SYLLABUS FOR

FOUR YEARS UNDER-GRADUATE COURSE

WITH SINGLE MAJOR IN NUTRITION

(*w.e.f. 2023*)

BANKURA UNIVERSITY

BANKURA

WEST BENGAL

PIN 722155

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO	Description
PSO 1	The core courses will help the student to develop knowledge on human physiology, nutritive value of different food, role of food and nutrients on human nutrition, role of nutrition in maintaining health and diseases.
PSO 2	The courses will add additional knowledge about applied aspects of the program as well as its applicability in maintaining good health and nutritional status.
PSO 3	The skill enhancement courses would further add additional skills related to the subject.
PSO 4	Students become highly cognizant of the expansion of the learning in their respective field which enables them to get admitted to the premier institutes of the country. An aptitude to research is also stimulated in the minds of this budding generation which prompts them to take up some projects in good laboratories of the country after completing the programme.
PSO 5	Students will be able to analyze and solve the nutrition related problems.
PSO 6	Students will be able to prepare diet chart for normal person as well as for the person in diseased condition
PSO 7	Students will be able to the functions of different nutrients at molecular level, the nutrient gene inter action and modulation of gene expression by nutrients.
PSO 8	The programme will strengthen the students to understand the structure and function of the gene, cell, tissue, organ and organ-system.
PSO 9	Research Motivation is also another significant outcome that the students are endowed with on the completion of the programme.

SEMESTER- V

Course Type	CourseCode	Course Title	Credit	Marks			No. of Hours		
				I.A	ESE	Total	Lec	Tu.	Pr.
Major	S/NUT/501/MJC-9	Nutritional Biochemistry I	4	10	40	50	4	1	NA
Major	S/NUT/502/MJC-10	Diet Therapy I	4 (3+1)	10	40 (25+15)	50	3	NA	2
Major	S/NUT/503/MJC-11	Maternal and Child Nutrition	4 (3+1)	10	40 (25+15)	50	3	NA	2
Major	S/NUT/504/MJC-12	Public Health Nutrition	4 (3+1)	10	40	50	4	1	NA
Minor	S/NUT/506/MN-5	Nutritional Management in Maternal and Child Health	4 (3+1)	10	40 (25+15)	50	3	NA	2

SEMESTER - VI

Course Type	CourseCode	Course Title	Credit	Marks			No. of Hours		
				I.A.	ESE	Total	Lec.	Tu.	Pr.
Major	S/NUT/601/MJC-13	Nutritional Biochemistry II	4	10	40	50	4	1	NA
Major	S/NUT/602/MJC-14	Diet Therapy II	4 (3+1)	10	40 (25+15)	50	3	NA	2
Major	S/NUT/603/MJC-15	Epidemiology	4	10	40	50	4	1	NA
Major	S/NUT/404/MJC-16	Food Microbiology	4 (3+1)	10	40 (25+15)	50	3	NA	2
Minor	S/NUT/405/MN-6	Therapeutic Nutrition	4 (3+1)	10	40 (25+15)	50	3	NA	2

I.A. – Internal Assessment; ESE- End Semester Examination; Lec. – Lecture; Tu. – Tutorial; Pr. - Practical

Detailed Syllabus

Semester V

Course Code: S/NUT/501/MJC-9
Course Category: Major
Course Title: Nutritional Biochemistry I

Course Outcomes:

- Understanding the different phases of cellular metabolism and enzymes involved thereof.
- Gaining knowledge on the interaction of major nutrients in human body.
- Understanding the concepts of macronutrients and energy metabolism in human body.

Course Type: Theory

Nutritional Biochemistry I (Theory)

1. Enzymes: Classification, properties, mechanism of action, factors affecting enzyme activity, kinetics, inhibitions, isozymes.
2. Carbohydrate Metabolism: Glycolysis, TCA cycle, Cori cycle, Pentose phosphate pathway, biological oxidation, gluconeogenesis, glycogenesis, glycogenolysis.
3. Lipids Metabolism: Synthesis of fatty acids, beta oxidation of fatty acids, ketone bodies, lipoproteins
4. Proteins Metabolism: Deamination, transamination, urea cycle. Catabolism of some specific amino acids – tryptophan, phenylalanine, serine, methionine

Suggested reading:

1. B. Srilakshmi. Nutrition Science. New Age International Publisher.
2. U. Satyanarayan, U. Chakrapani. Biochemistry. ELSEVIER.
3. MN Chatterjea, Rana Shinde. Textbook of Medical Biochemistry. JAYPEE.
4. Antonio Blanco, Gustavo Blanco. Medical Biochemistry. Academic Press.
5. Debajyoti Das. Biochemistry. Academic Publishers
6. Shivananda Nayak B. Handbook of Biochemistry & Nutrition. JAYPEE

Course Code: S/NUT/502/MJC-10
Course Category: Major
Course Title: Diet Therapy I
Course Type: Theory & Practical

Course Outcomes:

- Acquiring knowledge about different disease conditions of the physiological systems of human body.
- Gaining fundamental knowledge about the use of nutrition as an integral tool of therapy for various diseases.
- Gaining hands-on experience to the processes of modification of normal diet into therapeutic diet

Diet Therapy I (Theory)

1. General idea of diet therapy: Principles of diet therapy; therapeutic adaptations of normal diet, classification of therapeutic diets.

2. Role of dietitian & Nutritional Assessment of Hospitalized Patients: Types of dietitians and their role; Code of ethics; Role of dietitian in hospital management; MNA, MUST
3. Routine hospital diets: Oral feeding, tube feeding, parenteral nutrition (indications, compositions, advantages, disadvantages and complications, if any). Monomeric, oligomeric and polymeric diet, F-100, F-75 diet.
4. Energy modification of diet: Contributing factors, complications, measurement, nutritional care and prevention of overweight, obesity and underweight.
5. Diets for febrile conditions: Mechanism and Types of fever; Metabolic changes in fever; Diet for infections and febrile conditions - typhoid, tuberculosis and malaria; Immuno-nutrients and their role in diet, immunity boosting foods.
6. Diets in surgical conditions (pre- and post-operative diets) and burn injuries: Nutritional care in Pre and Post -operative conditions; Types and severity of burns, Rule of Nine, Metabolic changes in burns, Nutritional support in burns.
7. Diseases of gastro-intestinal tract (upper & lower): Aetiology, symptoms, diagnostic tests, management and nutritional care of peptic ulcer, diarrhoea, constipation, irritable bowel syndrome, inflammatory bowel disease, flatulence, haemorrhoids, diverticular disease.

Diet Therapy I (Practical)

1. Planning and preparation of special diets: clear fluid, full fluid, soft, semi solid, high protein, low fat and low calorie, high fibre diet

2. Preparation of diet chart of patient suffering from the following:

- Obesity
- Peptic ulcer

Suggested reading:

1. B. Srilakshmi. Dietetics. New Age International Publisher.
2. Staci Nix, William's Basic Nutrition and Diet Therapy. ELSEVIER.
3. F. P. Antia, Philip Abraham. Clinical Dietetics and Nutrition. Oxford.
4. Sumati R. Mudambi, MV Rajagopal. Fundamental of Food, Nutrition and Diet Therapy. New Age International Publisher.
5. Luxita Sharma. A Textbook of Clinical Nutritional. WILEY.
6. Subhangini A Joshi. Nutrition and Dietetics. Mc Grow Hill.
7. C. Gopalan. Nutritive Value of Indian Foods. ICMR, NIN.
8. V. Vimla. Advances in Diet Therapy. New Age International Publisher.

Course Code: S/NUT/603/MJC-11
Course Category: Major
Course Title: Maternal & Child Nutrition
Course Type: Theory & Practical

Course Outcome:

- Studying in detail the challenges of maternal and child nutrition.
- Gaining knowledge about the status of "at-risk" groups and related indicators as tools of social development
- Understanding the importance of nutrition in early childhood to lifelong support for special needs

Maternal & Child Nutrition (Theory)

1. Maternal and child health: Indicators of maternal and child health; Maternal and age specific mortality rates; Causes of poor maternal and child health; Schedule of antenatal care. Postnatal care. Post-partum depression.

2. Physiology of pregnancy and lactation: Physiological changes and hormonal regulation of pregnancy; Lactation – hormonal regulation of milk production and secretion, let down reflex.
3. Pre-term and low birth weight infants: Definitions; Causes of pre-term birth and low birth weight; Developmental problems; Nutritional management.
4. Children with special needs: Relationship of Nutrition with disability. Feeding problems and management of children with autism spectrum disorder, cerebral palsy, Down syndrome, Prader-Willi Syndrome cleft palate and lip.
5. Nutritional problems of infancy: Causes and nutritional management of growth faltering, SAM and MAM children – diagnosis, nutritional care and rehabilitation, obesity, GERD.

Maternal and Child Nutrition (Practical)

1. Planning and preparation of: weaning food**.**
2. Planning and preparation of supplementary nutritious dishes for: children, pregnant woman and lactating mother.

Suggested reading:

1. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
2. V. Jain. Review of preventive and Social Medicine, 8/e. New Delhi.Jaypee Brothers Medical Publishers.
3. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers
4. Ravinder Chadha. Pulkit Mathur. Nutrition. Orient BlackSwan
5. Anil Baran Sighamahapatra, Gargi Sighamahapatra. Essentials of Medical Physiology. Current Book International.

Course Code: S/NUT/504/MJC-12
Course Category: Major
Course Title: Public Health Nutrition
Course Type: Theory

Course Outcomes:

- Understanding the significance and prevalence of different public health problems.
- Studying the role of nutrition or the lack thereof in the causation of various such disorders
- Gaining knowledge about the use of nutritional science in treating public health problems and creating awareness

Public Health Nutrition (Theory)

1. Hygiene and sanitation: Concept of hygiene and sanitation and relation to nutrition, personal hygiene.
2. BUMT model and colour coding in relation to public health.
3. Community water and waste management: Different sources of water, toxic agents in water and their adverse effects on health, purification of water; Management of solid waste, sewage and biomedical waste.
4. Food borne diseases: Food borne infection, food borne intoxication and food poisoning; Symptoms, mode of transmission and prevention of Salmonellosis, Shigellosis and Listeriosis, Staphylococcal infection, Botulism and Aflatoxicosis.
5. Water borne diseases: Causative agent, mode of transmission, prevention & control of Cholera and amoebiasis.
6. Air pollution: Sources of air pollution, common air pollutants and health hazards related to them; Prevention and control of air pollution.

6. Nutrition in extreme climates: Physiological changes and nutrition in high altitude, extreme hot and extreme cold/polar environment.
7. Nutrition Security: Meaning of food and nutrition security; Determinants of nutrition security; Factors affecting nutrition security; Food and nutrition security in India.

Suggested reading:

1. R. Bansal. Food, Nutrition and Hygiene. SBPD Publishing House.
2. Rajvir Bhalwar. Textbook of Community Medicine. Wolters Kluwer
3. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
4. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers
5. S. Roday. Food Hygiene and Sanitation. Tata McGraw Hill, New Delhi
6. B. Srilakshmi. Nutrition Science. New Age International Publisher
7. Dr. Suryatapa Das. Textbook of Community Nutrition. Academic Publishers

Course Code: S/NUT/606/MN-5
Course Category: Minor
Course Title: Nutritional Management in Maternal and Child Health
Course Type: Theory & Practical

Course Outcome:

- Studying in detail the challenges of maternal and child nutrition.
- Gaining knowledge about the status of "at-risk" groups and related indicators as tools of social development

Nutritional Management in Maternal and Child Health (Theory)

1. Maternal and child health: Indicators of maternal and child health; Maternal and age specific mortality rates; Causes of poor maternal and child health; Schedule of antenatal care.
2. Physiology of pregnancy and lactation: Physiological changes and hormonal regulation of pregnancy; Lactation – hormonal regulation of milk production and secretion, let down reflex.
3. Pre-term and low birth weight infants: Definitions; Causes of pre-term birth and low birth weight; Developmental problems; Nutritional management.
4. Children with special needs: Relationship of Nutrition with disability. Feeding problems and management of children with autism spectrum disorder, cerebral palsy, Down syndrome, Prader-Willi Syndrome cleft palate and lip.
5. Nutritional problems of infancy: Causes and nutritional management of growth faltering, obesity, GERD.

Nutritional Management in Maternal and Child Health (Practical)

1. Planning and preparation of: weaning food**.**

2. Planning and preparation of supplementary nutritious dishes for: children, pregnant woman and lactating mother.

Suggested reading:

1. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
2. V. Jain. Review of preventive and Social Medicine, 8/e. New Delhi. Jaypee Brothers Medical Publishers.
3. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers
4. Ravinder Chadha. Pulkit Mathur. Nutrition. Orient BlackSwan
5. Anil Baran Sighamahapatra, Gargi Sighamahapatra. Essentials of Medical Physiology. Current Book International.

Semester VI

Course Code: S/NUT/601/MJC-13
Course Category: Major
Course Title: Nutritional Biochemistry II
Course Type: Theory

Course Outcomes:

- Gaining fundamental knowledge about the central dogma of life.
- Understanding the classification, structure and functions of different components of cellular nuclear material.
- Studying the roles of nutrient factors as components of cellular biochemical machinery.

Nutritional Biochemistry II (Theory)

1. Nucleic acids: Central dogma of life, DNA and RNA, Replication, Transcription, Translation and Protein Synthesis
2. Biochemical roles of Vitamins: Thiamine, Riboflavin, Niacin, Folic acid, Vitamin B12, vitamin C, Pantothenic Acid, Vitamin A, Vitamin D, Vitamin E
3. Nutrient-Drug Interactions: Absorption, distribution, metabolism, and excretion

Suggested reading:

1. B. Srilakshmi. Nutrition Science. New Age International Publisher
2. U. Satyanarayan, U. Chakrapani. Biochemistry. ELSEVIER
3. MN Chatterjee, Rana Shinde. Textbook of Medical Biochemistry. JAYPEE
4. Antonio Blanco, Gustavo Blanco. Medical Biochemistry. Academic Press
5. Debajyoti Das. Biochemistry. Academic Publishers
6. Shivananda Nayak B. Handbook of Biochemistry & Nutrition. JAYPEE

Course Code: S/NUT/602/MJC-14
Course Category: Major
Course Title: Diet Therapy II
Course Type: Theory & Practical

Course Outcomes:

- Understanding the basic changes to the normal homeostatic mechanism in various metabolic and lifestyle diseases.
- Learning about the role of nutrients and diet to regulate onset, progression and severity of diseases.
- Gaining fundamental knowledge about the use of nutrition as an integral tool of therapy for various disorders.
- Gaining hands-on experience to the processes of modification of normal diet into therapeutic diet

Diet Therapy II (Theory)

1. Nutritional anaemia: Types, causes, pathogenesis, diagnosis and dietary management.
2. Diseases of liver and gall bladder: Aetiology, symptoms, diagnostic tests, management and nutritional care of viral hepatitis, cirrhosis of liver and cholelithiasis; Liver function test.
3. Diabetes mellitus: Aetiology, types, symptoms, diagnostic tests, management and nutritional care. Complications of diabetes mellitus.

4. Diseases of the cardiovascular system: Aetiology, symptoms, risk factors, lifestyle modifications and nutritional care for atherosclerosis, hypertension, dyslipidaemia and ischaemic heart disease.
5. Renal diseases: Aetiology, symptoms, diagnostic tests, management and nutritional care of Glomerulonephritis, nephrosis, renal failure, nephrolithiasis, haemodialysis.

Diet Therapy II (Practical)

1. Planning and preparation of diet chart of patient suffering from the following:

- Cardiovascular diseases
- Diabetes Mellitus
- Hypertension
- Glomerulonephritis
- Anaemia

Suggested reading:

1. B. Srilakshmi. Dietetics. New Age International Publisher
2. Staci Nix, William's Basic Nutrition and Diet Therapy. ELSEVIER
3. F. P. Antia, Philip Abraham. Clinical Dietetics and Nutrition. Oxford
4. Sumati R. Mudambi, MV Rajagopal. Fundamental of Food, Nutrition and Diet Therapy. New Age International Publisher
5. Luxita Sharma. A Textbook of Clinical Nutritional. WILEY
6. Subhangini A Joshi. Nutrition and Dietetics. Mc Grow Hill
7. C. Gopalan. Nutritive Value of Indian Foods. ICMR, NIN
8. V. Vimla. Advances in Diet Therapy. New Age International Publisher

Course Code: S/NUT/503/MJC-15
Course Category: Major
Course Title: Epidemiology
Course Type: Theory

Course Outcomes:

- Understanding the demographics.
- Gaining knowledge about communicable diseases and their epidemiology
- Being able to understand the different methods employed in the epidemiological study of diseases.

Epidemiology (Theory)

1. Concept of Health: Changing concepts (Biomedical, Ecological, Psychosocial and Holistic); Dimension of health; Determinants of health.
2. Concept of disease: Endemic, epidemic and pandemic diseases; Acute and chronic diseases; Communicable and non-communicable diseases; Zoonosis, epizootic, enzootic, vector-borne and nosocomial diseases; Theories of disease causation; Transmission of disease.
3. Concept of epidemiology: Definition, objectives and principles of Epidemiology; Epidemiological methods (descriptive, analytical and experimental).
4. Epidemiology of communicable diseases: Chickenpox, mumps, measles, influenza, covid-19, tuberculosis, typhoid, the dengue syndrome, malaria, Japanese encephalitis and HIV-AIDS.
5. Immunization: Active and passive immunization; Immunizing agents; Herd immunity; National immunization schedule.
6. Demographic Cycle: Concept of demography; Different phases of demographic cycle.

Suggested reading:

1. K. Park. Park's textbook of preventive and social medicine. M/s Banarsidas Bhanot publishers
2. V. Jain. Review of preventive and Social Medicine, 8/e. New Delhi. Jaypee Brothers Medical Publishers.

3. Roy, R and Saha, Mahajan & Gupta Textbook of Preventive and Social Medicine. Jaypee Brothers Medical Publishers
4. R. Bhalwar. Textbook of Community Medicine, Wolters Kluwer (India) Pvt. Ltd.
5. M. Alderson. An introduction of Epidemiology. Macmilan. London
6. WHO (1996), International travel and Health, Vaccination requirements and Health advice.
7. S. Rajagopalan, M. A. Shiffman. Guide to simple sanitary measures for the control of enteric Diseases, Geneva, WHO
8. David D. Celentano, Moyses Szklo. Gordis Epidemiology. ELSEVIER

Course Code: S/NUT/604/MJC-16
Course Category: Major
Course Title: Food Microbiology
Course Type: Theory & Practical

Course Outcome:

- Learning and identifying the morphology, structure and role of different microorganisms in food
- Identifying common microorganism related food spoilage and contamination issues
- Describing nutritional factors and challenges for microbial growth in food.

Food Microbiology (Theory)

1. Sources of microorganisms in food: Primary sources – soil, water, air, animal hides, animal feed.
2. Cellular structure of bacteria, moulds and virus.
3. Sterilisation and disinfection: Physical and Chemical methods; Advantages and disadvantages.
4. Nutritional requirements of microorganisms: Requirements of macro and micro nutrients; Types of culture media; Isolation of pure culture.
5. Bacterial growth: Bacterial growth curve; Extrinsic and intrinsic parameters affecting bacterial growth; Generation time and TDT.
6. Food Spoilage and Contamination: Cereal and cereal products, vegetables and fruits, fish and other sea foods, meat and meat products, milk and milk products.
7. Microbiological examination: Microbiological examination of water and milk.

Food Microbiology (Practical)

1. Gram Staining of bacteria
2. Preparation of liquid and solid media for routine cultivation of bacteria
3. Preparation of slant and stab culture
4. Methylene blue reduction test of milk
5. Determination of potability of water by presumptive coliform test

Suggested reading:

1. William C. Frazier, Dennis C. Westhoff. Food Microbiology. Mc Grow Hill
2. James M Jay. Modern Food Microbiology. CBS Publishers
3. J. M. Banwart. Basic Food Microbiology. CBS Publishers
4. M.J. Pelzar, E. C. S. Chan, N. R. Krieg NR. Microbiology. Tata McGraw Hill.
5. I. Kannan. Essentials of Microbiology for Nurses. ELSEVIER.
6. Ananthanarayan and Paniker's, Textbook of Microbiology. Universities Press.Robert E. C. Wildman. Handbook of Nutraceuticals and Functional foods. CRC Press

Course Code: S/NUT/506/MN-6
Course Category: Minor
Course Title: Therapeutic Nutrition
Course Type: Theory & Practical

Course Outcomes:

- Understanding the basic changes to the physiological systems in various diseases.
- Learning about the role of nutrients and diet to regulate onset, progression and severity of diseases.
- Gaining fundamental knowledge about the use of nutrition as an integral tool of therapy for various disorders.

Therapeutic Nutrition (Theory)

1. Therapeutic adaptations of normal diet.
2. Routine Hospital Diet. Clear fluid, full fluid, soft and regular diet.
3. Aetiology, clinical features and nutritional management of
    - GI Tract Disorders – Peptic ulcer, diarrhoea, constipation, flatulence, celiac disease
    - Liver – Viral hepatitis
    - Obesity
    - Diabetes mellitus
    - Hypertension and coronary heart disease
    - Fever

Therapeutic nutrition (Practical)

1. Planning and preparation of diets for the following:
    - Therapeutic diets – Normal, soft, clear and full fluid
    - Obesity
    - Type 2 diabetes mellitus
    - CHD
    - Viral hepatitis