelial function and Diet."
29.	Annual Review of Physiology: "The Gut-Brain Axis in Energy Homeostasis."
30.	American Journal of Physiology (Endocrinology and Metabolism)
31.	The Journal of Nutrition.
32.	Nature Reviews Endocrinology.
33.	Endocrine Reviews (Society for Endocrinology).

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

Year	**I**	**Course Type: SEC**	**Credit**	**2 (1+1)**
Semester	**I**	**Course Number: Course Title: Food Formulation and Product Development**	**Hours**	**15**

OBJECTIVES:	1. Understand advanced principles of food formulation for Public Health Nutrition. 2. Design population-specific, nutrient-dense foods for food and nutrition security and public nutrition programmes. 3. Apply ingredient selection, processing, fortification, safety, quality and acceptability in product development. 4. Develop affordable, sustainable and culturally acceptable products for community use.

COURSE CONTENT / SYLLABUS

UNIT-I	**Principles and Steps of Food Product Development** a) Principles, concept and scope of food product development. b) Steps: idea generation, screening, feasibility, prototype development, evaluation and scale-up. c) Consumer need, market need and product positioning. d) Relevance of product development in food and nutrition practice.	4 Hours
UNIT-II	**Foundations of Food Formulation** a) Principles of food formulation and ingredient functionality. b) Nutrient density, sensory quality, cost and acceptability in formulation. c) Intended use, serving size and target population approach. d) Role of cereals, millets, pulses, dairy, fats and functional ingredients. e) Bioavailability of Micronutrients in Specialized Nutritious Foods	3 Hours
UNIT-III	**Public Health Relevance, Nutritional Design and Ingredient Selection** a) Food formulation for community nutrition, public health programmes and food and nutrition security. b) Addressing triple burden of malnutrition, stunting, wasting, underweight, anaemia and micronutrient deficiencies. c) Case study: UNICEF Ready-to-Use Therapeutic Foods (RUTF) - formulation, intended use, acceptability and relevance in severe acute malnutrition. d) Nutritional design for infants, children, adolescents, women and other vulnerable groups.	3 Hours
UNIT-IV	**Standardization, Quality and Safety** a) Prototype standardization, optimization and product specifications. b) Quality attributes: sensory, physical and nutritional quality. c) GMP, GHP, HACCP and process control. d) Food safety, hygiene and basic regulatory considerations.	2 Hours
UNIT-V	**Packaging, Labelling, Storage, Shelf Life and Quality Evaluation** a) Packaging functions, labelling requirements, storage conditions and shelf life. b) Analytical testing, quality control, contaminants and critical quality attributes.	3 Hours

	c) Costing, feasibility, sustainability and programme relevance. d) Product specification for community and public health nutrition use.	

REFERENCES

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2.	UNICEF Supply Division. (2019). *Expert Meeting on Ready-to-Use Therapeutic Foods (RUTF)*.
3.	UNICEF. (2023). *UNICEF Procedure on Sustainable Procurement*.
4.	Aramouni, F., & Deschenes, K. (2014). *Methods for Developing New Food Products: An Instructional Guide*. DEStech Publications, Inc.
5.	Fuller, G. W. (2011). *New Food Product Development: From Concept to Marketplace* (3rd ed.). CRC Press.
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For Practical

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)				
Year	**I**	**Course Type: SEC**	**Credit**	**2 (1+1)**
Semester	**I**	**Course Number: Course Title: Food Formulation and Product Development**	**Hours**	**30**

COURSE CONTENT / SYLLABUS		
UNIT-I	**Problem Identification and Product Planning** a) Identify a priority public health nutrition problem and target group. b) Prepare a product design brief with intended use and programme relevance. c) Review existing community or specialized nutrition products.	4 Hours
UNIT-II	**Raw Material Selection and Pre-processing** a) Select suitable local raw materials for nutrient-dense product development. b) Compare ingredients for cost, nutrient density and feasibility. c) Apply pre-processing methods to improve quality and bioavailability.	4 Hours
UNIT-III	**Prototype Development and Standardization** a) Develop anaemia-focused, protein-rich or energy-dense prototype formulations. b) Prepare complementary or supplementary food blends. c) Standardize two or more formulations for a selected nutrition problem.	8 Hours
UNIT-IV	**Nutritional and Sensory Evaluation** a) Calculate nutritive value per 100 g and per serving. b) Conduct sensory evaluation and acceptability testing. c) Assess basic physical quality parameters of developed products.	10 Hours
UNIT-V	**Product Specification and Feasibility** a) Prepare a product specification sheet with ingredients, process flow and storage. b) Evaluate costing, packaging, labelling, shelf life and feasibility. c) Present a final prototype for community or programme use. d) Visits to facility centres.	4 Hours

SEMESTER – II
(PUBLIC HEALTH NUTRITION)

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)				
YEAR	I	**Course Type: Major**	CREDIT	4 (3+1)
Semester	II	**Course Number:** **Course Title: Research Methods in Public Health Nutrition**	HOURS	45

OBJECTIVES:	1. To understand various methodologies employed in nutrition research 2. To gain full understanding of the use of statistics and epidemiology in nutrition research 3. To learn to critique some recent research studies from the perspectives of – research methodologies, interdisciplinary approaches 4. To develop skills related to use of software for data analysis, interpretation, report writing and presentation

COURSE CONTENT / SYLLABUS

UNIT-I	**Developing the Research Question** a) Selection of research topics – need, relevance, feasibility b) Research ethics-ethical issues, research with human participants, ethics and animal research, ethical committees, informed consent, plagiarism c) Statement of the problem, formulation of the research hypothesis, stating objectives d) Literature search – referencing, abstracting, computer searches, bibliography e) Mono-disciplinary Research f) Multi-disciplinary Research g) Trans-disciplinary Research h) Inter-disciplinary Research	5 hrs.
UNIT-II	**Research Designs and Sampling Designs** a) True Experimental Designs and Quasi Experimental Designs b) Hierarchy of study designs c) Internal & External Validity d) Threats to validity e) Scales and indices f) Epidemiological studies i. Observations and experiments ii. Observational epidemiology – Descriptive studies, ecological studies, cross-sectional studies, case-control studies, Cohort studies –Prospective and retrospective study design, Nested case control studies iii. Experimental epidemiology – field trials, community trials, randomized controlled trials, single and double blind studies, Factorial designs and Cross over studies, Secondary research: systematic reviews and Meta-analysis iv. Potential errors in epidemiological studies – Random error, sampling error, systematic error, selection bias, measurement bias, confounding and control of confounding v. Discussion on various classical studies with respect to research methodology g) Probability and non-probability sampling designs h) Determination of sample size	20 hrs.

UNIT-III	**Qualitative Research Methodology** a) Qualitative research tools and methods i. Ethnography ii. Case Study iii. Phenomenology iv. Grounded Theory b) Data collection methods-Focus group discussions, key informant interviews, Observation method, community mapping, body mapping, free listing, pile sorting and Venn diagrams c) Analyzing qualitative data i. Transcribing and summarizing data ii. Categorizing and Coding (using descriptive codes) iii. Arranging and organizing data with the help of computers (Microsoft Excel) iv. Deciding emerging common themes, patterns and concepts d) Integrating qualitative and quantitative methods e) Critique of recent research studies	10 hrs.
UNIT-IV	**Biostatistics for data analysis and Scientific writing** **a) Parametric and Non Parametric Statistics** i. Mean, Median & Mode ii. Standard Deviation and Standard Errors iii. Confidence Interval iv. Coefficient of variation v. Chi square tests (X2) vi. t – tests for independent samples vii. t – tests for paired samples viii. Analysis of variance ix. Correlation coefficients x. Odds ratio xi. Relative risk xii. Regression analysis **b) Scientific writing** i. Different forms of scientific writing - Articles in journals, reports, review articles, abstracts, dissertations ii. Use of outlines as a starting device- Reasons for preparing outlines, types of outlines (Topic outlines, Conceptual outlines, theme outline), how to formulate outlines iii. Components of scientific writing – Introduction, Review of literature, Methodology, Results and discussion, summary and conclusions, limitations, in-text citation, bibliography and appendices iv. Tables and illustrations as means of presenting data v. Writing a research proposal for grants –rationale and importance of the question being addressed, presenting pilot study/data, time frame, clarity, methods, outcome of the study and its implications, budgeting, available infrastructure and resources, executive summary etc.	10 hrs.

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2	Kirk J and Miller ML (2011). Reliability and validity in qualitative research. Sage Publications Inc.
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4	Snecdecor GW and Cochran WG (1991). Statistical methods (8th ed.). Wiley
5	Beaglehole R, Bonita R and Kjellstrom T (2006). Basic epidemiology (2nd ed.). World Health

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9	Ramamurthy GC (2011). Research methodology. Dreamtech Press
10	Tan W (2022). Research methods: A practical guide for students and researchers (2nd ed.). World Scientific
11	Dawson C (2019). Introduction to research methods: A practical guide for anyone undertaking a research project (5th ed.). Hachette, UK
12	O'Leary Z (2024). The essential guide to doing your research project (2nd ed.). SAGE, South Asia
13	Mohanty B and Misra S (2025). Statistics for behavioural and social sciences. Atlantic Publishers & Distributors (P) Ltd

FOR PRACTICAL

<table>
<tr><td></td><td colspan="3">The Maharaja Sayajirao University of Baroda
Faculty of Family and Community Sciences
Department of Foods and Nutrition
Fatehgunj, Vadodara 390002</td><td>ACADEMIC YEAR
2026-2027</td></tr>
<tr><td colspan="5">M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)</td></tr>
<tr><td>YEAR</td><td>I</td><td rowspan="2">Course Type: Major
Course Number:
Course Title: Research Methods in Public Health Nutrition</td><td>CREDIT</td><td>4 (3 + 1)</td></tr>
<tr><td>Semester</td><td>II</td><td>HOURS</td><td>30</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td colspan="5">COURSE CONTENT / SYLLABUS</td></tr>
<tr><td>UNIT-I</td><td colspan="3">Research Process
a) Review of Literature, Citing Bibliography and Plagiarism check
i. Using search engines on the internet for literature search
ii. Using referencing software
iii. Plagiarism Check
b) Responsible use of Artificial Intelligence- for literature search, graphical representation, making presentations
c) Computer Applications in Research
i. Steps in data analysis: Cleaning and Verifying data, Coding data, Data entry, tabulating data, Data Analysis
ii. Practice in calculation of Sample size for various study design by use of relevant formulas
iii. Spreadsheet tool (Microsoft Excel): Introduction to features and functions, using formulae, data storing, statistical data analysis, generating charts/graphs
iv. Presentation tool (Microsoft Power point): Introduction to features and functions, creating presentations
v. Epi Info for statistical analysis (Chi Square, Odds Ratio, Relative Risk)
vi. Use of Epicollect software as tool for data collection
vii. Use of Anthroplus software for calculating Z scores</td><td>14 hrs.</td></tr>
<tr><td>UNIT-II</td><td colspan="3">Hands on Experience: Independent Project work
a) Data analysis of given data sets
b) Interpretation & Report writing
c) Presentation</td><td>16 hrs</td></tr>
</table>

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

Year	**I**	**Course Type: Major**	**Credit**	**4 (4 + 0)**
Semester	**II**	**Course Number: Course Title: Global Nutrition**	**Hours**	**60**

OBJECTIVE:	1. To understand Global and national nutrition / health problems and priorities. 2. learn about the existing global / national development systems focusing on delivering nutrition specific and nutrition sensitive interventions. 3. To understand the various global / national programs and policies to improve nutrition outcomes and control malnutrition in all its forms and non-communicable diseases 4. To understand the problem of foods and nutrition security, its measures and government programs and policies in India and their critique 5. To develop skills to identify various developmental indicators related to health and nutrition and understand their importance, interpretations and identify data gaps or their progress to meet global and national nutrition targets. 6. To develop skills to conduct coverage evaluation surveys to understand the status of implementation of any flagship or ongoing program, learn to analyze and interpret data, present findings and submit technical reports.

COURSE CONTENT / SYLLABUS

UNIT-I	**Global / National Health and Nutrition Goals and Targets** a) Concept of global health and Nutrition b) Global & National Burden of disease with focus on diet and nutrition related direct and indirect causes c) Global Health / Nutrition / Goals and Targets: Sustainable development goals and relationship with nutrition d) UN decade of actions on Nutrition (2016-2025) and identified action areas e) Evidence based recommendations for action in food, nutrition, f) health interventions for continuum of care across the lifecycle g) Essential Nutrition Actions (ENAs) for mainstreaming nutrition in primary health care. h) Countdown to 2030, where are we in terms of achieving SDGs in India : Bottlenecks and Way forward i) Any recent global / national initiative or programs	12 Hrs
UNIT-II	**Global / National Development Systems** a) Focusing on advocacy on nutrition and setting the agenda for action in nutrition, health and allied sectors b) National / State Development Systems related to health, nutrition and allied sectors c) Organizational management and service in nutrition, health and allied sectors d) Strategic management in health and nutrition care, budgeting, monitoring and reporting systems, innovations in monitoring activities at field level and their impact	10 Hrs

	e) Best practices in service delivery by various states Role of non government organizations in nutrition and health care	
UNIT-III	**Policies and Programs Approaches for Malnutrition** a) Nutrition Specific and Nutrition Sensitive interventions and windows of opportunity available for best impact : evidence, scale up, impact b) Importance of focusing on health and nutrition interventions in first 1000 days of life; improving delivery of key nutrition interventions, its evidence, impact, significance for controlling under nutrition, micronutrient malnutrition and NCD prevention c) Strengthening gender sensitivity and community empowerment of above program d) The rolling of WHO growth standards in India – for children below 5 years of age and 5 to 19 years of age; challenges, importance and implications e) Insights from current national strategies / policies in India focused on improving nutrition and health f) Understanding the demographic indicators – population growth rate, crude birth rate, crude death rate, total fertility rate, life expectancy – looking at the census data g) Nutritional epidemiology of all forms of malnutrition including micronutrient malnutrition; the problem of stunting and wasting in populations, their diagnosis, causes and remedial strategies h) RMNCH+A: (i) Sexual and Reproductive health (ii) Maternal and child health (iii) Preconception and Adolescent health (iv) Gender and health a) Achieving Universal Health Coverage for all – Aayushmaan Bharat; Health insurance schemes; National program for healthcare of the elderly	16 Hrs
UNIT-IV	**Policies and Programs Approaches / Strategies for Preventing and Controlling Double Burden of Malnutrition and Non Communicable Diseases** a) Nutritional epidemiology of double burden of malnutrition and Non Communicable Diseases (NCDs) b) Global / National / State initiatives to prevent and control double burden of malnutrition (along with micronutrient malnutrition) and NCD control in vulnerable age groups (maternal, neonatal, child, adolescents) c) Evidence based recommendations for prevention and control of NCDs in productive age group population d) National program and strategies recommended for the control of NCDs; Best practices e) Population based guidelines for obesity; population based approaches / strategies for NCD control; best buy interventions	10 hr
UNIT- V	**Global / National Food and Nutrition Security**	12 hr

	Understanding Food and Nutrition Security (FNS)**; r**ecent trends in hunger and food security a) An integrated understanding of food security and nutrition for health and well being b) Sustained escapes from food insecurity and malnutrition c) Nexus between economic growth, poverty and food security and nutrition – The role of inequality – Zero Hunger Initiative d) Addressing food security in India:- e) National Food Security Mission, National Food Security Act, AAY f) Food Safety Net Programs - TPDS, MDMP, ICDS, etc. g) Role of FSSAI in food security h) Food fortification initiatives i) Rashtriya Krishi Vikas yojna	

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Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

YEAR	**I**	**Course Type: Major**	**CREDIT**	**4 (3+1)**
Semester	**II**	**Course Number: Course Title: Nutrition Program Planning and Management**	**HOURS**	**45**

OBJECTIVES:	1. To understand the basic principles of nutrition, health program planning and learn to integrate professional ethics, accountability and principles of cultural competence 2. To develop analytical and assessment skills for collecting and interpreting information 3. To get equipped with skills to undertake operational planning / research in institutional and field settings

COURSE CONTENT / SYLLABUS

UNIT-I	**Global / National Nutrition-Health Goals / Targets, Nutrition Health System Strengthening** a) Sustainable Development Goals (SDGs): Tracking the indicators to measure national progress and identify gaps b) Evaluations of ongoing nutrition health programs and interventions and lessons learned c) Population needs and expectations on nutrition/health issues – ownership and accountability; stakeholders; approaches for population consultation d) Spectrum of situation analysis / need assessment of the nutrition / health sector – need and partners involved in situation analysis / need assessment e) Setting priorities for national nutrition and health programs and policies based on situation analysis / need assessment, of delivery of essential evidence based nutrition/health actions, their coverage and utilization f) Priority setting for national nutrition health plans – process and approaches; identifying prominent challenges; role of media and stakeholders. g) Professional ethics, principles of cultural competence and accountability in all professional conduct.	10hrs.
UNIT-II	**Evidence based practice - Strategic Planning: Transforming Priorities into Plans** a) Strategic planning – need, approaches, multi-sectoral collaborations, coherence with other sectors b) Involving key stakeholders; making use of participatory research / model c) Process steps for developing the plans – goals, objectives, broad action areas d) Formulating strategic objectives on the basis of SMART criteria e) Laws, regulations and ethics in the planning process f) Incorporating gender in nutrition and health programs	15 hrs.
UNIT-III	**Operational planning: Transforming Plans into Action** a) What is operational planning? Concepts, definitions, and steps b) Strategic planning vs. operational planning c) Partners in operational planning – to be done by those involved in carrying out the plans; involvement of multi-stakeholders d) Planning for decentralizing and fragmentation	10 hrs.

	e) Vertical vs. Horizontal approach in program planning	
UNIT-IV	**Monitoring and Evaluation of Nutrition and Health Programs** a) Identifying outcomes, impact, cost and evidence based practice for evaluation research. b) Importance and purpose: i. tracking progress and performance of national nutrition and health strategy; ii. reporting progress on health related SDGs; iii. needed for functional surveillance mechanisms iv. for decision making and accountability c) Components: preferred data sources based on health indicators, data collection, management, analysis, use and dissemination d) Types of monitoring – ways of strengthening monitoring, mechanisms for review and action; key actors and ideal time.	10 hrs.

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3.	United Nations Population Fund. United Nations Development Fund for Women 2006. Gender Responsive Budgeting in Practice: A Training Manual. UNFPA / UNIFEM New York 2006
4.	United Nations Standing Committee on Nutrition (UNSCN). Managing Successful Nutrition Programmes – Nutrition policy discussion paper No. 8 https://www.unscn.org/web/archives_resources/files/Policy_paper_No_8.pdf
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6.	FAO: Gender and Nutrition Key Facts http://www.fao.org/docrep/012/al184e/al184e00.pdf
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For Practical

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

YEAR	**I**	**Course Type: Major**	**CREDIT**	**4 (3+1)**
Semester	**II**	**Course Number: Course Title: Nutrition Program Planning and Management**	**HOURS**	**30**

OBJECTIVES:	1. To learn to analyze the nutrition situation and choose the most appropriate nutrition approaches based on the specific context and need 2. To develop skills for critical evaluations of the existing nutrition health programs 3. To get equipped with necessary knowledge and skills required to plan and manage health and nutrition programs

COURSE CONTENT / SYLLABUS

UNIT-I	a) Understanding the indicators used in health, nutrition and allied sectors, their definitions and data sources at national level b) Comparison of nutritional profile, determinants of nutritional status and gender differences of latest NFHS and other data of Urban, Rural and Tribal communities c) Practice in demography and population sciences; Calculating target population in health and nutrition programmes, calculating supply, requirement etc.
UNIT-II	a) Conducting a coverage evaluation survey (using quantitative and qualitative methods) for delivery of key nutrition health interventions in a community b) Prepare, pretest and validate survey tools, collect data, analyze, interpret, report and suggest recommendations for improving coverage and delivery of services c) Presentations and submission of reports
UNIT-III	a) Programme Planning using the Nutrition Program Design Assistant (NPAD) Tool b) Key Steps: Step 1. Gather and Synthesize Information on the Nutrition Situation Step 2. Determine Initial Program Goal and Objectives Step 3. Review Health and Nutrition Services Step 4. Preliminary Program Design: Prevention Step 5. Preliminary Program Design: Recuperation /Therapeutic Management Step 6. Putting It All Together

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Family and Community Sciences** **Department of Foods and Nutrition** **Fatehgunj, Vadodara 390002**	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

YEAR	**I**	**Course Type: Major (Vocational)**	Credit	4 (1+3)
Semester	**II**	**Course Number:** **Course Title: Field Practice in Public Health Nutrition**	Hours	15

OBJECTIVES:	1. To enable students to connect all aspects of the curriculum including seminars, course works, project experience to establish an understanding, appreciation and working knowledge of public health practice and analyse how their chosen area of intervention or study enhanced public health practice in India 2. To enable students to understand key components of program management including program design, implementation, monitoring and evaluation, sustainability and scaling up. 3. To equip students with skills for the program planning cycle through fundamental nutrition related program management at district level. 4. To enable students to learn to apply and use various methodologies and tools for successful management of programs. 5. To provide exposure to students in field settings about functioning of government programs at sub-national level. 6. 6. To enable students to explore program management with a practical, hands-on approach through case studies, class exercises and field visits.

COURSE CONTENT / SYLLABUS

UNIT-I	**Nutrition Program Planning and Management** a) **Nutrition and Health Program Planning at Sub-National Level** i. Understanding the sub-national level: local, district or regional level situation through use of available data sets; understanding the local nutrition health delivery systems for Essential Nutrition Actions (ENA), decentralization & governance ii. Bottom-up, inter-sectoral, multi-stakeholder collaboration at the sub-national level (Management, Leadership & Partnership for District Health) iii. Issues to consider during planning: social determinants, socio-cultural context, scale up & sustainability **b) Result-Based Model for Nutrition Program Management** i. RBM Core Principles: Understanding Results-Based Management concepts and best practices to drive strategic implementation and accountability. ii. Logical Framework & Result Chain: Utilizing the Logical Framework Approach to link resources (inputs/activities) directly to measurable outputs, outcomes, and impact.	7 hrs.
UNIT-II	**Program Design, Evaluation, and Sustainability** **a) Design & Strategy:** i. Synthesizing situational data to identify gaps ii. Setting SMART objectives iii. Preliminary program design: determining interventions based on priority areas, program approaches to deliver these interventions, replicability and sustainability	8 hrs.

	b) **Monitoring & Evaluation (M&E):** Utilizing program frameworks for process, impact, and outcome evaluation, including the use of ICT-based real-time monitoring. i. Importance of programme frameworks for programme design, monitoring and evaluation ii. Types of monitoring; ICT based real time monitoring iii. Process, impact and outcome evaluation c) **Scaling & Sustainability:** Assessing program sustainability and creating Action Plans for scaling interventions through participatory stakeholder engagement and process documentation.	
	References: 1. MWCD 2018. Guidelines for Implementation of ICT-RTM System. POSHAN Abhiyaan. Ministry of Women and Child Development, Government of India 2. Schmets G, Rajan D, Kadandale S, editors. Strategizing national health in the 21st century: a handbook. Geneva: World Health Organization; 2016 3. Global Nutrition Report March, 2016. How to Make SMART Commitments to Nutrition Action 4. Sustainability Report. 2013. The Program Sustainability Assessment Tool. Washington University, St Louis, MO.http://www.sustaintool.org 5. World Health Organization 2011. Beginning with the end in mind. Planning pilot projects and other programmatic research for successful scaling up. World Health Organization Expand Net 6. United Nations Development Programme 2009. Handbook on planning, monitoring and evaluating for development results. UNDP New York USA 7. CORE Group. Nutrition Working Group. Nutrition Program Design Assistant: A Tool for Program Planners. Reference Guide. Washington, DC: 2010 8. The International Training and Education Center for Health (I-TECH) 2008. Technical Implementation Guide. Rapid Evaluation. I-TECH, Washington, USA 9. United Nations. Statistical Institute for Asia & the Pacific (SIAP). Results-Based Management: Logical Framework Approach. SIAP Chiba, Japan 2007 10. World Health Organization. Drinking and Driving: a road safety manual. Module 4: How to evaluate the program 11. Karabi et al. BASICS II. 2004. Using 'Essential Nutrition Actions' to Accelerate Coverage with Nutrition Interventions in High Mortality Settings. Published by the Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development. Arlington, Virginia, 2004. 12. Save the children. Monitoring, Evaluation, Accountability and Learning (MEAL). Programme Frameworks, Objectives and Indicators 13. Management, Leadership & Partnership for District Health. WHO 2004 (Module 2) 14. https://www.logframer.eu/content/results-based-management-rbm 15. http://www.fao.org/investment-learning-platform/background/en/ 16. http://www.fao.org \Results-based Management _ Investment Learning Platform (ILP) _ Food and Agriculture Organization of the United Nations 17. https://www.fantaproject.org 18. https://usaidlearninglab.org/events/advanced-project-management-training-course 19. https://www.who.int/hiv/strategic/me/en/#tools 20. https://www.who.int/roadsafety/projects/manuals/alcohol/4-How%20to.pdf	

For Practical

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

YEAR	I	**Course Type: Major (Vocational)**	Credit	4 (1+3)
Semester	II	**Course Number:** **Course Title: Field Practice in Public Health Nutrition**	Hours	90

COURSE CONTENT / SYLLABUS

UNIT-I	**Situational Analysis – Crucial Step in the Planning Cycle** **a)** Understanding local / district (sub-national) level nutrition and health program cycles, enlisting successes and failures **b)** Organizing and conducting situational analysis / need assessment – setting priorities based on tracking the local nutrition health targets met and rapid needs assessment based on available data gaps.	7 hrs.
UNIT-II	**Program Planning** **a) Designing and Pretesting appropriate survey tools – Quantitative and Qualitative tools- their description, advantages and challenges:** i. Structured interviews ii. Semi-structured interviews with key informants iii. Open/informal in-depth interviews **b) Planning- Strategic and Operational** i. Setting goals and objectives - formulating strategic objectives on the basis of SMART criteria ii. Planning at local level (decentralized environment) iii. Issues to consider while planning at sub-national level iv. Selecting appropriate study design and sampling framework and sample size **c) Steps in operational planning** i. Mapping the stakeholders of health and nutrition delivery services ii. Involving stakeholders in participatory program planning (Triple A approach)	7 hrs.
UNIT-III	**Implementation, Monitoring and Evaluation** a) Execution of implementing plans & their monitoring b) Identifying output, outcome, impact indicators for discussion for evaluation c) Identify risks, threats, issues, and tasks- tools and methodology	7 hrs.
UNIT-IV	**Reporting and Documentation for dissemination & advocacy** a) Reporting progress and performance and disseminating results to stakeholders b) Preparation of a new program conceptual model or a model for modification and strengthening of any existing nutrition / health program	8 hrs.

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda Faculty of Family and Community Sciences Department of Foods and Nutrition Fatehgunj, Vadodara 390002		**ACADEMIC YEAR 2026-2027**	
M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)				
YEAR	**I**	**Course Type: MDC (Multi-Disciplinary Course)**	**CREDIT**	**4 (3+1)**
Semester	**II**	**Course Number: Course Title Communication for Development and Advocacy**	**HOURS**	**45**
Objectives	1. To gain understanding about traditional Communication and its transition to communication for development 2. To develop communication strategies that address social inclusion, ensuring that nutrition programs are gender-sensitive and accessible to hard-to-reach or marginalized groups (including those excluded by caste). 3. To develop the ability to write clear policy briefs and presentations that persuade local leaders and policymakers to fund or support nutrition programs			
COURSE CONTENT / SYLLABUS				
UNIT-I	**Concepts and Theories related to Social and Behaviour Change communication-Overview** a) Formal, Non-Formal, Participatory Communication b) Models and Types of Communication c) Components of BCC d) Transition from IEC-BCC-SBCC e) Characteristics and overarching principles for developing SBCC program or campaign			6 hrs.
UNIT-II	**Communication for Development (C4D)** a) Global C4D and Social Ecological Model b) Guiding principles for C4D programming c) Sectoral review of C4D achievements with special focus on Health, Nutrition and WASH d) Comparing SBCC and C4D- Similarities and Differences			10 hrs.
UNIT-III	**Understanding Social Inclusion/Hard to Reach segments and its importance in C4D** a) Social Inclusion and Exclusion b) Gender Responsive Communication c) Gender responsive C4D d) Challenges and opportunities for integrating Gender in C4D e) Applying gender lens to C4D programme planning f) Communicating gender for rural Development g) Exclusion based on Caste			13 hrs.
UNIT- IV	**Nutrition Advocacy Process** a) Introduction- What is Nutrition Advocacy? & its needs, b) Types of Advocacy (Global/National/Regional/Local) c) Nutrition Advocacy Process i. Identifying Policy Issues ii. Selecting an Advocacy Objective iii. Researching Audiences			16 hrs.

	iv. Developing and Delivering Advocacy Messages Understanding the Decision-Making Process v. Building Alliances - enhancing nutrition access through public-private partnerships vi. Effective presentations vii. Fundraising for Advocacy viii. Improving Advocacy Skills – Monitor and Follow up d) Understanding strategic advocacy plans of various Global platforms:- FAO, WHO, Save the Children, UNICEF, UNDP, USAID, SUN, SPHERE, IFPRI, CARE, Save the children, FANTA Project, NNM & recent examples. e) Linking research to policy and practice- Role of leaders	

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20.	Manual for Country-Level Nutrition Advocacy Using PROFILES and Nutrition Costing, Food and

	Nutrition Technical Assistance III Project (FANTA) FHI 360 1825 Connecticut Avenue, NW Washington, DC 20009-5721
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For Practical

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M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

YEAR	**I**	**Course Type: MDC (Multi-Disciplinary Course)**	**CREDIT**	**4 (3+1)**
Semester	**II**	**Course Number: Course Title : Communication for Development and Advocacy**	**HOURS**	**30**

Objectives	a) To gain understanding about traditional Communication and its transition to communication for development b) To develop communication strategies that address social inclusion, ensuring that nutrition programs are gender-sensitive and accessible to hard-to-reach or marginalized groups (including those excluded by caste). c) 3. To develop the ability to write clear policy briefs and presentations that persuade local leaders and policymakers to fund or support nutrition programs

COURSE CONTENT / SYLLABUS

UNIT-I	**SBCC and C4D** a) Review a traditional "Nutrition Education" pamphlet (IEC) and redesign it into Behavior Change (SBCC) strategy that targets specific barriers. Choose a relevant topic and plan as per SBCC 'C' planning process. b) Socio Ecological Model- Use case study for identifying influences at various levels of SEM.	10 hrs.
UNIT-II	**Inclusive Design and Gender lens** a) Review existing Health & WASH campaigns. Identify gender stereotypes or "blind spots". Develop/ redraft campaign scripts to be gender transformative. b) Design a communication plan using participatory tools like community radio or folk media and implement it in atleast 1 setting.	8 hrs.
UNIT III	**C4D sectoral programming and advocacy** a) Develop a 360-degree communication plan for a "Nutrition-Sensitive" intervention. Define specific channels (formal vs non formal) and create a draft message matrix. b) Prepare a 3-minute "Elevator Pitch" for a local government official for resolving any of the current issues under any 1 ongoing national programs. i. Identify gaps ii. Budget considerations iii. Return on investment iv. (iv) Stakeholders	12 hrs.

Syllabus of Courses

	The Maharaja Sayajirao University of Baroda **Faculty of Family and Community Sciences** **Department of Foods and Nutrition** **Fatehgunj, Vadodara 390002**	**ACADEMIC YEAR 2026-2027**

M.Sc. F.C.Sc (Public Health Nutrition) – First year (NEP – GIA)

Year	**I**	**Course Type: Major**	**Credit**	**2 (2 + 0)**
Semester	**II**	**Course Number:** **Course Title: Nutrition for Special Conditions**	**Hours**	**30**

OBJECTIVE:	a) To develop a comprehensive understanding of specialized nutritional requirements in conditions such as geriatric care, critical illness, and sports performance, with emphasis on physiological and metabolic adaptations. b) To evaluate and apply evidence-based nutrition and health strategies for the prevention, management, and optimization of outcomes in these conditions.

COURSE CONTENT / SYLLABUS

UNIT-I	**Enteral Nutrition** a) Nutritional screening and nutritional status assessment of the critically ill b) Enteral Nutrition: Routes of feeding (nasogastric, orogastric, nasojejunal, PEG Gastrostomy, Jejunostomy), types of formulas (standard polymeric, semi elemental, disease specific I.e. renal, hepatic, cancer), Complications in feeding: aspiration, diarrhea, tube blockage)	10 Hrs
UNIT-II	**Parenteral Nutrition** a) Parenteral Nutrition: indications for PN (non-functioning gut, severe ileus, bowel obstruction), Routes of feeding (TPN, PPN), Types of TPN bags, b) Nutrients in TPN (glucose, amino acids, lipids, electrolytes, vitamins, minerals), c) Complications: catheter infection, hyperglycemia, electrolyte imbalance, kidney and liver dysfunction	10 Hrs
UNIT-III	**Sports Nutrition** a) Review of different energy systems for endurance and power activity b) Sports-specific nutrients requirements c) Pre-game and post-game meals d) Water and electrolyte balance, losses and their replenishment during exercise and sports events, effects of dehydration, sport drinks e) Different nutraceutical aids and commercial supplements	10 Hrs

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