VIDYASAGAR UNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF

BACHELOR OF SCIENCE (HONOURS)

MAJOR IN NUTRITION

4-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023 & NEP, 2020

VIDYASAGAR UNIVERSITY
BACHELOR OF SCIENCE (HONOURS) MAJOR IN NUTRITION
(Under CCFUP, 2023)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	TOTAL
B.Sc. (Hons.)	2nd	III	**SEMESTER-III**							
			Major-3	NUTHMJ03	T: Nutritional Physiology, Biophysics and Biochemistry; P: Practical	4	3-0-1	15	60	75
			Major-4	NUTHMJ04	T: Food Science and Food Commodities; P: Practical	4	3-0-1	15	60	75
			SEC	NUTSEC03	P: Low cost supplementary foods (Practical)	3	0-0-3	10	40	50
			AEC	AEC03	Communicative English -2 (***common for all programmes***)	2	2-0-0	10	40	50
			MDC	MDC03	Multidisciplinary Course -3 (***to be chosen from the list***)	3	3-0-0	10	40	50
			Minor-3 (Disc.-I)	NUTMIN03	T: Concept of Food and Nutrition; P: Practical	4	3-0-1	15	60	75
			Semester-III Total			20				375
		IV	**SEMESTER-IV**							
			Major-5	NUTHMJ05	T: Metabolism of Biomolecules; P: Practical	4	3-0-1	15	60	75
			Major-6	NUTHMJ06	T: Nutrition in different phases of Human life Cycle; P: Practical	4	3-0-1	15	60	75
			Major-7	NUTHMJ07	T: Nutritional Epidemiology; P: Practical	4	3-0-1	15	60	75
			AEC	AEC04	MIL-2 (***common for all programmes***)	2	2-0-0	10	40	50
			Minor-4 (Disc.-II)	NUTMNI04	T: Nutrition during Physiological State; P: Practical	4	3-0-1	15	60	75
			Summer Intern.	INT	Internship/ Apprenticeship - activities to be decided by the Colleges following the guidelines to be given later	4	0-0-4	-	-	50
			Semester-IV Total			22				400
			TOTAL of YEAR-2			42				775

MJ = Major, MI = Minor Course, SEC = Skill Enhancement Course, AEC = Ability Enhancement Course, MDC = Multidisciplinary Course, CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical, MIL = Modern Indian Language

Programme Specific Objectives:

i. Understand the role of nutrient for community welfare
ii. Carrier opportunities in Public Health and Nutrition Community Nutrition Sectors.
iii. Enable entrepreneurship development in the field of food science and nutrition.
iv. Pursue higher education and research in the different domains of nutrition and public health
v. Skill based knowledge up gradation.

Detailed Syllabus

MAJOR (MJ)

MJ-3: Nutritional Physiology, Biophysics and Biochemistry Credits 04 (Full Marks: 75)

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability to

1. Understand the impact of various physiological systems in human bodywith nutrition.
2. Nutrition physiology is the study of how food and nutrients interact with the human body, and how these interactions affect health.
3. It explains various aspects and systems of the body from a physical and nutritional perspective.
4. Biochemistry can help us understand the chemical and metabolic processes that our bodies undergo in order to use the nutrients we consume

MJ-3T: Nutritional Physiology, Biophysics and Biochemistry Credits 03

Course contents:

1. **Nutritional Physiology**
   - Concept of eukaryotic cells-structure and function. Comparison of features of prokaryotic and eukaryotic cells, structure outside the cell membrane, cell membrane transport system.
   - Structure and function of neuron and synapses. Neurotransmitters and its role. Organization of central and peripheral nervous system. Hypothalamus, pituitary gland and its role in various body functions. Neuromuscular junction-its role. Role of various nutrients on maintenance of neurological functions.
   - Function of gut-brain axis. Basic function of gut hormones, oxytocin, prolactin, thyroidal hormones, pancreatic hormones.
   - Basic concepts of Spermatogenesis, oogenesis, folleculogenesis and its regulation. Menstruation cycle-its regulation and menopause.
   - Components of blood, blood coagulation. Importance of plasma proteins- ferritin, transferrin, ceruloplasmin, prealbumin. Erythropoiesis. Structure and function of heart - Regulation of cardiac output and blood pressure.
   - Role of lungs in the exchange of gases and transport of oxygen and carbon dioxide. Lungs volume and capacity. Lungs compliances. Regulation of breathing. Urine formation. Non-excretory function of kidney.

2. **Nutritional Biophysics**
   - Biological (Nutritional) importance of diffusion, absorption, osmosis.
   - Colloids. – Physiochemical properties and their biological (Nutritional) importance.
   - Nutritional importance of viscosity and surface tension.
   - Biological importance of acid, base, buffer, pH and acid-base balance.
   - Enzymes: Definition, classification, coenzyme, isoenzyme, specificity of enzymes, enzyme kinetics (Michelis-Menten equation) including factors affecting enzyme activity, enzyme inhibition.

3. **Nutritional Biochemistry:**
   - Definition and function, Classification, Isomerism of monosaccharide, Properties of monosaccharide, Structure and functions of modified monosaccharide, disaccharides, oligosaccharides, polysaccharides and mucopolysaccharides.
   - Definition and function, Classification, Classification of fatty acids (straight chain fatty acid, Substituted fatty acids, cyclic fatty acids), Isomerism of fatty acids, Properties of fatty acids, Glycerol, Properties of fats, Characterization of fats, Phospholipids, Micelle, Bilayer, Liposome, Glycolipids, Steroids and Sterols, Structure and Properties.
   - Definition and Functions, Classification, Amino acids and their functions, Isomerism of amino acids , Classification of amino acids, Properties of amino acids , Properties of protein, Structure of proteins (Primary, Higher orders, Bonds stabilizing higher structures, secondary (alfa helix, beta pleated sheet, beta bend and omega loop and Triple helix supercoil, and tertiary supersecondary motifs with domain).

4. **Application of carbohydrates, proteins and lipids in nutrition:**
   - Glycemic index and glycemic load.
   - Fatty acids: Role and nutritional significances of PUFA, MUFA, SFA, USFA, Omega - 3 fatty acid.
   - Protein quality (BV, PER, NPU).

MJ-3P: Nutritional Physiology, Biophysics and Biochemistry (Practical) Credits 01

Course contents:

1. Determination of pH: in acids, alkalis and buffers using pH meter and indicators.
2. Qualitative test of carbohydrates, protein and fats.
3. Enzyme Assays: SerumAlkaline phosphatase (ALP), Serum Glutamate Oxaloacetate Transaminase (SGOT), Serum Glutamate Pyruvate Transaminase (SGPT), Amylase, Lipase.
4. Estimation of glucose, protein, cholesterol, triglyceride, creatinine and urea in plasma using biochemical methods and Biochemistry analyser. Compare the results.

MJ-4: Food Science and Food Commodities **Credits 04 (Full Marks: 75)**

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability

1. To know regarding the energy rich foods, body-building foods and protective foods.
2. To enhance the knowledge about various types of foods and their uses.
3. To gather the knowledge on effect of cooking affect the nutritional value of foods.

MJ-4T: Food Science and Food Commodities **Credits 03**

Course contents:

1. **Concept about energy rich foods:**
   - Nutritional aspects of wheat, rice, oats, rye, barley, millets, quinoa, maize or corn, jowar, ragi and bajra.
   - Types, sources, use and nutritional aspects of fats and oils. Specific fats and oils (lard, butter, margarine, cotton seed oil, groundnut oil, coconut oil, soyabean oil, olive oil, rice bran oil, sesame oil, rape seed oil and mustard oil, palm oil),
   - Effect of heating on fat (smoke point, flash point and fire point, changes in fat on heating). Role of fat/oil in cookery (fat or oil used as medium of cooking, fat improves the texture of foods, fat improves palatability, improves quality of the product).
   - Specific nuts and oil seeds (almonds, coconut, flaxseed, gardencress seeds, groundnut, soyabean, sunflower seeds, walnuts, oilseed cakes)

2. **Concept about Body building foods:**
   - Types of pulses and legumes, uses, and nutritional aspects. Pulse in cookery (effects of cooking of pulse, factors affecting cooking quality).
   - Nutritive value and composition of milk, Types of processed milk, milk products (butter, curd, paneer and cheese).Role of milk products in cookery,Milk in cookery (effect of heat in various milk component).
   - Nutritional aspects and uses of edible fish and meat, concept of red and white meat.
   - Cookery of egg, fish and meat (effect of heat in various component of egg, changes during cooking of meat), role of egg in cookery.

3. **Concept about protective and immune rich foods:**
   - Uses and nutritional aspect of commonly available leafy and green vegetables.
   - Uses and nutritional aspect of commonly available others vegetables.
   - Relation between various vegetables and human immune system.
   - Vegetable cookery (preliminary preparation, changes during cooking, loss of nutrient during cooking, effects of cooking on pigment)
   - Uses and nutritional aspect of fresh fruits and dry fruits– raw and processed product.
   - Fruits and human immune system.

4. **Concept about the new foods:**
   - Genetically modified food.
   - Functional food
   - Fortified food.

- Designer food.
- Super foods

MJ-4P: Food Science and food commodities (Practical) **Credits 01**

1. Proximate analysis of foods- Ash, moisture, carbohydrate, protein, fats, pH.
2. Visit to local Food processing plants like bakery industry, milk processing unit, flour mill, dal mill, rice mill, oil extraction mill, fruit juice manufacturing units etc. And prepare a report on that visit.

MJ-5: Metabolism of Biomolecules **Credits 04 (Full Marks: 75)**

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability

1. Understand of various enzymes in energy-producing mechanism.
2. To know how electron uses in energy production in the body.
3. Study about the various biochemical pathways of the metabolism of carbohydrates.
4. To learn about the metabolism of lipids including fatty acids.

MJ-5T: Metabolism of Biomolecules **Credits 03**

Course contents:

1. **Carbohydrate metabolism:**
   - Glycolysis-its metabolic pathway, regulation and energy generation.
   - TCA Cycle- its metabolic pathway, regulation and energy generation.
   - Glycogenolysis& gluconeogenesis- metabolic pathway, importance.
   - Pentose phosphate pathway- metabolic pathway, importance.

2. **Protein and Nucleic acid Metabolism :**
   - Transamination, deamination, transmethylation.
   - Amino acid derivatives with significances.
   - Urea cycle-Biochemical pathways, significance.
   - Synthesis of nucleic acid- purine and pyrimidine synthesis.
   - Catabolism of nucleic acid- purine and pyrimidine catabolism.

3. **Lipid metabolism:**
   - Biosynthesis of triglycerides and phospholipids.
   - Biosynthesis of palmitic acid and its significance.
   - Biosynthesis of oleic acid (Omega 9 fatty acid), linoleic acid (Omega 6 fatty acid) linolenic acid (Omega 3 fatty acid) and its significance
   - Ketone bodies types and formation, utilization of ketone bodies.
   - Beta, omega and alfa oxidation of fatty acids.

4. Metabolism of micronutrients:

- Metabolism of vitamin A, D, E, K, B6 and C.
- Metabolism of vitamin calcium, iron, iodine and zinc.

MJ-5P: Food Science and food commodities (Practical) Credits 01

1. Estimation of lactose in milk.
3. Estimation of calcium from foods.
4. Determination of acid number and saponification number of fats and oil.
2. Estimation of total carbohydrate from food.
3. Estimation of vitamin C from foods.

MJ-6: Nutrition in different phases of Human life Cycle Credits 04 (Full Marks: 75)

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability

1. To know regarding nutritional requirements and dietary management during pregnancy.
2. To know about the physiology of lactation, nutritional requirements and dietary management during lactation.
3. To learn about nutritional requirement of toddlers / preschool / school going children / adolescent / adults.
4. To learn about geriatric nutrition.

MJ-6T: Nutrition in different phases of Human life Cycle Credits 03

Course contents:

1. Nutrition during Pregnancy:

- Physiology of pregnancy, non-nutritional factors affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule.
- Nutritional requirements during pregnancy and dietary management. Special importance of iron, folic acid and calcium during pregnancy.
- Common problems of pregnancy and their managements- morning sickness, anaemia, constipation, pregnancy induced hypertension, gestational diabetes.

2. Nutrition during Lactation and infancy:

- Physiology of Lactation.
- Nutritional requirements during lactation.
- Dietary management, food supplements.
- Increase the production of breast milk-various factors.
- Care and preparation of nipples during breast feeding.

- Breast feeding - colostrums, its composition and importance in feeding. Initiation of breast feeding and duration of breast-feeding, advantages of exclusive breast-feeding, nutritional and other advantages of breast-feeding.
- Introduction of complementary foods, initiation of management of weaning.
- Management of preterm and low birth weight baby – their special needs.

3. Nutrition during preschool stage to adult:

- Nutrition requirement of toddlers.
- Nutrition requirement of preschool.
- Nutrition requirement of school going children.
- Nutrition requirement of adolescent.
- Nutrition requirement of adults.

4. Geriatric nutrition:

- Physiological changes during aging.
- Nutritional requirement during aging.
- Dietary guidelines during aging.
- Geriatric health problems.

MJ-6P: Nutrition in different phases of Human life Cycle (Practical) Credits 01

1. Planning and preparation of balanced diet for a pregnant women at different trimester.
2. Planning and preparation of balanced diet for a lactating women in different phase.
3. Preparation of weaning food.
4. Planning and preparation of balanced diet for a pre-school children.
5. Planning and preparation of balanced diet for school going child. Preparation of packed lunch.
6. Planning and preparation of balanced diet for adolescents.
7. Planning and preparation of balanced diet for adult men and women of different Physical activity and economic status.
8. Planning and preparation of balanced diet for senior citizen.

MJ-7T: Nutritional Epidemiology Credits 03

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability to

1. Describe major study designs in nutritional epidemiology and select an appropriate design for addressing a study question.
2. Explain implication of study design and methods of diet and nutritional status assessment in interpreting studies in nutritional epidemiology
3. Explain the role of epidemiological research in improving health and nutritional status
4. Demonstrate knowledge of epidemiological approach to defining and measuring occurrence of nutrition and health related states in population.

Course contents:

1. **Basic epidemiology concepts and methods:**
   - Definition, scope and purpose of epidemiology.
   - Measurement of mortality, morbidity and disability – rates, ratios and proportions.
   - Epidemiologic study methods- observational and experimental studies.
   - Observational epidemiology- descriptive and analytical studies – Time, place, person distribution, ecological, cross sectional, case-control and cohort.
   - Experimental epidemiology- experimental and quasi experimental trials.

2. **Study of the epidemiologic approach:**
   - Randomized control trials, Field trials and community trials.
   - Population, sampling, sample size and power.
   - Determinants of disease.
   - Vital statistics and their significance.
   - Herd immunity.

3. **Nutritional status assessment in interpreting studies in nutritional epidemiology:**
   - Nutritional status assessment- definition, scope and importance.
   - Nutritional status assessment by ABCD methods and algorithm of assessment.
   - Weight for age, Height for age, weight for height, BMI, Gomez classification, Waterlow Classification.
   - Various methods of diet survey with merits and demerits.
   - Nutritional surveillance.
   - HOMA assessment.

4. **Demography & Population Control:**
   - Introduction, Definition, Demographic cycle
   - Population Pyramid.
   - Fertility, factors affecting fertility, Indicators of fertility.
   - Population explosion as a public health problem.
   - Approaches for population control, Family planning methods.

MJ-7P: Nutritional Epidemiology (Practical) Credits 01

1. Assignment programme on public health and epidemiology special emphasis on communicable **Or** non-communicable diseases. ***(Compulsory for 10 marks***)
2. Submit a report on educational excursion in research institute of public health and epidemiology **Or** related higher learning centre working on public health and epidemiology. ***(Compulsory for 10 marks)***

MINOR (MI)

MI – 3: Concept of Food and Nutrition **Credits 04(Full Marks: 75)**

MI – 3T: Concept of Food and Nutrition **Credits 04**

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability to learn

1. The nutritional value of various foods.
2. Effect of cooking methods on nutritive value of various foods.
3. Various food products with uses.

Course contents:

1. Cereals, Millets, Pulses and legumes:

- Nutritional aspects and uses of wheat, rice, oats, rye, barley, millets, maize or corn, jowar, ragi and bajra.
- Nutritional aspects of various types of pulses and legumes.
- Effects of cooking on cereals and pulses.

2. Egg, Fish, meat, Milk and milk Products:

- Cookery of egg, fish and meat (effect of heat in various component of egg, changes during cooking of meat),role of egg in cookery.
- Nutritional aspects of edible fish and meat, concept of red and white meat,
- Nutritive value and composition of milk,
- Types of processed milk, milk products (butter, curd, paneer and cheese).
- Role of milk products in cookery,
- Substitutes of milk and milk products.

3. Vegetables and fruits:

- Uses and nutritional aspect of commonly available vegetables.
- Fresh fruits and dry fruits– raw and processed product.
- Vegetable cookery (preliminary preparation, changes during cooking, loss of nutrient during cooking, effects of cooking on pigment).

MI-3P: Concept of Food and Nutrition (Practical) **Credits 01**

Course Outline:

1. Methods of preparation and analysis of nutritive value of Breakfast cereals.
2. Methods of preparation and analysis of nutritive value of Milk and milk products.
3. Methods of preparation and analysis of nutritive value of Poultry products.
4. Methods of preparation and analysis of nutritive value of Vegetables.

MI-4: Nutrition during Physiological State **Credits 04 (Full Marks: 75)**

MI-4T: Nutrition during Physiological State **Credits 03**

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability to learn

1. To know regarding the nutritional benefit of breast milk and management of preterm baby.
2. To know about the nutritional requirements and dietary management during pregnancy.
3. Physiology of lactation, nutritional requirements and dietary management during lactation.
4. To learn about geriatric nutrition.

Course contents:

1. **Nutrition during infancy:**
   - Breast feeding - colostrums, its composition and importance in feeding. Initiation of breast feeding and duration of breast-feeding, advantages of exclusive breast-feeding, nutritional and other advantages of breast-feeding.
   - Introduction of complementary foods, initiation of management of weaning.
   - Management of preterm and low birth weight baby – their special needs.
2. **Nutrition during pregnancy and lactation**:
   - Nutritional requirements during lactation. Dietary management, food supplements. Increase the production of breast milk-various factors. Care and preparation of nipples during breast feeding.
   - Non-nutritional factors affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule.
   - Nutritional requirements during pregnancy and dietary management. Special importance of iron, folic acid and calcium during pregnancy.
   - Common problems of pregnancy and their managements- morning sickness, anaemia, constipation, pregnancy induced hypertension, gestational diabetes.
3. **Nutrition during elder person:**
   - Physiological changes during aging.
   - Nutritional requirement during aging.
   - Dietary guidelines during aging.
   - Geriatric health problems.

MI-4P: Nutrition during Physiological State (Practical) **Credits 01**

Course Outline:

1. Planning and preparation of balanced diet for a pregnant woman.
2. Planning and preparation of balanced diet for a lactating woman.
3. Preparation of weaning food.
4. Planning and preparation of balanced diet for senior citizen.

SKILL ENHANCEMENT COURSE (SEC)

SEC 3: Low cost supplementary foods **Credits 03 (Full Marks: 50)**

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability

- To know regarding low cost supplementary foods vs. market available foods with cost effectiveness.
- To know the skills for preparation of low cost supplementary foods

SEC3P: Low cost supplementary foods (Practical)

Course Outline:

Prepare a Report on Low cost supplementary foods (LCSF) feeding by various community to their infant and pre-school children at remote villages, rural, semi-urban and urban area by considering following points-Pre-program survey

- Recipes suitable for infants or pre-school children.
- Methods of preparing different types of recipes.
- Adult food modified to suit children's' needs
- Method of feeding.
- Preparation of locally available foods.
- Compare the nutritive value and cost of LCSF and market available products.
- Compare the health status infant and pre-school children fed of LCSF and market available products.

INTERNSHIP/APPRENTICESHIP (INT)

Credit-04 Marks: 50 **(120 hours, 8 weeks)**

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability to know regarding the various activities of dietary department in a hospital and patient care.

Guideline for Internship/Apprenticeship

A report on the basis of internship in a hospital dietary department or diet clinic to be submitted. Aspects to be covered for general knowledge to:

- Establish rapport with patients - assess the nutritional status and diet history of patients.
- Plan diet sheets after careful study of patients' case sheets - prepare and provide guidance in the production of therapeutic diets.
- Supervise preparation of diets, assist and guide in tray setting with special emphasis on portion control and therapeutic modifications.
- Supervise delivery of trays to patients.
- Get feedback from patients regarding diets
- The modification of diet through consultation doctors.
- Gain experience in the administrative set up of a dietary department.
- The role of dietician in hospital management.