



MANGALORE UNIVERSITY

B.Sc. (Basic / Hons.) in FOOD, NUTRITION and DIETETICS (FND)

Preamble:

In keeping with the Govt of India's NEP-2020 vision of a holistic and multidisciplinary Under-Graduate education that equips employable graduates with the required skills in domain as well as personality that are required in the 21st century, the Govt. of Karnataka constituted Subject-wise Committees to work towards envisaging, designing and drafting a common syllabus with hallmarks being multiple entry and exit points enabling horizontal and vertical mobility. This has now been adopted/adapted in Mangalore University with minor changes and shall be effective from the academic year 2021-22.

The B.Sc. (Basic / Honors) programme in Food, Nutrition and Dietetics intends to create competent professionals with in-depth understanding of various aspects offered under this programme. The programme offers a broad range of courses spanning across areas of community nutrition, food science, dietetics and nutrition counseling. The four-year programme aims at conceptual understanding of the key elements of food, nutrition and dietetics. Students would be trained in areas such as nutritional assessment, diet planning, food product development, health communication, clinical nutrition, nutrition education and behavior modification. The programme would also introduce students to research methodology and statistics which would be pivotal in developing reasoning, logic, problem solving and scientific temper. The students would be further exposed to continuous hands-on training through regular practical and internship experience. This would enable creative and critical thinking among the students. The comprehensive programme would enable students to keep themselves updated through internship, practical and projects. The field of Food, Nutrition and Dietetics is vast, dynamic and an evolving area of specialization. This requires students to learn and be abreast with recent advances and evidence-based guidelines in the field of food and nutrition. The skills and attributes acquired during the programme would open doors to job opportunities in areas of food science, nutrition, health promotion, and disease management, also paves way for research and higher education for interested students.

Hence, salient features are as follows:

1. Discipline Core (DSC) or Domain-specific Core Courses in Food, Nutrition and Dietetics
2. Discipline Electives (DSE) or Elective Courses in the Core Subject or Discipline.
3. Open Electives (OE) are Elective Courses offered to students from non-core subjects across disciplines.
4. Skill Enhancement Courses (SEC) that are domain-specific or generic
5. 1 hour of Lecture or 2 hours of practical per week in a semester is assigned one credit. Core discipline theory courses are of 3/4 credits, while practicals are of 2 credits

Program Outcomes (POs)

After successful completion of this program, graduates of Food Nutrition and Dietetics will have the following attributes:

PO 1. **Disciplinary Knowledge:** Understand the role and importance of food and nutrition for the welfare of the community and acquire the skills in planning diet, health and diseases

PO 2. **Communication Skills:** Learn and apply evidence-based guidelines in the field of dietetics, nutrition counselling, nutrition research laboratory, community

PO 3. **Critical thinking:** Understand the structure and functions of the different organs systems in relation to nutrition

PO 4. **Interpersonal and Problem Solving:** Design solutions and novel food products to meet the specified nutrient needs with appropriate consideration for the public health and safety

PO 5. **Critical thinking, Communication and problem solving:** Comprehend, communicate effectively, plan, design and implement programs in the field of nutrition and dietetics

PO 6. **Decision making, Analytical and Research skills:** Understand and demonstrate the knowledge of food science, food science and quality control in societal and environmental contexts

PO 7. **Moral and ethical awareness/reasoning and Research skills:** Apply ethical principles and commit to professional ethics and responsibilities in the field of nutrition, sports, food industry and health care sectors

PO 8. **Interpersonal and Business skills:** Understand the applications of nutraceuticals and functional foods in the product development from conceptualization to evaluation of the quality of the food product

PO 9. **Analytical and Research skills:** Comprehend the knowledge and role of food additives in food industry in relation to its analytical techniques

PO 10. **Critical thinking, Analysis and Research skills:** Understand and apply the concept of nutrients and nutritional science in the evaluation of health and disease

PO 11. **Goal Setting and Problem-solving skills:** Enable students to pursue higher education and research

Program Specific Outcomes (PSOs):

After successful completion of this program, graduates of Food, Nutrition and Dietetics will have the following specific attributes:

- Utilize the knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease processes
- Evaluate the food product and the application of necessary preservation techniques to increase the shelf life of the product and also be a part in the auditing industry
- Work in Research laboratories on the fortification and enrichment of existing product as well as the development of new product
- Apply the nutrition and dietetics-based knowledge and skills in the planning and assessment of suitable diets for individuals of every age, patients and the community in a sustainable manner.
- Provide nutrition counselling and education to individuals, groups, and communities throughout the lifespan using a variety of communication strategies

- Apply technical skills, knowledge of health behaviour, clinical judgment, and decision-making skills when assessing and evaluating the nutritional status of individuals and communities and their response to nutrition intervention.
- Implement strategies for food access, procurement, preparation, and security for individuals, families, and communities.
- Apply food science knowledge to describe functional properties of food ingredients.
- Apply the knowledge of principles and techniques of nutrition and dietetics for research-based approaches.
- Apply skills gained in nutrition and dietetics for research, development, and entrepreneurship.

MANGALORE UNIVERSITY

Programme Structure for B.Sc. (Basic / Hons.) Food, Nutrition and Dietetics with Food Nutrition and Dietetics as Programme Core Subject with Practical

Sem	Discipline Core Courses (Credits) (T+P=3+2; 3)	Open Elective Courses	Ability Enhancement compulsory Courses 4hrs		Skill enhancement Courses			Total credits
					Skill based	Value Based (Credits) L+T+P		
I	NDT 1.1 Fundamentals of Nutrition (3) NDT 1.2 Human Physiology I (3) NDT 1.3 Food Chemistry (3) NDP 1.1 Fundamentals of Nutrition (2) NDP 1.2 Human Physiology I (2)	OE 1 (3) NDT 1.2 Fundamentals of food and health	Languages (3+3)		SEC-1 (2)	Phy. Ed. Yoga (1)	Health & Wellness (1)	18+8
II	NDT 2.1 Principles of Food Science and Preservation (3) NDT 2.2 Dietetics I (3) NDT 2.3 Post harvest technology (3) NDP 2.1 Principles of Food Science and Preservation (2) NDP 2.2 Dietetics (2)	OE 2 (3) NDT 2.2 Food safety and hygiene	Languages (3+3)	EVS (2)		Phy. Ed. Sports (1)	NCC/NS S/R&R (S&G)/Cultural (1)	18+8
Exit option with Certificate in Food, Nutrition and Dietetics (with a minimum of 48 credits)								
III	NDT 3.1 Nutrition through Life Span I (3) NDT 3.2 Nutrition through Life Span II (3) NDT 3.3 Nutritional Biochemistry (3) NDP 3.1 Nutrition through Life Span (2) NDP 3.2 Nutritional Biochemistry (2)	OE 3 (3) NDT 3.2 Nutritional Assessment / Traditional foods and health	Languages (3+3)		SEC-2 (2)	Phy. Ed. Sports (1)	NCC/NS S/R&R (S&G)/Cultural (1)	18+8
IV	NDT 4.1 Food microbiology, sanitation and hygiene (3) NDT 4.2 Dietetics II (3) NDT 4.3 Food Toxicology II (3) NDP 4.1 Food microbiology, sanitation and hygiene (2) NDP 4.2 Dietetics II (2)	OE 4 (3) NDT 4.2 Nutrition in weight management / Diet in life style disorder	Languages (3+3)	Constitution of India (2)		Phy. Ed. Sports (1)	NCC/NS S/R&R (S&G)/Cultural (1)	18+8
Exit option with Diploma in Food, Nutrition and Dietetics (with a minimum of 96 credits)								
V	NDT 5.1 Clinical Nutrition and Dietetics I (3) NDT 5.2 Intermediary Metabolism (3) NDT 5.4 Nutrition psychology and diet adherence (3) NDP 5.1 Clinical Nutrition and Dietetics I (2) NDP 5.2 Intermediary Metabolism (2) NDP 5.4 Nutrition psychology and diet adherence (2)	Vocational NDT 5.3 Food product development and sensory analysis (3) NDP 5.3 Food product development and sensory analysis (2)			SEC-3 (2)	Phy. Ed. Sports (1)	NCC/NS S/R&R (S&G)/Cultural (1)	24

VI	NDT 6.1 Clinical Nutrition and Dietetics II (3) NDT 6.2 Community Nutrition and Public Health (3) NDT 6.3 Assessment of nutritional status (Minor, 3) NDP 6.1 Clinical Nutrition and Dietetics II (2) NDP 6.2 Community Nutrition and Public Health (Minor, 2) Assessment of nutritional status (2)	Vocational NDP 6.3 - Food analysis (2) Internship (2)			SEC-4 (2)	Phy. Ed. Sports (1)	NCC/NS S/R&R (S&G)/C ultural (1)	21
Exit option with BSc in Food, Nutrition and Dietetics (with a minimum of 140 credits)								
VII	NDT 7.1 Advanced Nutrition I (3) NDT 7.2 Advanced Food Science (3) NDT 7.3 Applied physiology (3) NDP 7.1 Advanced Nutrition I Practical (2) NDP 7.2 Advanced Food Science Practical (2)	DSCE NDT 7.4 - Statistics for Nutrition Research / Food and drug interaction (3) NDT 7.5 Food processing and preservation / Functional food quality (3) NDT 7.4 Research Methodology (3)						22
VIII	NDT 8.1 Advances in Medical nutrition therapy (3) NDT 8.2 Advanced Nutrition II (3) NDT 8.3 Exercise Physiology and nutrition (3) NDP 8.1 Advances in Medical nutrition therapy (2)	NDT 8.4 Nutrition counselling / Nutrition care process (3) NDT 8.5 Research Project* (6)						20
Award of BSc (Hons) Degree in Food, Nutrition and Dietetics (with a minimum of 180 credits)								

*In lieu of the research Project, two additional elective papers/Internship may be offered

Pedagogy for student engagement is predominantly lectures. However, other pedagogies that enhance better student engagement may be adopted for each course. The list includes active/ experiential learning /course projects/ problem or project-based learning (PBL)/ case studies/ self-study like seminar, term paper or MOOC/ field visits / industrial visits / group activity / simulations / hackathons etc.

Assessment: Every course needs to include assessment for higher order thinking skills (applying/ analyzing/evaluating/creating). These shall necessarily be reflected also in the Question Papers, such that questions of all levels of difficulty are framed. Alternate assessment methods that help formative assessment (i.e. assessment for learning) may also be adopted.

**SCHEME and SYLLABUS for B.Sc. (Basic / Hons.) Food, Nutrition and Dietetics
I Semester**

Group	Code	Course	No. of courses	Instruction hrs/week	Duration of Exam (hrs)	Marks			Credits	Total / Sem
						IA	Exam	Total		
Discipline Core Courses	NDT 1.1	Fundamentals of Nutrition	3T	3x4	3x3	3x40	3x60	3x100	3x3	9
	NDT 1.2	Human Physiology - I								
	NDT 1.3	Food Chemistry								
	NDP 1.1	Fundamentals of Nutrition	2P	3x2	3x2	2x25	2x25	2x50	2x2	4
	NDP 1.2	Human Physiology - I								
Open Elective Course	NDE 1.1	Fundamentals of food and health	1T	3	3	40	60	100	3	3
Total									16	

II Semester

Group	Code	Course	No. of courses	Instruction hrs/week	Duration of Exam (hrs)	Marks			Credits	Total/ Sem
						IA	Exam	Total		
Discipline Core Courses	NDT 2.1	Principles of food science and preservation	3T	3x4	3x3	3x40	3x60	3x100	3x3	9
	NDT 2.2	Dietetics - I								
	NDT 2.3	Post harvest technology								
	NDP 2.1	Principles of food science and preservation	2P	3x2	3x2	2x25	2x25	2x50	2x2	4
	NDP 2.2	Dietetics - I								
Open Elective Course	NDE 2.1	Food safety and hygiene	1T	3	3	40	60	100	3	3
Total									16	

NDT 101**BSc (Basic / Hons.) FND - I Semester
FUNDAMENTALS OF NUTRITION (THEORY)**

45 hrs - 4 hrs / week

Course Outcomes:

After successful completion of this course, students will be able to:

- CO 1. Comprehend nutritional classification of food and methods of assessing nutritional status and energy requirements
- CO 2. Understand the functions and sources of nutrients
- CO 3. Apply the knowledge of human nutrition in maintenance of good health for the individual and the community
- CO 4. Assess the factors affecting availability and requirements of nutrients

UNIT I (12 hours)

Introduction to nutrition: Understanding concept of nutrition, nutrients, nutritional status, malnutrition Functions of food, food groups, concept of balanced diet Methods of cooking and preservation of Nutrients Water: Functions, sources and water balance

UNIT II (11 hours)

Macronutrients: Classification, Sources, Functions and Deficiency of Carbohydrates, Dietary Fibre Proteins and fat

UNIT III (11 hrs)

Energy Metabolism: Significance, components, factors influencing body composition, energy metabolism, BMR Measurement methods – Direct and Indirect Energy expenditure in activities, the use of doubly labeled water Influence of energy excess & deficit on body composition – obesity and underweight. Current methodology, Recommendations

UNIT IV (11 hours)

Micro nutrients – Sources, Functions and Deficiency: Minerals: Calcium, Phosphorous, Iron, Iodine, Zinc Fat soluble vitamins (Vitamin A, D, E, K) Water soluble vitamins (B complex vitamins: Thiamine, Pyridoxine (B6), Cyanocobalamin (B12), Riboflavin, Niacin, Folic acid and Vitamin C

NDP 1.1 FUNDAMENTALS OF NUTRITION (PRACTICAL) 36 Hrs - 3 hrs/week

List of Experiments to be conducted

1. Weights and measures
2. Methods of cooking a. Water – boiling, steaming, pressure cooking b. Oil- Shallow frying, deep frying
3. Identification of nutrient rich food
4. Planning and preparation of macro nutrient rich recipes classes a. Energy b. Protein
5. Planning and preparation of micro nutrient recipes a. Iron b. Vitamin A.

REFERENCES

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- Swaminathan M. Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras, 1985

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- WHO Technical Reports Series for Different Nutrients.
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- Agarwal A, Udipi SA. Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi, 2014
- Bamji M, Rao NP, Reddy V. Text book of Human Nutrition, Oxford and IBH Publ. Co. PvtLtd, New Delhi, 1996
- Srilakshmi B. Nutrition science - 4th Ed., New age international Publ., New Delhi, 2015
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- Begum R. A Text book of Food, Nutrition & Dietetics, Sterling Publications, New Delhi. 2009
- Mudambi S R and Rajagopal M V. Fundamentals of Food, Nutrition and Diet Therapy by New Age International Publishers, New Delhi, 2008
- Srilakshmi. B. Human Nutrition, New Age International Publishers, 2009

NDT 1.2 HUMAN PHYSIOLOGY - I (THEORY)

45 hrs - 4 hrs / week

Course Outcomes:

After successful completion of this course, students will be able to:

- CO 1. Understand the homoeostatic status of the human body
- CO 2. Comprehend the physiological processes and functions of various vital organs as applicable to human nutrition
- CO 3. Apply the knowledge of physiological states to therapeutic diets
- CO 4. Assess malfunctioning of vital organs or systems

UNIT I (12 hours)

Introduction: Homeostasis and body fluids. Blood: Red blood cells – Erythropoiesis, stages of differentiation, function, counts, physiological variation. Hemoglobin – structure, function, concentration, physiological variation. White blood cells – production, function, life span, counts, differential counts. Platelets – origin, normal count, morphology, functions. Plasma proteins – production, concentration, types, albumin, globulin, fibrinogen. Clotting factors, mechanism of clotting, disorders of clotting factors. Blood Bank, blood groups. Anticoagulants – examples and uses. Anaemia – classification – morphological and etiological effects of anaemia on body. Blood indices – colour index, MCH, MCV, MCHC. Erythrocyte sedimentation rate (ESR). Blood volume – normal value, determination of blood volume and regulation of blood volume. Lymph – composition and function.

UNIT II (11 hours)

Cardiovascular system: Heart – physiological anatomy, nerve supply, properties of cardiac muscle, cardiac cycle – systole, diastole, conduction system. Cardiac output. Heart sounds: Normal heart sounds, areas of auscultation. Blood pressure – Definition, normal value, clinical measurement of blood pressure. Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension, radial pulse. Heart Sounds – Normal heart sounds, characteristics and signification (significance), heart rate. Electrocardiogram (ECG) – significance, coronary, cerebral circulation and capillary circulation

UNIT III (11 hours)

Digestive System: Physiological anatomy of gastro-intestinal tract, functions of digestive system. Salivary glands – structure and functions, deglutition, mastication – stages and regulation of saliva, functions of saliva. Stomach – structure and functions. Gastric secretion – composition, function, regulation of gastric juice secretion. Pancreas – structure, function, composition and regulation of pancreatic juice. Liver – functions of liver. Bile secretion - composition, function, regulation of bile secretion, bilirubin metabolism, types of bilirubin, jaundice – types, significance. Gall bladder – functions. Intestine – small intestine and large intestine. Small intestine - functions, digestion, absorption, movements. Large intestine – functions, Defecation

UNIT IV (11 hours)

Respiratory System: Function of respiratory system - physiological anatomy of respiratory system, respiratory tract, respiratory muscles, respiratory organs – lungs, alveoli, respiratory membrane, stages of respiration. Mechanism of normal and rigorous respiration, intra pulmonary pleural pressure, surface tension. Transportation of respiratory gases: Transportation of O₂: direction, pressure gradient, forms of transportation, oxygenation of haemoglobin, quantity of O₂ transported. Lung volumes and capacities. Regulation of respiration, mechanisms of regulation, nervous and chemical regulation, respiratory centre. Hypoxia, cyanosis, asphyxia, dyspnoea, dysbarism, artificial respiration, apnoea

NDP 1.2 HUMAN PHYSIOLOGY (PRACTICALS) 36 hrs - 3 hrs/week

Course Outcomes:

After successful completion of this course, students will be able to:

- CO 1. Record blood pressure using various methods
- CO 2. Estimate hemoglobin
- CO 3. Carry out blood grouping
- CO 4. Assess histological sections of various organs

1. Record of blood pressure – Sphygmomanometer, palpatory method, auscultatory method, variation of BP
2. Haemoglobin estimation
3. Blood grouping
4. Histology of Cartilage, bone, adipose tissue, skin, muscle

REFERENCES

- Guyton AC, Hall JE. Textbook of Medical Physiology, 9th Ed., Prism Books Pvt Ltd., Bangalore, 1996
- Chatterjee CC. Human Physiology, Calcutta, WB, 1988
- Wilson. Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone, 1989
- Sembulingam K, Sembulingam P. Essentials of medical physiology, Jaypee Bros. Medical Publ., New Delhi, 2012

BSc FND - I Semester
FOOD CHEMISTRY (THEORY)

NDT 1.3

45 hrs - 4 hrs / week

Course Objectives:

1. Comprehensive study on definition, composition of food, water-food relation, macronutrients, vitamins and flavours.
2. Study of various natural food pigments, enzymatic reactions, changes taking place and new product development and browning reactions in food required at industrial level.

Course Outcomes:

After successful completion of this course, students will be able to:

- CO 1. Define and have an overview on food chemistry including composition and the importance of water.
- CO 2. Classify the carbohydrates, lipids, proteins, vitamins and flavour, minerals and natural food pigments used in food products.
- CO 3. Apply the knowledge of browning reactions in food products
- CO 4. Build own product in innovative way by understanding changes that occurs during food development and use of enzyme technology.

UNIT I (12 hours)

Introduction: Composition of food, water in food, structure of water and ice, types of water, absorption and adsorption phenomenon, Water activity and packaging, Water activity and shelf-life

Lipids: Classification of lipids, Physical properties of lipids. Chemical properties of lipids. Effect of frying on fats, Changes in fats and oils on storage and its prevention, Technology of edible fats and oils - Refining, Hydrogenation and Interesterification, Fat Mimetics

UNIT II (11 hours)

Proteins: Protein classification and structure, Nature of food proteins (plant and animal proteins, Physical and chemical properties of proteins, Functional properties of proteins.

Carbohydrates: Classification of carbohydrates, Structure of important polysaccharides, Chemical reactions of carbohydrates, Modified celluloses and starches.

Flavours: Definition and basic tastes, Description of food flavours, Flavour enhancers

UNIT III (11 hours)

Minerals: Major and minor minerals, Metal uptake in canned foods, Toxic metals

Natural Food Pigments: Introduction and classification, Water soluble and insoluble food pigments (chlorophyll, carotenoids, anthocyanins and flavonoids, beet pigments)

Browning Reactions in Food: Browning, Maillard reaction, Caramelization reaction.

UNIT IV (11 hours)

Enzymes: Introduction, General characteristics, Enzymes in food processing, Industrial Uses of Enzymes, Immobilized enzymes

Changes occurring during food processing treatments: Drying and dehydration, Irradiation, Freezing, Canning

New product development: Definition, importance, need of product development, steps of product development, tools.

REFERENCES

- Fennema, OR. Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
- Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
- Wong, DWS. Food Enzymes, Chapman and Hall, New York, 1995
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- DeMan, J.M., Principles of Food Chemistry, AVI, New York, 1980
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- Desrosier, NW. and Desrosier, JN., The technology of food preservation, 4th Ed., Westport, Conn., AVI Pub. Co, 1977.
- Fuller, GW. New Product Development from Concept to Marketplace, CRC Press, 2004.
- Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
- Nooralabettu, K.P. Enzyme Technology, Pace Maker of Biotechnology, PHI Learning Private Limited, New Delhi. 2011

II Semester

NDT 2.1 PRINCIPLES OF FOOD SCIENCE AND PRESERVATION

45 hrs - 3 hrs/week

Course Outcomes:

After successful completion of this course, students will be able to:

- CO 1. Apply basic nutrition knowledge in making foods choices and obtaining an adequate diet
- CO 2. Learn to distinguish and relate the characteristics and properties of foods
- CO 3. Apply the knowledge gained on characteristics and properties of foods during cooking
- CO 4. Develop appropriate food preparation and processing methods to ensure quality standards

UNIT I (12 hours)

Introduction to Food Science: Properties of food (a) Colloids, sols, gels, foam (b) Emulsion formation (c) Bound and free water (d) pH value, osmosis and osmotic pressure (e) Boiling, melting and freezing points. Sensory evaluation - Subjective and objective. Cereals and millets - Production, importance & composition - cereal products. Wheat, rice maize, ragi and sorghum. Malting and cooking of cereals, non-enzymatic reactions, leavening agents. Fermented products, milling of wheat, parboiling of rice, pulses- composition, toxic constituents and cooking of pulses, variety and processing

UNIT II (11 hours)

Fruits and vegetables – Production composition, pigments, flavors and variety- changes during cooking-enzymatic browning, non-enzymatic browning. Milk and milk products- composition, storage- Processing of milk – Effects of heat on milk protein - Milk products available in India. Egg - structure, composition, storage, grade, evaluation, selection, Role of egg in food preparation, factors affecting coagulation of egg proteins.

UNIT III (11 hours)

Sugar, Jaggery and honey - Composition, different forms of sugar, storage- Behaviors of syrups at different temperatures- Crystallization and caramelization Oil and Fats- Composition, types, storage, plasticity, Hydrogenation and processing .Changes during heating- Fats as shortening agents, smoking point, Rancidity, specific fat (Lard, Butter, Margarine) Meat, Fish poultry-structure, composition, storage, Post mortem changes in meat, Curing of meat, Tenderization, Aging of meat, selection, Meat cookery

UNIT IV (11 hours)

Concepts of food safety and standards. Food Preservation, food spoilage, method of preservation by low temperature, high temperature, dehydration, food irradiation.

NDP 2.1 PRINCIPLES OF FOOD SCIENCE AND PRESERVATION (PRACTICAL)

36 Hrs - 3 hrs/week

List of Experiments to be conducted

1. Weights & measures, standardization of common food preparation.
2. Sensory evaluation
3. Starch cookery I-microscopic observation of different starches gel formation and gelatinization.
4. Starch cookery II- Rice and Wheat preparation, factors influencing dough 20 development, gluten formation.

5. Leavened products, milk cookery-casein formation, curd setting.
6. Fermented products and pulse cookery.
7. Vegetable cookery- Effect on pigments and enzymatic browning in fruits and vegetables
8. Egg cookery and fat and oil cookery.
9. Sugar and Jaggery- Syrup formation, crystallization and caramelization.

REFERENCES

- Manay NS, Shadaksharaswamy M. Foods - Facts and principles, New Age International Publ., New Delhi, 2010
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- Desroier NV. The technology of food preservation, AVI Pub. Co, 1963
- Lal G, Siddappa GS, Tandon GL. Preservation of food and vegetables, ICAR, New Delhi 1960
- Manay NS, Shadaksharaswamy M. Foods - Facts and principles, New Age International Publ., New Delhi, 2010

NDT 2.2

DIETETICS - I (THEORY)

45 hrs - 4 hrs / week

Course Outcomes:

After successful completion of this course, students will be able to:

- CO 1. Know the principles of diet therapy
- CO 2. Understand the modifications of normal diet for therapeutic purposes
- CO 3. Learn the role of a registered dietician
- CO 4. Identify the roles of others who collaborate in delivery of food and nutrition services

UNIT I (12 hours)

Definition of dietetics, clinical dietetics, objectives of dietetics, Growth and scope of dietetics, Characteristics and role of dietician in health care, classification of dietitian, characteristics of a dietitian, objectives of diet therapy. Hospital Dietary services- role and functions

Unit II (12 hours)

Concept of diet therapy and meal planning - Basic principles of meal planning: Explanation of terms: concept of health, recommended dietary allowances (RDA), Adequate intake, Food exchange list, food guide pyramid Factors affecting meal planning, use of food composition

uses.

UNIT I (12 hours)

Introduction to food processing: Historical development of food processing, Definition of food processing, aims and objectives of food processing, preparation of raw material for processing, introduction to different processes employed in food processing- milling, cooking, boiling, steaming, braising, stewing, roasting, frying, grilling, baking, fermentation, pickling, refining, canning, definition of shelf life, perishable foods, semi perishable foods, shelf stable foods

Unit II (11 hours)

Freezing and Refrigeration: Introduction to refrigeration, cool storage and freezing, definition, principle of freezing, freezing curve, changes occurring during freezing, types of freezing , introduction to thawing, changes during thawing and its effect on food.

Unit III (11 hours)

Sterilization: Principle and applications: commercial sterilization, Pasteurization, ultra high temperature sterilization, aseptic processing and blanching, Hurdle technology, microwave processing.

Unit IV (11 hours)

Drying and Dehydration: Definition, drying as a means of preservation, differences between sun drying and dehydration (i.e. mechanical drying), types of drying, factors affecting rate of drying, normal drying curve, names of types of driers used in the food industry. Evaporation: Definition and principle of evaporation, factors affecting evaporation, names of evaporators used in food industry. Irradiation: Introduction, units of radiation, kinds of ionizing radiations used in food irradiation, mechanism of action, uses of radiation processing in food industry. Fermentation: Principles of fermentation, Types of fermentation, curing and pickling, Advantages

REFERENCES

- Frazier WC, Westoff DC. Food Microbiology 4th Ed., Tata Mc Graw Hill Publ. Co. Ltd., 1998
- Desroier NV. The technology of food preservation, AVI Pub. Co, 1963
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- Potter NN, Hotchkiss JH. Food Science, 5th Ed., CBS Publisher and Distributors, Delhi, 1966
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- Johnson R, Anderson MT. Food Preservation, 2012
- Manay NS, Shadaksharaswamy M. Foods - Facts and principles, New Age International Publ.,New Delhi, 2010

Open Elective Courses

SEMESTER - I

NDE 1.1 FUNDAMENTALS OF FOOD AND HEALTH (OPEN ELECTIVE) 45 hours

Course Outcomes:

After successful completion of this Course, students will be able to:

CO 1. Gain knowledge on key nutrients and their implications on health

CO 2. Familiarize with the concept of health and issues of public health concern

CO 3. Understand the effect of novel and processed foods on general health and well being

Unit I (12 hours)

Overview of Food & Macronutrients: Overview of Food & Nutrients, Food choice and factors influencing food choice Classification of nutrients – macronutrients and micronutrients. Energy, Carbohydrates, Protein and Fats Classification, Functions and Sources Impact of macronutrients on health – Deficiency and Excess

Unit II (11 hours)

Micronutrients & Water: Micronutrients - Classification, Functions and Sources Impact of micronutrients on health – Deficiency and Excess Water – Role , Body fluids and electrolytes

Unit III (11 hours)

Components of health: Health – Definition, Components, Factors influencing health, Dietary guidelines Issues of public concern Malnutrition, Anemia, Vitamin A deficiency, Obesity, Diabetes and Hypertension.

Unit IV (11 hours)

Foods for health and well being: Functional foods – Probiotics, prebiotics and phytochemicals Health supplements, processed foods, organic foods Nutrition label – understanding and importance

REFERENCES

- Antia F.P., Abraham, P. Clinical Dietetics and Nutrition, Oxford University Press; 4th Ed., 2002
- Mahan L.K., Escott-Stump, S. Krause's food, nutrition and diet therapy, 11th Ed., Saunders company, London, 2004.
- Passmore R. and Davidson S. Human nutrition and Dietetics. Liming stone publishers, 1986
- Robinson C.H. Lawler, M.R., Chenometh W.L., Garwick A.E. Normal and therapeutic nutrient, 17th edition MacMillan Company, New York, 1990
- Shils M.E., Alfon J.A., Shike M. Modern nutrition in health and diseases, 8th Ed., 1994.
- William S.R., Nutrition and Diet Therapy, 4th edition

SEMESTER - II

NDE 2.1: FOOD SAFETY AND HYGIENE (OPEN ELECTIVE) 45 hours

Course Outcomes:

After successful completion of this Course, students will be able to:

- CO 1. Gain knowledge on food safety and their implications on health
- CO 2. Familiarize with the concept of food safety issues on public health
- CO 3. Understand the standards, laws and regulations regarding food safety

Unit I (12 hours)

Introduction to Food Safety: Concept and meaning of Food Safety, food adulteration, food hazards Food laws and regulations – National (FSSAI) and international (FAO) food laws, Governing bodies Exposure, estimation, toxicological requirements and risk analysis Safety aspects of water and beverages Safety assessment of food contaminants and pesticide residues

Unit II (11 hours)

Food Safety: Principles of prevention: Reduce microbial contamination and control growth Eliminate source of contaminants Sanitation: principle and purposes

Unit III (11 hours)

Food Protection: Food protection by: Thermal transfer methods, Chemical methods, Biocontrol methods and biotechnology, Irradiation methods Foodborne Illness Risk Factors Food worker Education and training

Unit IV (11 hours)

Food Hygiene: Food hygiene law and the importance of food safety. Food Safety Hazards. Temperature control, food deliveries, refrigeration, low and high-risk foods, 20 use by dates and best before dates, and stock rotation (FIFO). Cross-Contamination Hand hygiene, further hygiene considerations, protective clothing, reporting illness and first aid.

REFERENCES

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- Roday S. Food hygiene and sanitation with case studies, 2nd Ed., Tata McGraw Hill Education Pvt Ltd., 2011
- Kirk, R.S and Sawyer, R. Pearson's composition and analysis of foods, Longman Scientific and technical. 9th Ed., England, 1991
- Bryan, F.L. Hazardous analysis critical control point evaluation. A guide to identifying Hazards and assessing risks associated with food preparation and storage. WHO, Geneva, 1992

MODEL QUESTION PAPER
CREDIT BASED SEMESTER B.Sc. DEGREE EXAMINATION – MONTH, YEAR
CORE COURSE
(CODE NO): TITLE OF THE COURSE

Time: 3 Hours

Max. Marks: 60

I. Answer the following questions:

(4x15=60)

1
a
b
c

OR

2
a
b
c

3
a
b
c

OR

4
a
b
c

5
a
b
c

OR

6
a
b
c

7
a

- b
- c

OR

- 8
- a
- b
- c

In each question:

- a. Shall be questions based on basic conceptual understanding etc.
- b. Shall be questions based on deeper understanding, analytical, problem solving skills etc.
- c. Shall be questions based on critical thinking, higher order thinking skills etc.

MODEL QUESTION PAPER
I Semester B.Sc. Food Nutrition and Dietetics (Basic and Hons.) Degree Practical
Examination Month & Year
COURSE CODE AND TITLE

Time:	Max. Marks: 30
I. Major:	10 marks
II. Minor:	5 marks
IV. Spotters:	2×2.5=5 marks
a.	
b.	
V. Viva.	5 marks
VI. Record.	5 marks
