

M. Sc. in Nutrition and Dietetics

Duration – 2years

Semester-Mode Examination Sys



**Debra Thana Sahid Kshudiram Smriti
Mahavidyalaya (Autonomous)**

Paschim Medinipur: 721102

M.Sc. (2years Course) in Nutrition and Dietetics
Outline of the syllabus (Semester system)

Total Marks = 1200
Theoretical Marks = 800
Practical Marks = 400
Total Credits= 96

Summary of Courses of Studies: M. Sc. in Nutrition and Dietetics
(Under Choice Based Credit System)

1st Semester					
Course No.	Core	Title	Credit	Hours	Marks
NUD – 101	(Core)	Physiological Aspects of Nutrition	4 (Theory)		50
NUD – 102	(Core)	Life Cycle Events & Nutritional Assessment	4 (Theory)		50
NUD – 103	(Core)	Therapeutic Diet Part I	4 (Theory)		50
NUD – 104	(Core)	Food Toxicology & Food Safety	4 (Theory)		50
NUD – 195	(Core)	Therapeutic Diet Formulation Part I	4 (Practical)		50
NUD – 196	(Core)	Nutritional Physiology and Survey	4 (Practical)		50
2nd Semester					
NUD – 201	(CBCS)	Nutrition and Public Health	4 (Theory)		50
NUD – 202	(Core)	Nutritional Epidemiology and Public Health Nutrition	4 (Theory)		50
NUD – 203	(Core)	Advanced Therapeutic Diet Part II	4 (Theory)		50
NUD – 204	(Core)	Nutritional Chemistry and Metabolism	4 (Theory)		50
NUD – 295	(Core)	Therapeutic Diet Part II	4 (Practical)		50
NUD – 296	(Core)	Food & Nutrient Analysis	4 (Practical)		50
3rd Semester					
NUD – 301	(CBCS)	Food Style and Disease Management	4 (Theory)		50
NUD – 302	(Core)	Bio-statistics, Computer Application, Research Methodology	4 (Theory)		50
NUD – 303	(Core)	Advanced Therapeutic Nutrition Part III	4 (Theory)		50
NUD – 304	(Core)	Nutraceuticals, Food Processing & Preservation	4 (Theory)		50
NUD – 395	(Core)	Therapeutic Nutrition Part III	4 (Practical)		50
NUD – 396	(Core)	Biostatistics, Computer Applications, Research Methodology and Review Work	4 (Practical)		50
4th Semester					
NUD – 401	(Core)	Food Microbiology, Food Fortification and Biomolecule separation	4 (Theory)		50
NUD – 402	(Core)	Nutrition Counseling and Sports Nutrition	4 (Theory)		50
NUD – 403	(Core)	Advanced Clinical Nutrition Part III	4 (Theory)		50
NUD – 404	(Core)	Neutrigenomics, Nutriproteomics and Drug Nutrient Interaction	4 (Theory)		50
NUD – 495	(Core)	Internship Training in Hospital & Report Preparation (1 month)	4 (Practical)		50
NUD – 496	(Core)	Project Work	4 (Practical)		50

SEMESTER - I
M. Sc. in Nutrition and Dietetics
COURSE STRUCTURE
(ME- Major Exam, IA- Internal Assessment)

Course No.	Core	Course Title	ME	IA	Total Marks	Credit
NUD – 101	(Core)	Physiological aspects of Nutrition	40	10	50	4 (Theory)
NUD – 102	(Core)	Life Cycle Events & Nutritional Assessment	40	10	50	4 (Theory)
NUD – 103	(Core)	Therapeutic Diet Part I	40	10	50	4 (Theory)
NUD – 104	(Core)	Food Toxicology & Food Safety	40	10	50	4 (Theory)
NUD – 195	(Core)	Therapeutic Diet Formulation Part I	50	-	50	4 (Practical)
NUD – 196	(Core)	Nutritional Physiology and Survey	50	-	50	4 (Practical)
TOTAL			300		24	

M.Sc. 1st Semester

Theory

Course No. NUD – 101 Physiological Aspects of Nutrition

4 Credits

Group- A

2 Credits

- **1.1:** Digestive system: Organs of the digestive system, Secretory, digestive and absorptive functions of GIT, Pancreas, Liver, Gall bladder. Motility and hormones of GIT. Digestion and absorption of carbohydrate, protein and lipid. Stress and digestive diseases, General concept of digestive diseases- causes and symptoms. Role of transporter in absorption.
- **1.2:** Excretory system: Structure and function of kidney, formation, composition, and excretion of urine. Role of kidney in water, electrolytes and acid base balance. Renal disease- causes and symptoms.
- **1.3:** Respiratory system: Regulation of respiration exchange of gases, transport of oxygen and carbon dioxide. Role of Hb and buffer system, Disorders of respiratory system- acid-base imbalance. Malnutrition and respiratory disorders.
- **1.4:** Cardiovascular System: Physiology of heart, Cardiac cycle, cardiac output, Functions of CVS, Regulation of cardiac output and blood pressure, ECG, Blood pressure, Disorders of heart. Stress and CVD. Nutrients and cardiac health.
- **1.5:** Reproductive System: Physiology of female reproductive system- External and internal organs- puberty in the female, Menstrual cycle, menopause, Physiology of Male Reproductive system- External and internal organs, Functions of male reproductive system. Stress and reproduction. General concept of infertility. Endometriosis, PCOS. Diet and fertility.

Group- B

2 Credits

- **2.1:** Immune system: Properties, natural and acquired Immunity, features of immune responses, antigen – antibodies – types, properties, antigen – antibody interaction, B – and T – cell biology, MHC, Autoimmune disorders, hypersensitivity and allergy, Immunization, Nutritional immunology, Different approaches of vaccination development. Immuno-boosting and immunomodulating foods.
- **2.2:** Muscular System: Structure and functions of muscles, Diseases of muscles, Muscle mass and Physical Activity, Nutrients on muscle mass, Muscle cramps, Muscle fatigue and role of nutrients, Energy source of muscle in different activities- Creatin Phosphate System, Glycogen loading in muscle.
- **2.3:** Nervous System: Central nervous system- structure and functions of brain and spinal cord; Peripheral Nervous system- spinal nerves and cranial nerves; Autonomic nervous system; Neurons. Concept of Neural Diseases, Enteric Nervous System, Nutrient for Neural Activity Maintenance.

- **2.4:** Sense Organs: Structure and functions of ear, eye, skin, nose, physiology of smell, Sense of taste.
- **2.5:** Endocrine System: Structure and functions of Pituitary gland and Hypothalamus, Thyroid gland, Parathyroid gland, Adrenal and Suprarenal glands, Pancreatic islets, Pineal body, Thymus gland, local hormones, Disorders of Endocrine glands in brief. Role of ANH, Signal transduction process by hormone through receptor- Genomic and nongenomic signaling processes. CAMP, GMP, Tyrosine kinase, MAPK, DG & IP3 signaling systems.
- **2.6:** Aesthetic Aspect of Nutrition: Aesthetic importance of food, Impact of neural reflex on proper nutrition.

Group- A**2 Credits**

- **1.1:** Food Groups and Recommended Allowances- Different food groups and planning diets to meet the requirement at different socioeconomic levels, Recommended allowances for Indians, Basics requirement for computation of the allowances (comparison of India's recommended allowances with that of UK, USA, FAO & WHO),
- **1.2:** 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.
- **1.3:** 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
- **1.4:** Nutrition in Preschool- Prevalence of malnutrition in preschool age, food habits and nutrient intake of preschool children, dietary allowances – supplementary foods, feeding programmes for preschool children.
- **1.5:** Nutrition during school age- Physical development – Nutritional status of school age children, school lunch programmes, food habits, nutritional requirements for school age children.
- **1.6:** Nutrition during adolescence- Change of growth, characteristics of adolescents, nutritional needs of the adolescents, changes needed to prevent malnutrition in adolescence.
- **1.7:** Nutrition for Adults- Nutrition for the adults, basis for requirement of nutrients and work efficiency.
- **1.8:** Nutrition for the Aged- Nutritional requirements for aged, socio economic and psychological factors, Clinical needs, malnutrition of elderly persons

Group- B**2 Credits**

- **2.1:** Human growth and development, Uterine and neonatal growth, Skeletal and muscular growths.
- **2.2:** Reproductive growth and development and its determinants.
- **2.3:** Impact of altered nutrition on growth and development, Changes in Body composition throughout the life cycle, Alterations in body composition and their consequences.
- **2.4:** Principle of Nutritional status by anthropometric assessment – advantages and disadvantages, 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. Contactless anthropometry.

- **2.5:** Age group specific height, weight, weight for age, weight for height, BMI. Indian reference value, process- limitation.
- **2.6:** Body fat determination - process and its impact on nutritional anthropometry, Body mass determination.
- **2.7:** Determination of BMR.
- **2.8:** Bio-chemical Assessment- Sensor, criteria, relation with nutritional status, critical or risk level, Upper border and lower border
- **2.9:** Vital Statistics –Definition and importance, MR types, OR, IR, PR (Prevalence Rate)

Group- A

2 Credits

- **1.1:** Energy calculation- Normal and pathophysiological condition. Energy expenditure, REE, AER, RDA, BMR.
- **1.2:** Principle of diet formulation and its different steps- Factors affecting nutrient requirement (genetic, stage of life, nutrient interactions, environmental impacts, microbiological status, research condition). Types of diet formulation- natural-ingredient diets (nutrient concentrations, fixed-formula diet), purified and chemically defined diets.
- **1.3:** Special features of therapeutic diet and its formulation. Characteristics of therapeutic diet, purpose of therapeutic diet, principle of therapeutic diet, classification of therapeutic diet. Different special types of therapeutic diet.
- **1.4:** Way of nutrition care- Oral feeding, enteral feeding, parenteral feeding including partial and total parenteral feeding- their purpose, types, indications, merits, demerits, conditions for application.
- **1.5:** Polymeric and Monomeric formulated diet. F-75 and F-100 – composition, condition of application.

Group- B

2 Credits

- **2.1:** Group based and subject based therapeutic diet (personalized diet) and their advantages.
- **2.2:** Assessment of therapeutic diet in general.
- **2.3:** Dietary management of febrile condition- Development of fever, types of fever. Dietary management of acute and chronic fever.
- **2.4:** Severe Acute Malnutrition- Definition, etiology, pathophysiology, complications, principle of diet, Clinical dietary management. Refeeding syndrome- definition, clinical manifestation, management.
- **2.5:** Critically ill children- Different types of critically ill child, Metabolic response to critical illness- protein metabolism, carbohydrate metabolism, energy metabolism, electrolyte metabolism, vitamin and mineral metabolism. Nutrition in critical illness- enteral nutrition (purpose, initiation, route of feeding, advantages, drawbacks), parenteral nutrition (purpose, initiation, route of feeding, advantages, drawbacks).

Group- A**2 Credits**

- **1.1:** Concept and meaning of food quality and food safety, food adulteration, food hazards. Natural toxins.
- **1.2:** Exposure, estimation, toxicological requirements and risk assessment.
- **1.3:** Safety aspects of water and beverages such as soft drinks, tea, coffee, cocoa.
- **1.4:** Toxicity Indicators of food- LD 50, ED 50, safety factors of toxicity
- **1.5:** Mode of food toxicants on health disorders- Neural, Cardiac, Gastro intestinal, Carcinogenic, Skeleto-muscular.
- **1.6:** Food packaging- Basic idea, classification, advantages. Nano sensor-based packaging, Modified air packaging, Paper packaging, Plastic packaging, Flexible packaging, Cartoon packaging.

Group- B**2 Credits**

- **2.1:** General definition- cleanliness, hygiene, sanitation. General principles of food hygiene, hygiene in rural and urban areas in relation to food preparation. Personal hygiene and food handling habits. Importance of sanitation and hygiene in food services.
- **2.2:** Sanitary aspects of water supply, source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water prevention contamination of potable water supply.
- **2.3:** Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices. Sanitary aspects of waste disposal, establishing and maintaining sanitary practices in food plants, role of sanitation, general sanitary consideration and sanitary evaluation of food plants.
- **2.4:** Good manufacturing practice for food sector- in food industry, at household level. Extraneous materials in foods, principles of insects and pet control. Physical and chemical control. Effective control of microorganism: Importance of microorganism in food sanitation. Microorganism as indicator of sanitary quality. Hygiene and sanitation practices in food operating industry- before production, during production, after production
- **2.5:** Safety assessment of food contaminants and pesticide residues. Safety evaluation of heat treatments and related processing techniques.
- **2.6:** Food laws and regulations – national and international food laws, governing bodies, importance of food laws, Indian standards for food laws (BIS, DMI/ AGMARK, FSSAI), PFA act, FPO.

Practical

Course No. NUD – 195 Therapeutic Diet Formulation Part I

4 Credits

- **1.1:** F-75, F-100 diet formulation
- **1.2:** Diet for adult male, female (According to different physical activity)
- **1.3:** Diet for pregnant mother (according to trimester with meal frequency)
- **1.4:** Diet for lactating mother
- **1.5:** Weaning food formulation
- **1.6:** Diet for preschool children
- **1.7:** Diet for school children
- **1.8:** Diet for adolescent

Course No. NUD – 196 Nutritional Assessment and Survey

4 Credits

Nutritional Physiology

- **1.1:** Macro nutrient analysis in blood – Carbohydrate- fasting and Post Prandial, Protein- albumin, globulin, Fat- total cholesterol & lipid profile (HDL, LDL, VLDL, Triglycerides)
- **1.2:** Micro nutrient analysis in blood – Vitamin- Vit A, Vit C, Minerals
- **1.4:** Qualitative determination of nutraceuticals

Nutritional Anthropometry

- **1.5:** Nutritional status of Pre-school children using anthropometric parameters.
- **1.6:** Nutritional status of school going children using anthropometric parameters
- **1.7:** Nutritional status of adolescence using anthropometric parameters.
- **1.8:** Nutritional 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)

Nutritional Survey

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:

- **1.9:** Determination of socioeconomic status
- **1.10:** Determination of energy requirement of sedentary, moderate and heavy workers (Male & Female)
- **1.11:** Determination of nutritional consumption by questionnaire method
- **1.12:** Determination of nutritional status by weighing method / cooked food method
- **1.13:** Study on nutritional status of the beneficiaries under National nutritional Program

SEMESTER - II
M. Sc. in Nutrition and Dietetics
COURSE STRUCTURE
(ME- Major Exam, IA- Internal Assessment)

Course No.	Core	Course Title	ME	IA	Total Marks	Credit
NUD – 201	(CBCS)	Nutrition and Public Health	40	10	50	4 (Theory)
NUD – 202	(Core)	Nutritional Epidemiology and Public Health Nutrition	40	10	50	4 (Theory)
NUD – 203	(Core)	Advanced Therapeutic Diet Part II	40	10	50	4 (Theory)
NUD – 204	(Core)	Nutritional Chemistry and Metabolism	40	10	50	4 (Theory)
NUD – 295	(Core)	Therapeutic Diet Part II	50	-	50	4 (Practical)
NUD – 296	(Core)	Food & Nutrient Analysis	50	-	50	4 (Practical)
TOTAL			300		24	

M. Sc. 2nd Semester

Theory

Course No. NUD –201 (CBCS): Nutrition and Public Health

4 Credits

Group-A

2 Credits

- **1.1:** Basic information on Nutrition-Nutrition, Nutrients, Nutritional status, Health, Determinants of health, Interrelationship between nutrition and health, Malnutrition, Different types of malnutrition.
- **1.2:** Role of carbohydrate, protein, fat, vitamins, minerals, dietary fiber in health maintenance
- **1.3:** Disproportionate intake of nutrients and its health impact (Undernutrition, Anemia, Vitamin A deficiency, Vitamin D deficiency)
- **1.4:** Food groups, Food pyramid, Food exchange list
- **1.5:** Fast food, Junk food, Packaged food, Free food- definition, advantages, disadvantages, impact on health.
- **1.5:** Food contamination- sources, factors. Food hygiene- major public health issues in food hygiene, causes of food borne illness, Food safety, HACCP.

Group-B

2 Credits

- **2.1:** Immunization schedule- Vaccination, immunization, importance of vaccination, immunization schedule runs in India.
- **2.2:** Food Laws, Act- importance of food laws, Indian standards for food laws (BIS, DMI/ AGMARK, FSSAI), PFA act, FPO.
- **2.3:** Public health and hygiene- concept of public health, different domains of public health, strategies for public health. Concept of hygiene, relation between hygiene and sanitation.
- **2.4:** Protein deficiency and impact on public health- Causes of protein deficiency, classification of protein deficiency, prevention and management for protein deficiency.
- **2.5:** Carbohydrate deficiency impact on public health- Causes of carbohydrate deficiency, different types of carbohydrate deficiency, prevention and management for carbohydrate deficiency,
- **2.6:** Public health programs- importance of public health program, national programs for communicable diseases (TB, AIDS, leprosy, Immunization), national programs for noncommunicable diseases (blindness, cancer, diabetes, CVD), national nutritional programs (ICDS, MDM, SNP, Anemia, Iodine).
- **2.7:** Family welfare- objectives, family planning-importance, methods of contraception, importance of family welfare program.
- **2.8:** Mother child health care – ANC, INC, PNC, breastfeeding and weaning.

Course No. NUD –202: Nutritional Epidemiology and Public Health Nutrition 4 Credits

Group-A

2 Credits

- **1.1:** Definition and concepts of epidemiology- DALYs, QALYs, incidence rate, prevalence rate, screening test, true positive, true negative, false Positive, false negative, diagnostic test, ratio, rate, disease transmission, OR.
- **1.2:** Types of epidemiology and uses of epidemiology. Nutritional epidemiology and common determinants
- **1.3:** Role of genetics on health and disease- special reference of inborn error metabolism, thalassemia, hemophilia, leukemia, color blindness and their prevention.
- **1.4:** Levels of disease prevention- primordial, primary, secondary, tertiary.
- **1.5:** Important Public Health Acts- Pre conception and parental diagnostic act, The maternity benefit Act, Epidemic disease act, Vaccination act, Water pollution act.
- **1.6:** Health problems of developed and developing countries
- **1.7:** Nutritional epidemiology- components, determinants, pandemic, endemic, epidemic

Group-B

2 Credits

- **2.1:** Population growth- Process of population change, definition of population growth, factors affecting population growth, problems on population growth, solutions to problems of population growth.
- **2.2:** Birth rates, death rates, fertility rates, age-specific mortality rates, MMR, CPR, etc.
- **2.3:** Immunization Schedule- Definition of immunization, vaccine. Types of vaccine- live attenuated, inactivated, toxoids. Cold chain- definition, importance, equipment, Importance of immunization, immunization coverage. Immunization schedule in India.
- **2.3:** Approaches and methods of contraception- classification of contraceptive methods- spacing methods (barrier methods, vaginal methods, intrauterine devices, hormonal methods, non-hormonal contraceptive pills, post-coital contraception, fertility awareness-based methods, LAM) terminal/permanent methods (vasectomy, tubectomy), advantages, side effects, contraindications and complications of different contraceptive methods.
- **2.4:** Family welfare and planning, Mother Child Health care and its components.
- **2.5:** Communicable and non-communicable diseases- infectious and contagious diseases.
- **2.6:** Occupational disorders like, pneumoconiosis, hearing loss, accidents, dermatosis, asbestosis, silicosis etc.
- **2.7:** Major nutritional problems (PEM, Micronutrient deficiency, Chronic diseases, Eating disorders)- at risk group, etiology, clinical manifestations

and prevention.

- **2.8:** RCH program- Components of RCH care, Need and package of services under RCH Program, Health Programs.
- **2.9:** Nutrition Communication on public health upgradation- Principle, types, techniques, rural based nutrition communication, emphasis on KAP study, community-based nutrition Program.
- **2.10:** Supplementary Nutrition Program- Major programs, objectives, operation and public health upgradation.

Group-A

2 Credits

- **1.1:** Therapeutic diet for diabetes mellitus- Complications, causes, symptoms, diagnostic test, strategy for carbohydrate, protein, fat, dietary fiber, nutraceuticals, minerals, resistance starch inclusion, principle, management of diabetes by clinical diet. Role of functional food in management of diabetes.
- **1.2:** Clinical diet for atherosclerosis – Complications, causes, symptoms, diagnostic test, risk factors (unmodifiable, modifiable, novel), strategy for carbohydrate, protein, fat, dietary fiber, nutraceuticals, minerals, resistance starch inclusion or exclusion. Role of functional food for atherosclerosis. Principle of diet, nutritional management and dietary guidelines.
- **1.3:** Therapeutic diet for hypertension- Complications, causes, symptoms, diagnostic test, strategy for carbohydrate, protein, fat, dietary fiber, nutraceuticals, minerals, resistance starch inclusion or exclusion. management of hypertension by DASH diet. Role of probiotics and functional food in management of hypertension.
- **1.4:** Therapeutic diet for hyperlipidemia- Complications, causes, symptoms, diagnostic test, strategy for carbohydrate, protein, fat, dietary fiber, nutraceuticals, minerals, resistance starch inclusion or exclusion. Principle of diet, recommended diets- The Lifestyle Change diet, American Heart Association diet, DASH diet, Mediterranean diet, Ornish diet. Role of probiotics and functional food in management of hyperlipidemia.

Group-B

2 Credits

- **2.1:** Clinical diet formulation for renal stone, glomerulonephritis, renal failure- complications, causes, symptoms, diagnostic test, strategy for carbohydrate, protein, fat, dietary fiber, nutraceuticals, minerals, resistance starch inclusion and exclusion, dietary management.
- **2.2:** Clinical diet for IBS, IBD, constipation, Peptic Ulcer - symptoms, complications, diagnostic test, causes, strategy for carbohydrate, protein, fat, dietary fiber, nutraceuticals, minerals, resistance starch inclusion and exclusion, dietary management.
- **2.3:** Therapeutic diet for aged person- physiological and psychological changes, significance of proper nutrition in old age, nutrition related problems, food pyramid for older adults, dietary management.
- **2.4:** Therapeutic diet for obesity- symptoms, diagnostic test, complications, types, causes, strategy for carbohydrate, protein, fat, dietary fiber, nutraceuticals, minerals, resistance starch inclusion and exclusion, relationship between physical activity and obesity, dietary management of obesity (different types of diet plan for obesity).

Group-A**2 Credits**

- **1.1:** Carbohydrates: classification and sources of dietary carbohydrates – free sugars, starch, non-starch polysaccharides-, functions of carbohydrates, carbohydrate content of foods, requirements and intakes of dietary carbohydrates, Glycemic index, glycemic load, isomeric structure of carbohydrate, glycosidic bonds and its type. Carbohydrate pool in our body.
- **1.2:** Proteins: Chemistry of proteins, classification and functions of Proteins, Protein turnover, Protein requirements, conformation and structure of proteins – primary, secondary, tertiary and quaternary structure. Amino acids types. First class protein, second class protein. Protein pool in our body.
- **1.3:** Lipids: Types of natural lipids and their functions- structural lipids, storage lipids and metabolic lipids, fats in various foods, composition of fats in diets, chemical properties and characterization of fats. Waxes, Cerebrosides, Gangliosides, Phospholipids and Proteolipids. Steroids and Bile salts, EFA, ester bonds, short chain and medium chain fatty acids, trans fat, PUFA, MUFA. Lipid pool in our body.
- **1.4:** Nucleic Acid: Types of Nucleic Acid and their functions, structure of Nucleic Acid, classification of Nucleic Acid, phosphorylated bonds in nucleic acid, biosynthesis and degradation of purines and pyrimidines and their regulation. Inherited disorders of purine and pyrimidine metabolism.
- **1.5:** Enzymology: Nomenclature and classification, basic structure; basic structure; general properties, coenzymes and their functions, factors influencing enzyme reaction – kinetic properties, Michaelis constant, inhibition, purification, isoenzyme, mechanism of enzyme action, two-substrate reaction mechanism, allosteric and feed-back inhibition, Cofactor, apoenzyme, holoenzyme, amylase inhibitors, lipase inhibitors, protease inhibitors in food items, competitive, non-competitive, uncompetitive inhibition.

Group-B**2 Credits**

- **2.1:** Metabolism: Catabolism, anabolism, catabolic, anabolic and amphibolic pathways. amphibolism.
- **2.2:** Energy: Body composition, Physiological fuel value, Gross fuel value, Measurement of energy expenditure- BMR, RMR, TEF, SDA, RDA, ARE, AEE, Estimation of energy requirements for individual and groups, application of RDA, EEE, Age specific RDA.
- **2.3:** Metabolism of Carbohydrates: Glycolysis, TCA cycle, HMP shunt, Bioenergetics, Glycogenolysis, Alcoholic fermentation, Neoglucogenesis – special reference to rate limiting steps, hormonal regulation of blood glucose.
- **2.4:** Protein and Amino acid metabolism: Protein degradation, metabolism of aromatic, sulfur containing, BCAA and other amino acids, fate of nitrogen (Urea cycle), glutamine and alanine cycle, protein biosynthesis.
- **2.5:** Lipid metabolism: Beta – oxidations of saturated fatty acids. Biosynthesis of fatty acids – Acetyl-CoA carboxylase reaction, Biosynthesis of triglycerides, cholesterol & phospholipids, Regulation of fatty acid biosynthesis, Ketosis.
- **2.6:** Nucleic acid, DNA structure replication, transcription.

- **2.7:** Metabolism of Iron, Zinc, Iodine, Selenium, Fluoride, Chromium, Other essential trace elements.
- **2.8:** Immuno-boosting nutrients and their mode of action- Vitamin A, D, C, B₁₂, Minerals -Zn
- **2.9:** Importance of nutraceuticals- concept, type and health benefit.

Practical

Course No. NUD – 295 Therapeutic Nutrition Part II

4 Credits

- 1.1: Preparation of diet chart for diabetes mellitus
- 1.2: Preparation of diet chart for Hypertension
- 1.3: Preparation of diet chart for Atherosclerosis
- 1.4: Preparation of diet chart for Hyperlipidemia
- 1.5: Preparation of diet chart for Renal stone
- 1.6: Preparation of diet chart for Glomerulonephritis
- 1.7: Preparation of diet chart for renal failure
- 1.8: Preparation of diet chart for IBS, IBD
- 1.9: Preparation of diet chart for constipation
- 1.10: Preparation of diet chart for Diarrhoea
- 1.11: Preparation of diet chart for Dysentery
- 1.12: Preparation of diet chart for cholera
- 1.13: Preparation of diet chart for aged individual

Course No. NUD-296 Food & Nutrient Analysis

4 Credits

- 1.1: Determination of Saponification Number.
- 1.2: Determination of Acid Number and iodine number
- 1.3: Estimation of Serum cholesterol, triglyceride.
- 1.4: Estimation of Blood glucose by Glucose oxidase / Nelson Somogy method
- 1.5: Estimation of Serum proteins by Biuret method / Lowry method.
- 1.6: Estimation of Albumin / globulin ratio by Biuret method
- 1.7: Estimation of starch from wheat flour
- 1.8: Estimation of lactose from milk
- 1.10: Bio chemical testing of food additives
- 1.11: Estimation of carbohydrate in food
- 1.12: Estimation of dietary fiber
- 1.13: Estimation of Protein (TP)
- 1.14: Estimation of neutral fat and total cholesterol
- 1.15: Estimation of calcium in food
- 1.16: Estimation of phosphorus in food
- 1.17: Estimation of iron in food
- 1.18: Estimation of ascorbic acid in food
- 1.19: Estimation of thiamine in food
- 1.20: Qualitative assessment of nutraceuticals