VIDYASAGR UNIVERSITY

MIDNAPORE – 721 102
WEST BENGAL

Syllabus for M.Sc. Program (NEP 2020)

In

Nutrition and Dietetics (NEP 2020)

With effect from 2025-26

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Preamble

M Sc in Nutrition and Dietetics course explores the relationship between health and nutrition. The course has gained recognition in recent years with the upsurge in lifestyle disorders which has led to a demand for professional Nutritionists and Dietitians. The subject aims to comprehend the influence of food habits and suggest corrective measures in relation to age, health condition and food palate. The course aims to inculcate an understanding of varied aspects of Nutrition including Medical Nutrition Therapy in disease management. The programme endeavours to develop a research bent in students and seeks to highlight social responsibility through public health education among vulnerable groups. The curriculum is designed to acquaint the learners with the concepts and innovations in Food Manufacture and Processing. The current trend of the nations' incessant interest in disease awareness and management, demands competent Nutritionists and Dietitians which has opened up countless opportunities in the Service as well as Commercial Food and health sectors. The Government sectors recruit Nutritionists and Dietitians to work in Government Hospitals, Nursing Homes, Government Schools, Community Health Centers, Government Schemes and Missions, Government Owned Factories, Government Organizations (office cafeteria) and Government Research and Development (R&D) units. Nutritionists and Dietitians have opportunities in private Hospitals, Clinics, Nursing Homes, Restaurants, Star Hotels, Day Care Centers, Food Product Manufacturing Industries, Pharmaceutical Companies, Corporate Companies (Cafeteria), NGOs and private Research and Development (R&D) units. Diverse opportunities are available for Nutritionists and Dietitians in Sports Clubs, Sports Hostels, Health and Recreation Clubs, Athlete Camps, Fitness Centers and Gyms and also as private consultants.

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Program Outcomes (POs)

Students of Nutrition and Dietetics after completion of the program will be able to achieve:

1. **Apply knowledge of nutrition and health to create personalized diet plans, assessing and monitoring nutritional status, and communicating effectively** with individuals and groups.

2. Acquired knowledge & skills to work in clinical settings, public health, the food industry, and research, with specific outcomes often including proficiency in food science, food service management, and the ability to provide nutrition counseling for various conditions.

3. knowledge of Nutrition and Dietetics will provides concepts related to human nutrition and helps to become an effective learner and practitioner in all fields of dietetic practice.

4. This course also gives the opportunity to develop advanced skills in the design and implementation of research in the field of human nutrition and dietetics.

5. It is designed to impart advanced knowledge and skills that is life oriented, career and community oriented.

6. It has special relevance to industry and hospital application with the help of weekly field work, rural camp and hospital/industry internship programme to demonstrate high-level disciplinary skills and knowledge, ensuring work readiness for employment in a diverse range of nutrition and dietetics environments, including entrepreneurial endeavours.

7. Translate leading-edge food and nutrition science into practical recommendations to promote health and wellbeing for individuals, groups and populations by changing knowledge, skills, attitudes and behaviours.

8. Effectively communicate science, nutrition and dietetics, using a variety of communication media including digital technologies and social marketing, to positively influence health outcomes.

9. Demonstrate professionalism, life-long learning, commitment to quality improvement, ethical practice, effective collaboration and teamwork across interdisciplinary settings.

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PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1. Understand the relationship between nutrition and health,

PSO2. Comprehend methods of assessing human nutritional requirements, nutritional assessment and diet planning for different diseases and nutritional disorders

PSO3: Apply theoretical concepts in laboratory setting as per standard methods in the study areas

PSO4: Understand the applications of nutritional sciences in clinical interventions, communication for health promotion, clinical nutrition, disease monitoring and evaluation.

PSO5: To equip students to plan diets for clinical and therapeutic conditions within a hospital, fitness centre or gym setting, or any sports agencies.

PSO6: To provide students with an opportunity to conduct independent research in the field of therapeutic nutrition

PSO7. Advocate on behalf of individuals, groups and communities to inspire and positively influence the wider political, social and commercial environment that underpin food and nutrition systems and the practice of nutrition and dietetics.

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M Sc in Nutrition and Dietetics

FIRST SEMESTER

Course code	Course	Course Content	Credits	Marks	No of Hours	Credit (L-T-P)
NUDC401X1	DSC 1T	Biostatistics & Bioinformatics	2	25(T20+IA5)	20	2 (2-0-0)
NUDC402X1	DSC 2T	Applied Physiology	2	25(T20+IA5)	20	2 (2-0-0)
NUDC403X0	DSC 3T	Functional foods, nutraceuticals and oxidative stress management	4	50 (T40+IA10)	40	4(4-0-0)
NUDE404A0	DSE 1T	Disaster and nutritional management	4	50 (T40+IA10)	40	4(4-0-0)
NUDE404B0	DSE 1T	Environmental and Occupational Health	4	50 (T40+IA10)	40	4(4-0-0)
NUDE405A1	DSE 2T	Advances in Food Processing	2	25(T20+IA5)	20	2 (2-0-0)
NUDE405B1	DSE 2T	National Health Programs and Systems	2	25(T20+IA5)	20	2 (2-0-0)
NUDC401X8	DSC 1P	Biostatistics & Bioinformatics	2	25(P25)	20	2 (0-0-2)
NUDC402X8	DSC 2P	Applied Physiology	2	25(P25)	20	2 (0-0-2)
NUDE405A8	DSE 2P	Advances in Food Processing	2	25 (P25)	20	2 (0-0-2)
NUDE405B8	DSE 2P	National Health Programs and Systems	2	25 (P25)	20	2 (0-0-2)
NUDO406VC	Com 1	Indian Knowledge System (IKS)	2	25 (T20 + IA5)	20	2 (2-0-0)
NUDO407NC	Com 2	Vidyasagar: Life and Philosophy	Compulsory Non-Credit Course			
		TOTAL		**275**		

SECOND SEMESTER

Course code	Course	Course Content	Credits	Marks	No of Hours	Credit (L-T-P)
NUDC 451X0	DSC 4T	Research Methodology	4	50(T40+IA10)	40	4(4-0-0)
NUDC 452X1	DSC 5T	Therapeutic Nutrition	2	25(T20+IA5)	20	2(2-0-0)
NUDE 453A1	DSE 3T	Instrumentation in Molecular Nutrition	2	25(T20+IA5)	20	2(2-0-0)
NUDE 453B1	DSE 3T	Advance Human Nutrition	2	25(T20+IA5)	20	2(2-0-0)
NUDE 454A0	DSE 4T	Food Fortification	4	50(T40+IA10)	40	4(4-0-0)
NUDE 454B0	DSE 4T	Food hygiene and sanitation	4	50(T40+IA10)	40	4(4-0-0)
NUDE 455A1	DSE 5T	Nutrition in Critical Care	2	25(T20+IA5)	20	2(2-0-0)
NUDE 455B1	DSE 5T	Nutrition counselling	2	25(T20+IA5)	20	2(2-0-0)
NUDC 452X8	DSC 5P	Therapeutic Nutrition	2	25(P25)	20	2(0-0-2)
NUDE 453A8	DSE 3P	Instrumentation in Molecular Nutrition	2	25(P25)	20	2(0-0-2)
NUDE 453B8	DSE 3P	Advanced Human Nutrition	2	25(P25)	20	2(0-0-2)
NUDE 455A8	DSE 5P	Nutrition in Critical Care	2	25 (P25)	20	2(0-0-2)
NUDE 455B8	DSE 5P	Nutrition Counselling	2	25 (P25)	20	2(0-0-2)
NUDO 456X9	FV	Research Institute /Food Service unit/ Health centre/ Field visit	2	25(P25)	20	2 (0-0-2)
		TOTAL		275		

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THIRD SEMESTER

Course code	Course	Course Content	Credits	Marks	No of Hours	Credit (L-T-P)
NUDC 501X0	DSC 6T	Nutritional Epidemiology	2	25(T20+IA5)	20	2(2-0-0)
NUDC 502X0	DSC 7T	Community Nutrition and public health	2	25(T20+IA5)	20	2(2-0-0)
NUDC 503X1	DSC 8T	Nutritional Anthropometry	2	25(T20+IA5)	20	2(2-0-0)
NUDC 504X1	DSC 9T	Nutrition through life cycle	2	25(T20+IA5)	20	2 (2-0-0)
NUDC 505X1	DSC 10T	Drug and Nutrient Interaction	2	25(T20+IA5)	20	2(2-0-0)
NUDC 503X8	DSC 8P	Nutritional Anthropometry	2	25(P25)	20	2 (0-0-2)
NUDC 504X8	DSC 9P	Nutrition through life cycle	2	25(P25)	20	2(2-0-2)
NUDC 505X8	DSC 10P	Drug and Nutrient Interaction	2	25(P25)	20	2(0-0-2)
NUDO 506X9	MOOCs		4	50		
NUDO 507X9	SS/CV	Community Out-reach Program and Report Submission	2	25(P25)	20	2 (0-0-2)
		TOTAL	**22**	**275**		

FORUTH SEMESTER

Course code	Course	Course Content	Credits	Marks	No of Hours	Credit (L-T-P)
NUDC 551X0	DSC 11T	Sports Nutrition and nutrition in altered environmental condition	4	50(T40+IA10)	40	4(4-0-0)
NUDC 552X0	DSC 12T	Communicable and Non-Communicable Diseases	2	25(T20+IA5)	20	2(2-0-0)
NUDC 553X0	DSC 13T	Food & Nutrition Services in hospital	2	25(T20+IA5)	20	2(2-0-0)
NUDC 554X9	RP/D	Project Work	8	100 (P100)	80	8 (0-0-8)
NUDC 555X9	Start-up Proposal	Research/ Start-up Proposal Design	4	50 (P50)	40	4(4-0-0)
NUDC 556X9	SEC	Internship Training in Hospital	2	25(P20)	20	2(0-0-2)
		TOTAL	**22**	**275**		

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FIRST SEMESTER

NUDC401X1 DSC 1T BIOSTATISTICS & BIOINFORMATICS

Course Outcome (COs):

CO 1: Students can analyze and interpret biological and health data using modern statistical methods.

CO 2: Students can apply both descriptive statistics (like mean, median, and standard deviation) and inferential statistics to analyze complex datasets.

CO 3: Students can introduce statistical methods and their applications in biological sciences.

CO 4: Students can represent data effectively through various graphs and diagrams, such as bar charts, histograms, and scatter plots.

CO 5: Students can explain descriptive and inferential statistical tools and apply them to biological data.

CO 6: Students can use bioinformatics databases and algorithms (FASTA, BLAST) for sequence analysis.

Course content:

1. **Presentation of data**: Idea of statistical graphics
2. **Statistics of dispersion:** range, mean deviation, standard deviation and error, variance
3. **Characteristics of distributions:** probability distribution, normal distribution, skewness, kurtosis Mean median, mode and percentile and percentile rank
4. **Testing hypotheses:** Null Hypothesis, levels of significance, error of inference and computation of Z scores
5. **Test for Parametric and non parametric tests of difference between means:** t-test, ANOVA test Wilcoxon composite ranksum test, Chi square test, Correlation and Regression
6. **Basics of computer:** Generations of computer and types of computer b) computer hardware – CPU, Peripherals devices, computer memory, Computer software: system software, application software, Basic idea on Operating systems and Computer Languages, software,
7. **Basic idea of Word processing and data management**
8. **Concept of internet** – components, uses. WWW, browsing, Searching nutritional information
9. **Basic Bioinformatics** – Introduction to bioinformatics, its importance and scope, Biological databases, primary and secondary sequence databases, Genbank, EMBL, PDB.
   Current advancements in bioinformatics: Bbioinformatics, Cheminformatics, Immunoinformatics.
   Sequence-based Database Searches: what are sequence-based database searches, BLAST, FASTA and algorithms.

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NUDC402X1 DSC 2T APPLIED PHYSIOLOGY

Course Outcomes (COs):

CO 1: Students can learn about the physiological systems and functions and their regulation in human body

CO 2: Students can able to identify different physiological changes occur due to any type of physical illness.

Course Content:

1. Biological membranes: Membrane receptors, fundamentals of signal transduction.

2. Digestive system: Secretory, 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: Review of structure and function of neuron - conduction of nerve impulse, synapses, and role of neurotransmitters - Gastro intestinal reflexes

4. Endocrine system: Hormones on carbohydrates, protein, fat metabolism

5. Respiratory system: Review of structure and function. Role of lungs in the exchange of gases. Transport of oxygen and CO2. 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: Structure and function of nephron - Urine formation - 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.

NUDC403X0 DSC 3T FUNCTIONAL FOODS, NUTRACEUTICALS AND OXIDATIVE STRESS MANAGEMENT

Course Outcomes (COs):

CO 1: Students will be able to know about sources and application of functional foods and nutraceuticals and can apply them for improving health condition of the community.

CO 2: Students will acquire knowledge on the uses of nutraceuticals for the management and treatment of different diseases.

CO 3: Students will gain knowledge on the several plant based bioactive compounds and their role for health promotion and prevention of illnesses.

CO 4: Students can provide information on the uses of functional foods, sources of antinutritional substances in foods, oxidative stress management using nutraceuticals to the community people.

Course content:

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1. **Nutraceuticals:** a) Use of neutraceuticals in traditional health sciences. Their role in preventing /controlling diseases. B) Definition, classification, food and non food sources, mechanism of action. Role of Omega-3 fatty acids, carotenoids, dietary fiber, phytoestrogens; gulcosinolates; organosulphur compounds as neutraceuticals.
2. **Functional foods:** Definition, development of functional foods, benefits and sources of functional foods in Indian diet. Effects of processing conditions and storage. Development of biomarkers to indicate efficacy of functional ingredients.
3. **Development of nutraceutical and functional foods**: Standards for health claims. Process of developing - preclinical and clinical studies, marketing and regulatory issues.
4. **Other food components with potential health benefits:** Polyphenols: flavonoids, catechins is flavones tanning. Phytoesterogens, Phytosterols, Glucosinolates, Pigments: Lycopene, Curcumin etc. Organosulphur compounds, Other components – Phytates, Protease inhibitions, saponins, amylase inhibitions, haemagglutinins, active biodynamic principles, in spices, condiments and other plant materials.
5. **Probiotics and Symbiotics as functional foods**: Nutrient Vs. non nutrients, metabolism. Important features of probiotic microorganisms & prebiotic. Health effects of probiotics and prebiotics including mechanism of action, Probiotics in fermented milk product and non-milk products, Quality assurance of probiotics and safety.
6. **Oxidative stress management:** Oxidants and Free Radical Production, Detrimental Effects of Free Radicals on Human Health, Exogenous Antioxidants and management of oxidative stress, Role of Vitamin E, Vitamin C, Polyphenols, Flavonoids.

NUDE404A0 DSE 1T DISASTER AND NUTRITIONAL MANAGEMENT

Course Outcomes (COs):

CO 1: Students will be able to understand the complications occur during any disaster or emergency conditions.

CO 2: Students can develop nutrition care plan for the people affected by any disaster condition by studying their nutritional assessment.

CO 3: Students can identify vulnerable group during disaster conditions and helps to provide nutrition relief and rehabilitation.

CO 4: Students will know the role of different Govt and NGOs during disaster condition and essential emergency steps needed to taken during emergency condition to protect the health status of the affected individuals.

Course content:

1. **Concepts and Types of Disasters**

Concept and Types of Disasters (Natural/Manmade); Introduction to Different Types of Disasters, Factors Effecting Management of Disasters and Emergencies; Nutritional Concerns during Disaster and Emergencies among Vulnerable Populations: Causes of Malnutrition, Macro/Micro Nutrient Deficiencies.

2. **Nutritional Assessment in Emergency Situation**

Assessment of Nutritional Status and Food Needs of Emergency/disaster Affected Populations: Food Distribution Strategies, Nutrition Monitoring and Surveillance, Screening and Assessment of Nutritional Status, Identifying and Reaching the Vulnerable Groups.

3. **Public distribution system**: Ration system in disaster and different types of nutrition rehabilitation disaster management
4. **Nutrition Relief, Rehabilitation and Mitigation Strategies**

Targeting Food Aid: Food Rations for Nutritional Relief and Rehabilitation (Special/Fortified Foods, Local Foods in Rehabilitation, Packed Food); Transportation of Food During Emergencies: Food Storage and Preventing Food Spoilage; Household Food and Nutrition Security; Post Emergency/disaster: Importance of Nutrition in Post-Emergency/disaster Situations; Disaster Prevention and Mitigation Strategies: Warning Systems, Role of Government and Non-Government Organizations, Nutritionists in Relief, Rehabilitation and Mitigation. Disease Outbreak Preparedness (Ebola, COVID-19, etc.), Emergency Response and Relief Operations, Mental Health Support During Disasters.

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NUDE404B0 DSE 1T ENVIRONMENTAL AND OCCUPATIONAL HEALTH

Course Outcomes (COs):

CO 1: Students will be able to understand the complications occur during any type of adverse environmental conditions.

CO 2: Students can understand the problems occur with different types of occupational activities.

CO 3: Students can identify the risk and assess them to minimize the complications associate with environmental and occupational hazards.

Course content:

1. **Fundamentals of Environment:**
   Concept, types and component of environment. Environmental Health. Effects of the environment on health. Global environmental Issues. Scope of Environmental Health.

2. **Environmental Factors and Human Health**:
   - Hygiene and sanitation: basic concept and different aspects of hygiene and sanitation. Interrelationship of hygiene, sanitation and health.
   - Housing: Criteria for healthful housing. Housing and health. Indicators of housing.
   - Food and nutrition: Interrelationship of food, nutrition and environment.
   - Transmission of diseases: Environmental factors and disease transmission.

3. **Environmental issues and Human Health**:
   - Water pollution: Contaminants of water and their effects on human health. Control of water pollution. Purification of water.
   - Air pollution: Sources of air pollution. Different types of air pollutants. Effects of air pollution on human health. Prevention and control of air pollution.
   - Noise pollution: Sources and properties of noise. Effects of noise exposure. Control of noise pollution.
   - Solid waste: Sources of solid waste. health hazards caused by solid waste. Methods of disposal.
   - Biomedical waste: Sources and types. Health hazards caused by biomedical waste. Treatment and disposal.
   - Industrial waste: Sources and types. Effects on environment and human health. Management and treatment.
   - Radioactive waste: Sources. Effects on environment and human health. Management of radioactive waste.
   - Global warming: Causes of global warming. Effects of global warming on environment. Measures to prevent global warming.

4. **Occupational Health**
   - Basic concept of occupational health: Meaning and importance of occupational health. Occupational environment and its impact on human health.
   - Occupational hazards: Physical, chemical, biological, mechanical and psychosocial hazards.
   - Occupational diseases: Pneumoconiosis (silicosis, asbestosis and farmer's lung), occupational cancer, occupational dermatitis. Prevention of occupational diseases.
   - Occupational safety: Key aspects and importance.

NUDE405A1 DSE 2T ADVANCES IN FOOD PROCESSING

Course Outcome (COs):

CO 1: A holistic and comprehensive view of the advances in food processing which will be instrumental in future for food industries.

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CO 2: An in-depth understanding of the principles underlying the food processing techniques and applying them in solving food processing problems and product quality.

CO 3: Apply novel /innovative food technologies to design and improve products and processes.

CO 4: Design/develop/adapt and critically analyze scope and limitations of thermal and non- thermal processing methods in food processing.

Course content:

1. **Concept and principle of food processing:** Principles of food processing - physical and chemical principles. Emerging issues and sustainability in food processing. Importance and significance of microorganisms in food safety, intrinsic and extrinsic factors affecting the growth of micro-organisms in food. Protection and preservation of foods: Hurdle technology, chemical, modified atmosphere, irradiation, thermal and non thermal techniques**.** Food dehydration and concentration: methods of drying and concentration, types of dryers, factors affecting drying process. Heat processing: sterilization, pasteurization, blanching, canning. Cold preservation; refrigeration, freezing, freeze drying, refrigerated gas storage.
   Food irradiation: technology, application and safety assessments B. Chemicals in food preservation, safety of preserved foods.
2. **Processing of major food items:** Processing technology of foods and nutritional implications for cereals and pulses, fruits and vegetables, milk & products meat, fish & egg.
3. **Food spoilage:** Classification of food in relation to shelf life-Spoilage in food and its control: spoilage Caused by microorganism (bacteria, fungi and virus), enzymes, pets and rodents.
4. **Enzyme technology for food processing:** Use of enzymes in food and beverage industry (e.g., Cheese, fruit, juice, Wine, Meat tenderizing and dairy)

NUDE405B1 DSE 2T NATIONAL HEALTH PROGRAMS AND SYSTEMS

Course Outcome (COs):

CO 1: The student would be able to explain essential concepts, theories and models related to national health programmes.

CO 2: Students would comprehend evidences, guidelines/policies and frameworks related to national health programmes

CO 3: The student would be able to explain essential concepts, theories and models related to Health Systems, National Health Mission (NHM) and Health Sector Reforms

Course contents:

1. National Health Programs for communicable disease:

a) Universal Immunization Programme,
b) National Vector Borne Diseases Control Programme (NVBDCP),
c) National AIDS Control Programme (NACP),
d) Revised National Tuberculosis Control Programme (RNTCP),

2. National health programmes for non communicable diseases:

a) National Programme for Control Treatment of Occupational Diseases,
b) National Mental Health Programme,
c) National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS),

3. National programmes for nutrient deficiency and supplementary nutrition

a) National Programme for Control of Blindness (NPCB),
b) National Iodine deficiency disorder control programme (NIDDCP),
c) Anemia Mukt Bharat (AMB)**,**
d) Mid day meal programme (MDMP),

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e) Integrated Child Development Services (ICDS).

4. National Health systems:

a) Introduction to Health Systems and the building blocks of a Health System
b) Understanding the individual components: Part 1 Human Resources in Health
c) Understanding the individual components: Part 2 Service Delivery: Health care at low cost
d) National Rural Health Mission (NRHM), NRHM Goals, NRHM Framework for implementation, NRHM Components, Institutional setup under NRHM.

NUDC401X8 DSC 1P BIOSTATISTICS & BIOINFORMATICS

Course Outcome (COs):

CO 1: Students can perform statistical data analysis of mean, median, mode etc from their practical experiments

CO 2: Students can able to do statistical analysis from any biological and experimental data by using t test, chi square test, anova.

CO 3: Students will be able to analyse experimental data statistically and graphically using software tools.

CO 4: Students will acquire proficiency in bioinformatics methods for sequence analysis, alignment, primer design, and phylogenetic tree construction.

CO 5: Students will gain competence in bridging computational biology with laboratory techniques such as PCR and structural prediction.

Course content:

1. Computation of mean, median and mode of grouped and ungrouped data
2. Data representation by, bar diagram, histogram and pie diagram
3. Formulation Bar diagram, Pie diagram, Line diagram from the supplied data using MS Excel.
4. Use of Ms Word – data representation in tabular form, manipulation of tables
5. Use of Ms Excel – data tabulation, data representation by charts
6. Use of Ms power point
7. Computation of mean, median, mode, SD, SE, correlation coefficient, regression and ANOVA using available software.
8. Performing BLAST and interpretation of the results.
9. Nutritional assessment by using free software.

NUDC402X8 DSC 2P APPLIED PHYSIOLOGY

Course Outcomes (COs):

CO 1: Students can learn about the changes in different physiological parameters and relate them with causes of any type of illness.

CO 2: Students can able to know the normal and abnormal levels of physiological data related to human health and diseases

Course content:

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1. Microscopic examination of various tissues
2. Determination of clotting and bleeding time
3. Enumeration of RBC and WBC
4. Estimation of hemoglobin and Red blood cell indices
5. Determination of blood group and Rh factor
6. Determination of pulse rate and Blood pressure
7. Determination of Respiratory Rate
8. Lung function test

NUDE405A8 DSE 2P ADVANCES IN FOOD PROCESSING

Course content:

1. Determining frying quality of different oils.
2. Manufacturing of different sweets, candies and biscuits.
3. Studying the textural characteristics of curds prepared using different milk (cow, buffalo and dairy milk).
4. Preparation of sugar and Jaggery based Indian sweets.
5. Demonstrate the different methods of cooking (frying, boiling, grilling and baking) on the quality of chicken, fish and meat.
6. Assessment of some important nutraceuticals in foods.
7. Antioxidative sensor of foods: Estimation of antioxidative compounds in foods like Vitamin C, Vitamin E, Zinc and other natural antioxidants
8. Proximate analysis of foods: Ash content, Moisture content, PH etc.

NUDE405B8 DSE 2P NATIONAL HEALTH PROGRAMS AND SYSTEMS

The Students should participate in a nutritional survey in the community and submit a report during examination. The Survey may be made on the following topics:

1. Determination of socioeconomic status
2. Determination of energy requirement of sedentary persons
3. Determination of energy requirement of light, moderate and heavy workers
4. Determination of nutritional consumption by questionnaire method
5. Determination of nutritional status by diet survey method
6. study on nutritional status of the beneficiaries under National nutritional Programme

INDIAN KNOWLEDGE SYSTEM

Code: NUDO406VC Course: COM1 FULL MARKS-25 CREDIT: 2

Course Content:

1. Introduction to IKS: What is knowledge System, Characteristic Features of Indian Knowledge System).
2. Importance of IKS: Macaulay's Education Policy and its impact, Need of revisiting Ancient Indian Traditions.
3. Scope of IKS: The Universality of IKS (from Micro to Macro), development form Earliest times to

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18th Century CE.

4. Tradition of IKS: Ancient Indian Education System: Home, Gurukul, Pathashala, Universities and ancient educational centres. Relevant sites in the vicinity of the Institute: Water Management System, Temple Management, etc.
5. Medicine (Ayurveda), Alchemy, Mathematics, Logic, Art of Governance (Arthashastra).
6. Aesthetics, Town Planning, Strategic Studies, Krishi Shastra, Vyakaran & Lexicography, Ancient Sports, Yoga and Wellbeing
7. Traditional and Ancient food culture: Culture specific food, Fermented food, Folk food cum medicine, Food Taboos, Tribal food culture, Food diversity in India.

SECOND SEMESTER

NUDC 451X0 DSC 4T RESEARCH METHODOLOGY

Course Outcome (COs):

CO 1: A research methodology course aims to equip students with the skills to conduct independent research, including formulating research questions, designing studies, and collecting and analyzing data.
CO 2: Key outcomes include performing literature reviews, understanding and applying various research designs and statistical tools, and effectively communicating findings through reports and proposals. Ethical considerations and intellectual property rights are also integral parts of these outcomes.
CO 3: Develop the ability to define and formulate a research problem with specific, measurable, achievable, relevant, and time-bound (SMART) objectives.
CO 4: Conduct effective literature searches, critically analyze existing research, and prepare a comprehensive review with proper citation and referencing.

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CO 5: Students can choose and apply appropriate research designs, strategies, and methodologies (qualitative, quantitative, hybrid) based on the research problem.
CO 6: Students gain experience with data collection instruments and apply statistical tools to analyze and interpret research findings.
CO 7: Students may develop and write a formal research proposal with a clear plan, justification, and a full-length research report or paper.

Course Content:

1. Objectives of research: definition, objectives, types of research, quantitative and qualitative research in food and nutrition.
2. Basic Principles of research design: Meaning and need, types of research designs – exploratory, descriptive, experimental, survey and case study - cross–sectional and longitudinal, Study design issues, sampling methods and sample size.
3. Instruments of data collection; Observation, questionnaire, interview: reliability and validity of measuring instruments, data management and quality control
4. Research Strategies in food and Nutrition: Issues in design, conduct, analysis and interpretation a) descriptive studies (case studies, case-control and cohort studies – prospective and retrospective)
5. Ethics in nutrition research
6. Scientific writing as a means of communication: a) Different forms – research articles / notes, review articles, monographs, dissertations, and reports b) components of dissertation / research report / article c) Methods of presenting research findings – oral / poster
7. Background of Literature review, aims and objectives, Methodology, Expenditure, Bibliography of project proposal formulation, PERT chart.
8. Pilot project and its importance.
9. Implementation of project proposal and its evaluation.

NUDC 452X1 DSC 5T THERAPEUTIC NUTRITION

Course Outcome (COs):

CO 1: The students will be able to Analyse and understand the relationship between healthy eating and prevention and treatment of illness and disease.

CO 2: Demonstrate knowledge and skills to enable individuals to work in public health and health promotion. Apply the knowledge in primary care in managing dietary needs in long term health conditions.

CO 3: Students will be able to manage nutrition related disease and/or disease related malnutrition.

CO 3: Student may exhibit the techniques of writing menus and different types of food services. They can demonstrate knowledge and understanding regarding hospital food service system & food delivery

Course Contents

Unit I Introduction to therapeutic nutrition and dietetics Nutritional assessment in clinical care – goals and methods (SGA). Modification of normal diets (normal, soft and fluid diets), types and factors to be considered in planning therapeutic diets, general principles of dietary calculation. Principle involved in planning menu. Techniques of writing menus, Food service management in hospitals- Types (centralized and decentralized systems of service), management of delivery and service of food in different systems.

Unit II Dietary management of metabolic syndrome and associated disorders Metabolic syndrome: Concept; Pathophysiology of insulin resistance. Obesity- introduction, etiology, clinical assessment, treatment approaches, consequences of obesity and its prevention. Diabetes mellitus – types, etiology, symptoms and diagnosis, aims of dietary treatments, special dietary consideration for type I and II diabetics, complications of diabetes. Diseases of

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the heart and blood vessels- etiology, symptoms and diagnosis; atherosclerosis, lipids and other dietary factors and coronary heart diseases (CHD). Diet in CHD, hypertension, congestive heart failure and hyperlipidemia.

Unit III Dietary management of gastrointestinal tract disorders Structure and function of gastrointestinal tract, dietary treatment for constipation, diarrhea, peptic ulcer, celiac disease, tropical enteropathy, tropical sprue, inflammatory bowel disease, irritable bowel syndrome and diverticular disease.

Unit IV Nutritional management in liver. Diseases of the liver - functions of liver, clinical assessment of liver function. Pathogenesis, signs and symptoms of hepatitis, acute liver failure, cirrhosis and encephalopathy. Nutritional management in liver diseases. Dietary management in gallbladder diseases.

Unit V Diseases of the kidney - functions of kidney, clinical assessment of kidney function. Pathogenesis, signs and symptoms of acute and chronic renal failure, nephrotic syndrome and renal calculi. Nutritional management in kidney diseases and during renal replacement therapy.

Unit VI Diet principles in other diseases Infectious diseases (typhoid, malaria, tuberculosis, HIV), arthritis, gout, hypothyroidism, food allergy, surgery and trauma.

NUDE 453A1 DSE 3T INSTRUMENTATION IN MOLECULAR NUTRITION

Course Outcome (COs):

CO 1: An "Instrumentation in Molecular Nutrition" course focuses on the advanced laboratory techniques and analytical instruments used to study how diet and nutrition affect gene expression, metabolic pathways, and cellular functions.

CO 2: Key outcomes include the specific syllabus and learning outcomes can vary, but generally cover a range of molecular and biochemical methods.

CO 3: This skill based course will teach the students the various instrumentations that are used in the analytical laboratories.

CO 4: This course covers both fundamental and applications of the instruments that are routinely used for the characterization of biomolecules

CO 5: At the end of the course, the student has the basic knowledge on the theory, operation and function of analytical instruments.

Course contents:

UNIT I Spectrometric methods

Principles and applications of UV and visible spectrophotometry, flame photometry-Atomic Absorption Spectrophotometry (AAS) and Atomic Emission Spectrophotometry (AES), Spectrofluorimetry and brief mention (principle and applications) of Nuclear Magnetic Resonance (NMR), Electron Spin Resonance (ESR) spectrometry, Mass spectrometry (MS), Fourier Transform Infrared Spectrometry (FTIR) and Electron microscopy.

UNIT II Chromatographic techniques

Principle and applications of paper, thin layer, adsorption, gel, gas, ion exchange, affinity chromatography, HPLC and HPTLC techniques.

UNIT III Electrophoretic techniques

Principle and applications of paper, starch gel, agar gel and polyacrylamide gel electrophoresis. Isoelectric focusing, Immuno-electrophoresis, Enzyme linked immunosorbant assay (ELISA), Radio-immuno assay (RIA).

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UNIT IV Centrifugation techniques

Basic principles, preparative centrifugation techniques, analytical ultracentrifugation techniques, application- determination of molecular weight and purity of macromolecules.

UNIT V PCR and related techniques:

Standard PCR, gradient PCR, and RT-PCR, along with gel documentation systems.

NUDE 453B1 DSE 3T ADVANCE HUMAN NUTRITION

Course Outcomes (COs):
The students will be able to:
CO 1: Assess the nutritional status and determine nutrition related conditions and diseases.
CO 2. Critique and effectively communicate nutrition information.
CO 3. Describe methods used in assessing the nutritional status.
CO 4. Understand adult human body composition and demonstrate the techniques for the measurement of body compositions.
CO 5. Apply knowledge in the assessment of energy expenditure for various activities.
CO 6. Understand inborn errors of various metabolism

Course Contents

Unit I Concepts in nutrition and metabolism
Nutrient balance, turnover, flux, metabolic pools and adaptation to altered nutrient supply.
Unit II Body composition and energy expenditure
Composition of human adult body, techniques for the measurement of body 6 h composition, primary influences on body composition (nutrition, physical activity, hormones, trauma and disease).
Energy balance- Components of energy intake and expenditure; Control of food intake and regulation of energy balance- internal and external factors; Assessment of energy expenditure at rest and work- calorimetry and computation of energy requirements.
Unit III Carbohydrates
Carbohydrate metabolism and regulation, disorders related to carbohydrate metabolism, Inborn errors of carbohydrate metabolism; Glycemic and non- glycemic carbohydrates, glycemic response of foods - factors affecting glycemic index and measurement. Dietary fiber and non-starch polysaccharides- classification, digestion, absorption and mechanisms of health effects.

Unit IV Proteins
Protein and amino acid composition of foods, amino acid metabolism and its regulation; Protein turnover, factors influencing protein turnover- body size, age, metabolic rate, deficiency and imbalance of amino acid, pathological states; Inborn errors of amino acid metabolism; Protein quality evaluation of foods; Computation of protein requirements of individuals.
Unit V Lipids
Classification of dietary lipids, structural and physiological aspects; dietary lipid uptake, digestion – gastric and intestinal step; Absorption of lipids – role of small intestine; transport and secretion of lipids; Postprandial lipid metabolism, disorders related to lipid metabolism; Essential fatty acids: functions and role in eicosanoid metabolism, deficiency conditions.
Unit VI Body fluid and electrolyte balance
Water distribution in the body, preformed and metabolic water; maintenance 4 h and regulation of fluid and electrolyte balance.
Unit VII Minerals
Dietary sources, absorption, bioavailability, transport and storage; functions and mechanisms of action; interaction with other nutrients, requirements, deficiency, toxicity and clinical assessment of minerals such as calcium, phosphorus, magnesium, iron, zinc, copper, selenium, iodine and fluorine. Mineral antagonists in foods.

Unit VIII Vitamins

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Nomenclature, chemistry, dietary sources, absorption, bioavailability, transport and storage; loss in preparation and handling; functions and mechanisms of action; interaction with other nutrients, requirements, deficiency, toxicity and clinical assessment of vitamins: Fat soluble vitamins - A, D, E, K; water soluble- B and C vitamins. Vitamin antagonists in foods.

NUDE 454A0 DSE 4T FOOD FORTIFICATION

Course Outcome (COs):

CO 1: Describe the basic principles of food fortifications and its needs.

CO 2: List the characteristics of fortificants and fortification methods.

CO 3: Describe design of fortification and about different fortification methods.

Unit I: Food fortification – Needs, objectives, principles and rationale, selection and basis of fortificants. Types of fortification. Health benefits of fortification, Selection of nutrients for fortification, Levels to be added, Characteristics of fortificants and method of fortification. Technology of fortifying cereal products: Fortification methods. Fortification premixes, Design and composition of premixes and quality control. Fortification of bread, pasta, noodles, biscuits, and breakfast cereals.

Unit II: Micronutrient fortification of snack products, merits and demerits of fortification, choice of products and selection of micronutrients, Setting level of fortification, Safety limits, Technological and cost limits, Challenges in fortifying snack products, Nutrient interaction and bioavailability.

Unit III: Other special fortified products - salt, sugars, milk and oils: Salt: Technology of fortifying salt with iron and iodine, Iodine stability and quality of double fortified salt, Safety issues, Levels to be added. Sugars: Fortification with iron and vitamin A, Premix formulation, Fortification level, Packaging. Milk: Fortification with vitamin A, technology and levels. Oils: Fortification with vitamin A, Rationale of vitamin A fortification, Stability of vitamin A in oil during storage and cooking, Effects of frying on Vitamin A content, Efficacy and safety of vitamin A added to oil, Technology of fortifying, Packaging.

Unit IV:

Foods as Vehicles for Fortification: Rice, Cereal flours, cereal products (bread, pasta, noodles, biscuits and ii) Salt and sugar, iii) edible oils, iv) Beverages; Candies, Nutri- bars, and Granola bars, vi) Snack food, water and other foods. Technology of fortification, challenges (safety, technological and cost limits), packaging and shelf life quality of fortified foods.

NUDE 454B0 DSE 4T FOOD HYGIENE AND SANITATION

Course Outcome (COs):

CO 1: Describe the basic principles of food hygiene and sanitation.

CO 2: To understand the importance of maintaining hygiene and sanitation in domestic and industrial purposes.

CO 3: Understanding different methods of maintaining personal hygiene and sanitation for the prevention of foodborne diseases.

Course content

1. The relationship of micro organisms to sanitation. Role of microbiology – Environmental effects of microbial growth. Effects of micro- organisms on food degradation and food borne illnesses- bacteria, virus, molds, yeasts, and parasites. Microbiology of food safety.

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2. Other food hazards – chemicals, antibiotics, hormones, metal contamination poisonous foods.
3. Food contamination- sources and transmissions. Water, air, sewage and soil as reservoirs of infection and ways of spread. Other agents of contamination - Humans, domestic animals, vermins, birds.
4. Importance of personal hygiene of food handler - habits -clothes, illness. Education of food handler in handling and serving food.
5. Food safety system and quality assurance. Safety in food procurement, storage, handling and preparation – control of spoilage – safety of left over foods. Food laws and regulatory framework.
6. Cleaning methods – sterilization, and disinfection –products and methods –use of detergents, heat, chemicals, and tests for sanitizer strength.
7. Control of infestation: rodent control- rats, mice; vector control- use of pesticides.

8. Food sanitation, control and inspection-planning and implementation of training programme for health personnel. Sanitary design of food premises.

9. **Community Water and Waste Management**: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water/portability and tests for portability, community, waste and waste disposal, sewage disposal and treatment, solid waste and disposal, liquid waste disposal.

10. **Air & health**- Indices of thermal comfort, Pollution a) Sources b) Pollutants c) Monitoring d) Effects e) Prevention & control. AQI, Standard levels of AQI.

NUDE 455A1 DSE 5T NUTRITION IN CRITICAL CARE

Course Outcome (COs):

CO1: Principles of nutrients, digestion, absorption, and metabolism.

CO 2: How different body systems (digestive, endocrine, etc.) work and how they are impacted by nutrition.

CO 3: Understanding energy requirements, Recommended Dietary Allowances (RDA), and how factors like life stage (pregnancy, lactation), age, and activity level affect needs.

CO 4: Methods for gathering information, including medical history, clinical signs, dietary intake, and anthropometric measurements (height, weight).

CO 5: Evaluating eating behaviours and identifying factors that may hinder dietary changes.

CO 6 Principles of planning balanced meals, including food groups, food guides, and the impact of food cost.

Course Contents

1. Introduction to term Dietician: Definition of Dietician, Difference between registered dietician & Nutritionist
2. Role of dietician in hospital: work area of hospital dietician, role of dietician in hospital
3. Role of dietician in community: work area of community dietician, role of community dietician
4. Nutritional care: Nutritional care of hospitalized patients - hospital malnutrition, impetus for improved nutritional care of patients, nutritional screening, assessment of the critically ill. Preparation of nutritional care plan.
5. Nutritional support systems: Nutritional support systems and other life saving measures for the critically ill- monitoring nutrient intake and providing nutrition support service, role of immuno enhancers, conditionally essential nutrients, immune-suppressants and special diets.
6. Planning, monitoring and management of enteral and parenteral feeding: Designer feeds, commercial feeds, techniques, applications and complications.

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7. Management of high risk conditions: including patho-physiological clinical and metabolic aspects in the following conditions: burns, CV complications and surgery, cancer, AIDS, multiple organ failure, chronic renal failure (CRF), dialysis, transplant, GI tract surgery, hepatic failure and transplants, neurosurgery, fractures and other conditions of stress, trauma and sepsis, dumping syndrome. Home care for critically ill and requiring long term nutrition support.
8. Complications of nutritional support systems: Including re-feeding syndrome, palliative care, rehabilitation diets (stages).
9. Metabolic responses to critical illness.

NUDE 455B1 DSE 5T NUTRITION COUNSELLING

Course Outcomes (COs)

CO 1: Understand the principles and procedures of nutrition counseling and the role of the counselor.

CO 2: Develop an understanding how: (a) lifestyles influence health and well-being; (b) acute and chronic disease affects the emotional and psychological state and the behavior of the individuals.

CO 3: Be familiar with various techniques used in counseling.

CO 4: Be able to use various types and techniques of counseling to motivate patients to achieve well-being

CO 5: To apply counselling methods to patients with different diseases as well as to promote body's potential towards health, wellness and disease prevention

Course contents:

- Nutrition Counseling: definition, concept, the role of clinical dietician, the recipients, counseling environment. A systems approach to nutritional care: overview of the system, components of the system. Dietician as part of the medical team and outreach services
- Factors for Counseling: dietary diagnosis and tests for nutritional status – correlation, clinical and dietary information, nutritional and health conditions including cares of skin, hair, face, hands, feet etc. Psychological conditions, food allergies, aging, gender related and other problems. Aesthetic attributes of diets.
- Assessment and planning component: medical history assessment – techniques of obtaining relevant information for patient. Methods of interview – verbal and nonverbal techniques. Counseling models – data analysis (dietary, biological, environmental, behavioral data). Facilitator resource analysis – culmination of the assessment process. Designing of counseling plans – goals and objectives, classifying objections, resource planning – client care plan and designing evaluation instruments.
- Implementation and evaluation component: resources and aids of counseling the client/patient – client concurrence, co-ordination of care plans - the provision of learning experience. Measuring the success of performance of client and evaluating the counseling process. Patient education and counseling – assessment of patient needs, establishing report, counseling relationship. Follow up visits and patient education
- Nutrition Advocacy: concepts and practices in nutrition advocacy – steps for success concept of mainstreaming nutrition in all child survival programs and in national health and development programs.
- National policies and nutrition advocacy – Nutrition Mission of various states and its implications, need for revision in state nutrition policies.

NUDC 452X8 DSC 5P THERAPEUTIC NUTRITION

1. Therapeutic diet preparation for metabolic disease

a. Therapeutic diet chart preparation for Diabetes

b. Therapeutic diet chart preparation for Hypertension

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c. Therapeutic diet chart preparation for Atherosclerosis

d. Therapeutic diet chart preparation for Nutritional anaemia

2. **Therapeutic diet preparation for Gastro Intestinal Diseases**

a. Therapeutic diet chart preparation for Diarrhoea

b. Therapeutic diet chart preparation for Dysentery

c. Therapeutic diet chart preparation for Flatulence

d. Therapeutic diet chart preparation for Jaundice

e. Therapeutic diet chart preparation for Hepatitis

f. Therapeutic diet chart preparation for Irritable bowel Syndrome, Inflammatory bowel disease

g. Therapeutic diet chart preparation for Constipation

h. Therapeutic diet chart preparation for Colitis

i. Therapeutic diet chart preparation for Ulcer.

7. **Therapeutic diet preparation for rheumatic diseases**

a. Therapeutic diet chart preparation for Arthritis.

b. Therapeutic diet chart preparation for Osteoarthritis**.**

NUDE 453A8 DSE 3P INSTRUMENTATION IN MOLECULAR NUTRITION

1. Application of UV and visible spectrophotometry,
2. DNA Extraction From Eukaryotic Cells (Human Blood Cells).
3. DNA Extraction From Different Tissues (Bovine Spleen, Liver, Plant)
4. RNA Extraction From Different Tissues (Bovine Spleen, Liver and Plant).
5. DNA Extraction from Bacterial Cells (Bacterial Plasmid Extraction).
6. DNA and RNA Concentration and Quantification By UV Spectro-NanoDrop Method. Electrophoresis Analysis
7. Applications of paper, thin layer Chromatography, HPLC and
8. Agarose Gel Electrophoresis
9. Basic Concept Polymerase Chain Reaction (PCR)
10. Extraction and Purification of Native Proteins
11. Separation and Estimation of Proteins

NUDE 453B8 DSE 3P ADVANCE HUMAN NUTRITION

1. Demonstration of blood glucose monitoring using glucometer.
2. Estimation of protein, GOT, cholesterol, triglyceride, creatinine and urea in serum using biochemical analyzer.
3. Body composition analysis: Anthropometric and bioelectrical impedance methods.
4. Physical activity measurement using standard questionnaire.
5. Computation of total energy expenditure using factorial method.
6. Development of low cost protein food supplements and protein quality evaluation by computational method (PDCAAS).

NUDE 455A8 DSE 5P NUTRITION IN CRITICAL CARE

- Preparation of clear fluid diet, full fluid diet, soft diet, bland diet

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- Preparation of naso gastric, naso duodenal tube feeding
- Preparation of low calorie diet
- Preparation of High calorie diet
- Preparation of salt restricted diet
- Preparation of DASH diet
- Preparation of RUTF for SAM children
- Preparation of High fiber diet
- Preparation of Monomeric and polymeric formula
- Nutrition for sepsis, burn, trauma patients.
- Nutrition in post surgical condition

NUDE 455B8 DSE 5P NUTRITION COUNSELLING

1. Preparation of case history of a patient.

2. Understanding the use of conventional and non-conventional methods of counselling

i. Face to face counseling.

ii. Use of software for counseling e.g Dietcal.

iii. Use of any one Diet App for counseling and assessing food intake.

3. Planning Nutrition counseling sessions and identifying ways to adhere to dietary changes for the following conditions:

Lactation counseling, SAM. Eating disorders. Overweight / Obesity in School children, adolescent and adults. Metabolic syndrome. Diabetes- Gestational Diabetes. Renal disease, Liver disorders.

4. Organizing health camps and patient feedback – both at hospital level and community

5. Visit to and training at hospital/ nursing home/ medical college/ clinic where dietitians work

NUDO 459 VISIT TO ANY RESEARCH INSTITUTE /FOOD SERVICE UNIT/ HEALTH CENTRE/FIELD VISIT

CO1: Develop a knowledge base about the physical facilities needed for different types of food service units/ research institute.

CO2: Acquire knowledge about handling operations of different modern equipment used in food industries/ research institute

CO3: Gaining practical knowledge on public health/ research institute on the field visits to any rural community

Course Content

Students are required to visit any type of food industry or nutrition research institute/ health centre/ health clinic to learn about the new techniques and instruments, methods used in diet calculation/ food processing etc., or Field visit to any local community to assess the nutritional status by anthropometric/ clinical/ diet survey method of local people and encourage to improve the health status.

A report should be prepared according to the visit. Evaluation of the report shall be made on the viva-voce examination.

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THIRD SEMESTER

DSC 6T NUTRITIONAL EPIDEMIOLOGY

Course content

1. **Introduction to Epidemiology:** Definition, Objective and uses and core functions of epidemiology, Epidemiologic approach, Historical evolution of epidemiology, Concept of health and disease, Determinants of health and diseases, Difference between epidemiology and clinical/preventive medicine, Epidemiology as the cornerstone of public health/health - for example: contribution of Nurses' Health study, British Doctors' study and Framingham Heart Study to public health etc.
2. **Basic concepts of epidemiology**: Difference between infectious and communicable diseases vs. noncommunicable diseases, Natural history of disease, Chain of infection, Mode and route of transmission of diseases, Meaning of outbreak or epidemic, endemic and pandemic, incubation period, latency period, clinical case, subclinical case, carrier, infectivity, pathogenicity and virulence, theories and principles of causation-epidemiological triad, levels of prevention and modes of intervention.
3. **Epidemiological studies:** Classification of epidemiological studies, design, advantages and disadvantages of descriptive study according to time, place and person, concept of analytical and experimental study, case control and cohort studies,
4. **Concepts of clinical epidemiology:** Surveillance and Screening: Definition, functions, various forms of public health surveillance, surveillance system design and operation, understanding of Integrated Disease Surveillance Programme (IDSP), Definition, basis of screening, lead time, types and uses of screening, criteria for choosing a screening test, screening tests vs. diagnostic tests, error in screening tests.
5. **Measurement Issues**: Measurement of disease, Occurrence and Measures of association, Exposure and Outcome, Assessment of Food Consumption, Intake and validation of Assessment, Biochemical Markers of nutrient intake and nutritional status, Sociodemographic and psycho social variables, Design and planning of Nutritional Epidemiological studies, Nutritional Surveillance; Basic concepts, uses and setting up of surveillance systems, Monitoring and Evaluation.
6. Epidemiology of genetic disorders and services, Human genome project & human genome diversity project, Preconception & prenatal diagnostic technology (PNDT), Medical termination of pregnancy act 1971.

DSC 7T COMMUNITY NUTRITION AND PUBLIC HEALTH

Course content

1. **Community health concept:** Definition and brief study of community, family, village and block. Definition, dimension and determinant of health, positive health, health situation in India, Relationship between health and nutrition. Role of public nutritionist in health care delivery. Health Indices: fertility indicator, vital statistics, mortality, morbidity and demographic indicator, human development Index, Reproductive health index. IMR, MMR, birth rate, sex ratio, poverty level. Concept of disease, causation (Agent, host, environmental factors) concept and control & prevention, modes of intervention,
2. **Nutrition Education**: Meaning, nature and importance of nutrition education to the community, training of workers in nutrition education programme. Principles of planning, executing and evaluation nutrition education programme. Methods and Techniques of organizing nutrition programmes using audio, video aids and exhibition, Problems of nutrition.
3. **Nutrition and National development:** National nutritional policy – Aim objectives, guidelines and thrust areas. PDS – Public distribution system. Need for voluntarism in community development, Assistance available to voluntary agencies from ministries, departments, Government of India, Central State Social Welfare Board etc, national nutrition surveillance system etc. Antenatal & Post natal care
4. **Nutrition policy and programs-**
   a. National nutrition policy: need for nutrition policy, policy strategies and their implementation b. Nutrition programs: National anemia prophylaxis programme, Prevention of night blindness, Vitamin A prophylaxis program, National iodine prophylaxis program, Goiter control program, ICDS
   c. National nutrition surveillance system. Food for work etc.

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d. NGO in community development operations.

5. **Food and Nutrition Security:** Nutritional Status; Determinants of nutritional status of individual and populations, Nutrition and Non-nutritional indicators; socio-cultural, biologic, environmental and economic, Factors affecting food security system, National and international systems to improve food security.

DSC 8T NUTRITIONAL ANTHROPOMETRY

Course content

- Principle of Nutritional status by anthropometric assessment–advantages and disadvantages.
- Age group specific height, weight, weight for age, weight for height, BMI. Indian reference value, process- limitation.
- Body fat determination –process and its impact on nutritional anthropology
- Body mass determination.
- BMR determination from Anthropometric parameters.
- Different Anthropometric measures and their importance in nutritional status.
- Anthropometry–methods, reference standards in children and adults, scales of comparison (percentiles, Z score) classification and interpretation of somatic data, somatic indicators of PEM.

DSC 9T NUTRITION THROUGH LIFE CYCLE

Course content

1. **Food Groups and Recommended Allowances**
   Different food groups and planning diets to meet the requirement at different socioeconomic levels, Recommended allowances for Indians, Basic requirement for computation of the allowances (comparison of India's recommended allowances with that of UK, USA, FAO & WHO),
2. **Nutrition in Pregnancy and Lactation**
   Nutritional status and general health, weight gain during pregnancy and nature of weight gain, requirements, storage of nutrients in normal pregnancy. Physiological cost, complications fetal growth and implications of public health programmes. Nutritional requirements of lactation.
3. **Nutrition in infancy**
   Nutritional status of infants, weight as the indicator, Nutritional allowance for the infants, breast feeding, breast feeding versus formula feeding, Weaning foods suitable for infants, feeding the premature infant
4. **Nutrition in Preschool**
   Prevalence of malnutrition in preschoolage, food habits and nutrient intake of preschool children, dietary allowances – supplementary foods, feeding programmes for preschool children
5. **Nutrition during school age**
   Physical development–Nutritional status of school age children, school lunch programmes, food habits, nutritional requirements for school age children
6. **Nutrition during adolescence**
   Change of growth, characteristics of adolescents, nutritional needs of the adolescents, changes needed to prevent malnutrition in adolescence
7. **Nutrition for Adults**
   Nutrition for the adults, basis for requirement nutrition and work efficiency
8. **Nutrition for the Aged**
   Nutritional requirements for aged, socioeconomic and psychological factors, Clinical needs, malnutrition of elderly persons.

DSC 10T DRUG AND NUTRIENT INTERACTION

Course content

1. **Drugs and pharmaceutical compounds**-natural and synthetic, use of excipients.

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2. **Characteristics of drugs action:** Pharmacodynamics, pharmacokinetics, route and form of excretion. Drug abuse and drug resistance

3. **Drug-nutrient interaction**s–effect of drugs on ingestion, digestion, absorption and metabolism of nutrients, effect on nutritional status, effect on organ function, drug dosage and efficacy.

4. **Nutrient effects on drug therapy–**effects of dietary composition, interactions between medication and milk, iron, fruit juices, antacids.

5. Intestinal micro flora and nutrition of hosts, pre-biotics and probiotics.

6. Nutrient as medicine (Pharmacologic use of nutrients)

DSC 8P NUTRITIONAL ANTHROPOMETRY

Course content

- Nutrition status of Pre-schoolchildren using anthropometric parameters.
- Nutrition status of school going children using anthropometric parameters
- Nutritional status of adolescence using anthropometric parameters.
- Nutrition status of geriatric person.
- (Above nutritional assessments should be made by measuring height, weight, head circumference, Mid-arm circumference, BMI and other anthropometric indices and skin fold thicknesses)

DSC 9P NUTRITION THROUGH LIFE CYCLE

Course content

- Preparation of Diet chart of infants
- preparation of diet chart for preschool children
- preparation of diet chart for school children
- preparation of diet chart for adolescents
- Preparation of diet chart for old age
- Preparation of diet chart for athletes
- Preparation of diet chart for pregnant mother
- Preparation of diet chart for lactating mother

DSC 10P DRUG AND NUTRIENT INTERACTION

Course content

1. Animal handling, animal health check-up
2. Different route of administration of drugs
3. Dose response relationship of a drug
4. Acute toxicity study of a drug, studying wellness parameters
5. Study of LD50 and therapeutic dose
6. Effect of toxicity exposure to any drugs in acute and chronic administration

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NUDC MOOCS

An PG level online course should be completed from SWAYAM platform having 4 credits

SS/CV COMMUNITY OUT-REACH PROGRAM AND REPORT SUBMISSION

Course content

The Students should participate in a nutritional survey in the community and submit a report during examination. The Survey may be made on the following topics:

- Determination of socioeconomic status
- Determination of energy requirement of sedentary persons
- Determination of energy requirement of light, moderate and heavy workers
- Determination of nutritional consumption by questionnaire method
- Determination of nutritional status by weighing method / cooked food method
- Study on nutritional status of the beneficiaries under National nutritional Programme

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FOURTH SEMESTER

DSC 11T SPORTS NUTRITION AND NUTRITION IN ALTERED ENVIRONMENTAL CONDITION

Course content

Approaches to the management of fitness and health: Nutrition, exercise, physical fitness and health - their interrelationship. Significance of physical fitness and nutrition in prevention and management of weight control regimes. Nutrition guidelines for maintenance of health and fitness.

Nutritional requirements of exercise: Effect of specific nutrients on work performance and physical fitness. Nutrients that support physical activity, mobilization of fuel stores during exercise. Fluid requirements

Nutrition in sport activities: Sports specific requirements- importance of carbohydrate loading, pre-game and post-game meals, diets for persons with high energy requirements, stress, fracture and injury

Dietary supplements and ergogenic aids: Definitions, Use of different nutragenic / ergogenic aids and commercial supplements, sports drinks, sports bars etc.

Nutrition in Space: Physiological and biochemical changes, Complications, Space foods, Nutritional requirement in space

Nutrition in high altitude: Physiological and biochemical changes in high altitude, Health hazards, Nutritional requirements

Changes of nutritional requirement in extreme cold and warm climate, Interrelationship between nutrition and environmental challenges

DSC 12T COMMUNICABLE AND NON-COMMUNICABLE DISEASES

Course content

Epidemiology of communicable diseases (CDs):

- Classification, Burden of disease, Trends in CDs; global and regional
- Agent factors in CD transmission, Infectiousness, transmissibility, communicability, reservoir,
- Host factors in CDs Susceptibility, resistance, immunity
- Environmental factors in CDs, Conducive environment, breeding grounds, Climate change and relationship with infectious diseases, Emerging and re-emerging diseases Drug resistance in CDs, Biological reasons for emergence of resistance, Impact on national programs, Economic burden of drug resistance, Globalization and spread of infectious diseases, Impact and challenges
- Control strategies, Levels of prevention and modes of intervention, Source reduction, Vaccination, Integrated vector control, Diagnosis and treatment
- Control Communicable Diseases with special reference to Patterns of transmission, risk factors, prevention and intervention of HIV/AIDS, Leprosy, Vector Born Diseases (Malaria, Filaria, Plague, Yellow fever Dengue, Chikungunya, Kala-Azar, Japanese Encephalitis, KFD), Epidemiology and control of communicable vaccine preventable disease: Tuberculosis, Diphtheria, Whooping Cough, Measles, Tetanus, Polio.

Epidemiology of non-communicable diseases & injuries:

- NCD typology, Risk factors for NCDs, Epidemiology of NCDs in India, Epidemiology of intentional and unintentional injuries, Congenital diseases in India, Public health interventions for NCDs. Epidemiology of major NCDs of public health importance: Cardiovascular diseases, Coronary heart disease, Hypertension, Stroke, Rheumatic heart disease, Cancer, Diabetes, Obesity, Blindness, Accidents and injuries.

DSC 13T FOOD AND NUTRITION SERVICES IN HOSPITAL

Course content

- **Scope for food and nutrition services in hospitals-** importance of nutritional care and foods service in hospitals.
- **Role of nutrition support team**- dietetic interns, dietitians (therapeutic, administrative and consultant dietitian) medical doctors and nurses. Team approach in patient care, Psychological considerations in

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patient care, inter personal relationship with patients.

- **Assessment of nutritional status in clinical situations and development of nutrition care plan**: Assessment nutritional status in hospital setup-dietary, clinical, biological, somatic, behavioral methods. Psychological factors affecting food intake. Data analysis and interpretation. Medical records-types, uses. Factors to be considered for counseling, Nutritional and health conditions including body care-skin, hair, face, hands, feet etc. Aging, gender related and other problems
- **Types of services**- services in primary, secondary and tertiary health care setup, patients in different critical care centers, post-natal, pediatric and geriatric patients. Basic quality management in nutrition services- total quality, structuring quality program in health care, assessment of quality of services.
- **Patient satisfaction**- meeting patient needs and wants, managing customer's expectations, assessing patient's satisfaction as a mark of quality.
- **Continuous quality improvement-** strategies, training and monitoring.

RP/D PROJECT WORK

Course content

(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, quality control laboratories, food industries or other institutions with prior approval).

(The student should appear before examiners board and the dissertation shall be evaluated by means of presentation and viva – voce).

START-UP PROPOSAL RESEARCH/ START-UP PROPOSAL DESIGN

Course content

A grant proposal on any relevant topic in biology will have to be prepared by students following the format of DST/DBT/ICMR, India. The students will also be required to defend the proposal before a panel of experts. Both the written proposal and its defense will be taken into consideration for evaluation.

SEC INTERNSHIP TRAINING IN HOSPITAL

Course content

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.

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