ಕ್ರಮಾಂಕ /No: ಎಂಯು/ಎಸಿಸಿ/ಸಿ.ಆರ್ 80/2021-22/ಎ8

ಕುಲಸಚಿವರ ಕಚೇರಿ
ಮಂಗಳಗಂಗೋತ್ರಿ – 574 199
Office of the Registrar
Mangalagangothri – 574 199

ದಿನಾಂಕ/Date: 26/12/2022

ರಿಗೆ:

ಕುಲಸಚಿವರು (ಪರೀಕ್ಷಾಂಗ)
ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ
ಮಂಗಳಗಂಗೋತ್ರಿ.

ಮಾನ್ಯರೆ,

ವಿಷಯ: ಬಿ.ಎಸ್ಸಿ(ಫುಡ್ ನ್ಯೂಟ್ರಿಷಿಯನ್ ಆಂಡ್ ಡೈಟೆಟಿಕ್ಸ್) ಕಾರ್ಯಕ್ರಮದ ಪಠ್ಯಕ್ರಮದಲ್ಲಿರುವ ಕೋರ್ಸುಗಳ ಶೀರ್ಷಿಕೆಯಲ್ಲಿನ ಬದಲಾವಣೆ ಬಗ್ಗೆ.

ಉಲ್ಲೇಖ: ಪ್ರೊ. ಮೋನಿಕ ಸದಾನಂದ, ಅಧ್ಯಕ್ಷರು, ಪದವಿ ಮಟ್ಟದ ಫುಡ್ ನ್ಯೂಟ್ರಿಷಿಯನ್ ಆಂಡ್ ಡೈಟೆಟಿಕ್ಸ್ ಮತ್ತು ಸ್ನಾತಕೋತ್ತರ ಫುಡ್ ಸಾಯನ್ಸ್ ಆಂಡ್ ನ್ಯೂಟ್ರಿಷಿಯನ್ ಸಂಯುಕ್ತ ಅಧ್ಯಯನ ಮಂಡಳಿ ಇವರ ದಿನಾಂಕ ರಹಿತ ಪತ್ರ ಸಂ:110158/2022/MUREGACC

****

ಮೇಲಿನ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಉನ್ನತ ಶಿಕ್ಷಣ ಪರಿಷತ್ ರಚಿಸಿರುವ ಫುಡ್ ಸಾಯನ್ಸ್ ಆಂಡ್ ನ್ಯೂಟ್ರಿಷಿಯನ್ ಮತ್ತು ನ್ಯೂಟ್ರಿಷಿಯನ್ ಆಂಡ್ ಡೈಟೆಟಿಕ್ಸ್ ತಜ್ಞರ ಸಮಿತಿಯು ತಯಾರಿಸಿರುವ ಬಿ.ಎಸ್ಸಿ (ಫುಡ್ ನ್ಯೂಟ್ರಿಷಿಯನ್ ಆಂಡ್ ಡೈಟೆಟಿಕ್ಸ್) ಕಾರ್ಯಕ್ರಮದ ಪಠ್ಯಕ್ರಮವನ್ನು ಶೈಕ್ಷಣಿಕ ವರ್ಷ 2021-22 ನೇ ಸಾಲಿನ NEP ಬ್ಯಾಚ್ ಗೆ ಅಳವಡಿಸಿದ್ದು, 2022-23 ನೇ ಸಾಲಿನಲ್ಲಿ ಪಠ್ಯಕ್ರಮವನ್ನು ಪರಿಷ್ಕರಿಸಿರುವುದರಿಂದ ತೃತೀಯ ಮತ್ತು ಚತುರ್ಥ ಸೆಮಿಸ್ಟರ್ ಗಳಲ್ಲಿ ಕೋರ್ಸುಗಳ ಶೀರ್ಷಿಕೆಯಲ್ಲಿ ವ್ಯತ್ಯಾಸವುಂಟಾಗಿರುತ್ತದೆ. ಈ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ಉಲ್ಲೇಖಿತ ಪತ್ರದ ಕೋರಿಕೆಯಂತೆ 2021-22ನೇ ಸಾಲಿನ ಪ್ರ.ಸೆ.ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನ್ವಯವಾಗುವ HUMAN PHYSIOLOGY I ಕೋರ್ಸಿನ ಶೀರ್ಷಿಕೆಯನ್ನು HUMAN PHYSIOLOGY ಎಂದು ಮತ್ತು ಸದರಿ ಸಾಲಿನ ತೃತೀಯ ಸೆಮಿಸ್ಟರ್ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನ್ವಯವಾಗುವ HUMAN NUTRITION II ನ್ನು HUMAN NUTRITION ಎಂದೂ ಸರಿಪಡಿಸಿ ಅಂಕಪಟ್ಟಿ ನೀಡಲು ತಿಳಿಸಲಾಗಿದೆ.

ತಿದ್ದುಪಡಿ ಮಾಡಿರುವ ಪಠ್ಯಕ್ರಮವನ್ನು ವೆಬ್ ಸೈಟ್ ನಿಂದ ಪಡೆಯಲು ತಿಳಿಸಲಾಗಿದೆ.

(ಕರಡು ಕುಲಸಚಿವರಿಂದ ಅನುಮೋದಿಸಲ್ಪಟ್ಟಿದೆ)

ತಮ್ಮ ವಿಶ್ವಾಸಿ

ಕುಲಸಚಿವರ ಪರವಾಗಿ

ಪ್ರತಿ:

1. ಪ್ರಾಂಶುಪಾಲರು, ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ವ್ಯಾಪ್ತಿಗೊಳಪಟ್ಟ ಬಿ.ಎಸ್ಸಿ (ಫುಡ್ ನ್ಯೂಟ್ರಿಷಿಯನ್ ಆಂಡ್ ಡೈಟೆಟಿಕ್ಸ್) ಕಾರ್ಯಕ್ರಮವನ್ನು ಬೋಧಿಸುವ ಕಾಲೇಜುಗಳು.
2. ಪ್ರೊ. ಮೋನಿಕ ಸದಾನಂದ, ಅಧ್ಯಕ್ಷರು, ಪದವಿ ಮಟ್ಟದ ಫುಡ್ ನ್ಯೂಟ್ರಿಷಿಯನ್ ಆಂಡ್ ಡೈಟೆಟಿಕ್ಸ್ ಮತ್ತು ಸ್ನಾತಕೋತ್ತರ ಫುಡ್ ಸೈನ್ಸ್ ಆಂಡ್ ನ್ಯೂಟ್ರಿಷಿಯನ್ ಸಂಯುಕ್ತ ಅಧ್ಯಯನ ಮಂಡಳಿ ಮತ್ತು ಸ್ನಾತಕೋತ್ತರ ಜೀವ ವಿಜ್ಞಾನ ವಿಭಾಗ, ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮಂಗಳಗಂಗೋತ್ರಿ.
3. ಪ್ರೊ. ಹೆಚ್.ಎಲ್ ಶಶಿರೇಖಾ, ನೋಡಲ್ ಅಧಿಕಾರಿ, UUCMS, ಲೆಕ್ಚರ್ ಕಾಂಪ್ಲೆಕ್ಸ್, ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮಂಗಳಗಂಗೋತ್ರಿ.
4. ನಿರ್ದೇಶಕರು, DUIMS, ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮಂಗಳಗಂಗೋತ್ರಿ.

MANGALORE UNIVERSITY

B.Sc. (Basic and Hons.) in FOOD NUTRITION and DIETETICS (FND) 2021-22 (NEP)

CHOICE BASED CREDIT SYSTEM (CBCS)

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 the envisaging, designing and drafting a common syllabus with hallmark being multiple entry and exit points enabling horizontal and vertical mobility. This has now been adopted 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 Biotechnology
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
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 (3) NDT 1.3 Food Chemistry (3) NDP 1.1 Fundamentals of Nutrition (2) NDP 1.2 Human Physiology (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/NSS/R&R (S&G)/Cultural (1)	18+8
Exit option with Certificate in Nutrition and Dietetics (with a minimum of 48 credits)								
III	NDT 3.1 Lifespan Nutrition - I (3) NDT 3.2 Nutritional Biochemistry - I (3) NDT 3.3 Human Nutrition (3) NDP 3.1 Lifespan Nutrition - I (2) NDP 3.2 Nutritional Biochemistry - I (2)	OE 3 (3) NDT 3.2 Nutritional Assessment / Traditional foods and health	Languages (3+3)		**SEC-2** (2)	Phy. Ed. Sports (1)	NCC/NSS/R&R (S&G)/Cultural (1)	18+8
IV	NDT 4.1 Dietetics - II (3) NDT 4.2 Lifespan Nutrition - II (3) NDT 4.3 Quality Control I (3) NDP 4.1 Dietetics II (2) NDP 4.2 Lifespan Nutrition - 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/NSS/R&R (S&G)/Cultural (1)	18+8

*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 2021-22 (NEP)

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								
	NDT 1.3	Food Chemistry								
	NDP 1.1	Fundamentals of Nutrition	2P	3x2	3x2	2x20	2x30	2x50	2x2	4
	NDP 1.2	Human Physiology								
Open Elective Course	NDE 1.4	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	2x20	2x30	2x50	2x2	4
	NDP 2.2	Dietetics - I								
Open Elective Course	NDT 1.1	Food safety and hygiene	1T	3	3	40	60	100	3	3
										16

III 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	Lifespan Nutrition - I	3T	3x4	3x3	3x40	3x60	3x100	3x3	9
	NDT 1.2	Nutritional Biochemistry - I								
	NDT 1.3	Human Nutrition								
	NDP 1.1	Lifespan Nutrition - I	2P	3x2	3x2	2x20	2x30	2x50	2x2	4
	NDP 1.2	Nutritional Biochemistry - I								
Open Elective Course	NDE 1.4	Nutritional Assessment / Traditional foods and health	1T	3	3	40	60	100	3	3
									Total	**16**

IV 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 NDT 2.2 NDT 2.3	Dietetics - II Lifespan Nutrition – II Quality Control I	3T	3x4	3x3	3x40	3x60	3x100	3x3	9
	NDP 2.1 NDP 2.2	Dietetics - II Lifespan Nutrition – II	2P	3x2	3x2	2x20	2x30	2x50	2x2	4
Open Elective Course	NDT 1.1	Nutrition in weight management / Diet in life style disorder	1T	3	3	40	60	100	3	3
										16

BSc (Basic / Hons.) FND - I Semester
NDT 101: 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

- Guthrie AH (1986) Introductory Nutrition, 6th Ed., The CV Mosby Company
- Swaminathan M

(1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras

- Gopalan C (1991) Nutrition value of Indian foods, ICMR
- WTO Technical Reports Series for Different Nutrients.
- Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition,17th Ed., Macmillan Publ. Co.
- Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi
- Bamji M, Rao NP, Reddy V (1996) Text book of Human Nutrition, Oxford and IBH Publ. Co. PvtLtd, New Delhi
- Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi
- Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2005) Modern Nutrition in health anddisease – 10th Ed., Lippincott Williams and Wilkins
- Raheena Begum., (2009), A Text book of Food, Nutrition & Dietetics, Sterling Publications, New Delhi.
- Mudambi S R and Rajagopal M V., (2008), Fundamentals of Food, Nutrition and Diet Therapy by New Age International Publishers, New Delhi
- Srilakshmi. B., (2009), Human Nutrition, New Age International Publishers

NDT1.2: HUMAN PHYSIOLOGY (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: Homoeostasis 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 O_2: 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 (1996): Textbook of Medical Physiology, 9th Ed., Prism Books Pvt Ltd.,Bangalore
- Chatterjee CC (1988) Human Physiology, Calcutta, WB
- Wilson (1989) Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone
- Sembulingam

K, Sembulingam P (2012) Essentials of medical physiology, Jaypee Bros. Medical Publ., New Delhi

BSc FND - I Semester
NDT 1.3: FOOD CHEMISTRY (THEORY)

45 hrs - 4 hrs / week

Course Outcomes:
After successful completion of this course, students will be able to:
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:
At the end of the 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:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995
4. Potter, N.N. and Hotchkiss, J.H, Food Science, 5th Ed., Chapman & Hall, 1995
5. DeMan, J.M., Principles of Food Chemistry, AVI, New York, 1980
6. DeMan, J.M., Principles of Food Chemistry, 3rd Ed., Springer 1999
7. Desrosier, Norman W. and Desrosier., James N., The technology of food preservation, 4th Ed., Westport, Conn.: AVI Pub. Co, 1977.
8. Fuller, Gordon W, New Product Development from Concept to Marketplace, CRC Press, 2004.
10. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
11. Krishna Prasad Nooralabettu. 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 (2010) Foods - Facts and principles, New Age International Publ.,New Delhi
- Levies (1988) Food commodities, Heinemann Ltd., London
- Hughes and Benniion M (1970) Introductory Foods, Macmillan and Co, New York Dowell P, Bailey A (1980) The Book of ingredients, Dorling Kindersley Ltd., London
- Roseville LJ, Viera ER (1992) Elementary food science, 3rd Ed., Chapman and Hall, New YorkCharley H (1982) Food Science, 2nd Ed., John Wiley and Sons.
- Potter NN, Hotchkiss JH (1966) Food Science, 5th Ed, CBS Publisher and Distributors, Delhi
- Frazier WC, Westoff DC (1998) Food Microbiology 4th Ed., Tata Mc Graw Hill Publ. Co. Ltd
- Prescott SC, Proctor BE (1937) Food Technology, McGraw Hill
- Desroier NV (1963) The technology of food preservation, AVI Pub. Co
- Lal G, Siddappa GS, Tandon GL (1960) Preservation of food and vegetables, ICAR, New Delhi Manay NS, Shadaksharaswamy M (2010) Foods - Facts and principles, New Age International Publ., New Delhi

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 tables, Reference man and woman. Planning of balanced diet and approaches of assessing nutrient requirements. Food prescription.

Unit III (12 hours)
Planning diets of different activity levels for various income groups. Definition of nutritional care, interpersonal relationship with patient, Team approach to nutritional care, Diet prescription

UNIT IV (12 hours)
Routine hospital diets: Liquid diet, semi-solid, regular and bland diet. Modification of normaldiets. Types of feeding - oral feeding and tube feeding - enteral and parental

NDP 2.2 DIETETICS (PRACTICALS)

36 hrs - 3 hrs/week

Course Outcomes:
After successful completion of this course, students will be able to:
CO 1. Plan fluid diets
CO 2. Plan diets for metabolism related disorders
CO 3. Plan diet for febrile conditions
CO 4. Assess the modifications of normal diet for therapeutic purposes

1) Identification of food sources for various nutrients using food composition tables.
2) Collection of nutritional components of the various vegetables and fruits, fish, poultry and meat available.
3) Planning and preparation of meals for adults of different activity levels for various income groups.
4) Estimation of BMI and other nutritional status parameters
5) Planning, preparing and calculating of fluid diets (Two case studies)

REFERENCES

- Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982) Nutrition in health and disease, 17th Ed., JB Lippincott and Co., Philadelphia
- Antia FP (1973) Clinical dietetics and nutrition, 2nd Ed, Oxford Univ. Press, Delhi Williams SR (1989) Nutrition and diet therapy, 6th Ed, Time, Mirror, Mosby College Publ.
- Raheen Begum (1989) A textbook of foods, nutrition and dietetics, Sterling Publ., Delhi
- Joshi SA, (1992) Nutrition and dietetics, Tata McGraw Hill Publications, New Delhi
- Srilakshmi B (2011) Dietetics, 6th Ed., New Age International Publ., New Delhi

NDT 2.3 POST HARVEST TECHNOLOGY (THEORY)

45 hrs - 4 hrs / week

Course Outcomes:
After successful completion of this course, students will be able to:
CO 1. Comprehend the need for preservation and processing
CO 2. Understand the rationale behind processing leading to a final product with enhanced characteristics and shelf life.
CO 3. Evaluate the reactions and changes taking place during freezing and refrigeration
CO 4. Apply the methodologies of drying to preserve the harvest and turn it into multiple 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 (1998), Food Microbiology 4th Ed., Tata Mc Graw Hill Publ. Co. Ltd
- Desroier NV (1963) The technology of food preservation, AVI Pub. Co
- Lal G, Siddappa GS, Tandon GL (1960) Preservation of food and vegetables, ICAR, New DelhiPotter NN, Hotchkiss JH (1966) Food Science, 5th Ed., CBS Publisher and Distributors, Delhi Prescott SC, Proctor BE (1937) Food Technology, McGraw Hill
- Johnson R, Anderson MT (2012) Food Preservation,
- Manay NS, Shadaksharaswamy M (2010) Foods - Facts and principles, New Age International Publ.,New Delhi

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

1. Antia F.P., Philip Abraham, Clinical Dietetics and Nutrition, Oxford University Press; 4th edition.
2. Kathleen Mahan L., Sylnia Escott-Stump, Krause's food, nutrition and diet therapy (11th edition). Saunders company, London.
3. Passmore R. and Davidson S. (1986) Human nutrition and Dietetics. Liming stone publishers.
4. Robinson C.H. Careme, Chenometh W.L., Garmick A.E. (1986) 16th edition Normal Therapeutic nutrient, Mc Millan Company New York.
5. Shils M.E., Alfon J.A., Shike M (1994), Modern nutrition in health and diseases, 8th edition.
6. 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

1. Food Safety-Theory and Practice: Paul L. Knechtges, Jones & Bartlett Learning,2012
2. Food Hygiene and Sanitation With case studies, Sunetra Roday, 2 nd Edition, Tata McGraw Hill Education Pvt Ltd.,2011
3. Kirk, R.S and Sawyer, R.: Pearson's composition and analysis of foods, Longman Scientific and technical. 9 th Edition, England .1991
4. 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

Program Name	**B Sc Food Nutrition and Dietetics**	Semester	**Third Semester**
Course Title	**Life Span Nutrition I (Theory + Practical)**		
Course Code:	**DSC**	No. of Theory +Practical Credits	**3+2**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Comprehend the concept of a balanced diet
CO 2. Understand the role of nutrition in growth and development processes from birth till adolescence
CO 3. Formulate nutritional needs of people at different stages of growth
CO 4. Formulate diets for various nutrition-related health conditions

Content of Theory	**45 Hrs**
Unit–1	15
Basic principles of meal planning: Explanation of terms: Health, RDA, Adequate intake, Balanced diet. Food exchange list, food guide pyramid. Vegetarian diets - classification of vegetarianism. Quality of various nutrients - proteins, fats, minerals, vitamins, fibres and antioxidants. Principles of planning meals. Factors affecting meal planning	
Unit -2	15
Nutrition during infancy: Growth and development. Use of growth chart to monitor development. Advantages of breast feeding. Nutrition factors of human milk. Difference between human and animal milk. Artificial feeding. Factors to be considered in bottle feeding. Feeding problems. Nutritional requirements. Weaning: Need and use. Points to be considered in introducing weaning foods. Problems in weaning. Types of supplementary foods	
Unit -3	15
Nutritional needs for children: Pre School - Factors to be considered in planning meals for preschool children. Factors affecting nutritional status. Pica. Dietary guidelines. Nutritional requirements. Diet planning School children - Meal planning for school children. Feeding problems. School lunch programmes. Factors affecting feeding programmes. Nutritional requirements. Nutritional needs for adolescents: Special needs for girls during menarche - Food habits. Dietary guidelines. Nutritional problems- obesity, eating disorder, osteoporosis, anaemia, under nutrition, premenstrual syndrome, PCOD. Nutritional requirements.	

Pedagogy

Formative Assessment:

Assessment Occasion/ type	Weightage in Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

Course Title	**Life Span Nutrition I (Practical)**	Practical Credits	**2**

Content of Practical

Planning, preparing and calculating the major nutrients of the following (Two planned diets with different age groups)

1. Nutritive Recipes for weaning
2. Diet planning for Infancy- 6-8 months and 9-12 months
3. Use and interpretation of Growth Charts- WHO Growth Charts
4. Diet planning for Toddlers- (1-3 years)
5. Diet planning for Preschool Child- (4-6 years)
6. Diet planning for School going Child-(7-9 years and 10-12 years)
7. Nutritive Recipes for snacks and packed lunches
8. Diet planning for Adolescents (13-15 years and 16-18 years)

Pedagogy

Formative Assessment

Assessment Occasion/ type	Weightage in Marks
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
Total	**25 Marks**

References

- Elizabeth, K. E. (2022). Nutrition and child development,6th Ed., Paras Medical Publisher, Hyderabad.
- Joshi AS. (2021). Nutrition and Dietetics, 5th Ed. McGraw Hill, Noida
- Srilashmi B. (2019). Dietetics, 8th Ed., New Age International Publishers., New Delhi

- Mudambi SR, Rajgopal MV. (2020). Fundamentals Of Foods, Nutrition And Diet Therapy, 6th Ed.,New Age International Publishers., New Delhi
- Agarwal A, Udipi SA. (2013). Textbook Of Human Nutrition., 1st Ed., Jaypee Brothers Medical Publishers, New Delhi
- Mahan K L, Escott-Stump S (2012) Krause's Food and the Nutrition Care Process, 13th Ed., Elsevier, Missouri
- Mclaren DS, Meguid MM (1998) Nutrition and its disorders, Churchill Livingstone
- Gopalan C (1993) Recent trends in nutrition, 9th Ed., Oxford Univ. Press
- Ghosh (1992) The feeding and care of infants and young children, VHAI, 6th Ed., New Delhi
- Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras
- WHO (1978) A growth chart for international use in maternal and child health care, Geneva

Program Name	**B Sc Food Nutrition and Dietetics**	Semester	**Third Semester**
Course Title	**Nutritional Biochemistry I (Theory + Practical)**		
Course Code:	**DSC**	No. of Theory +Practical Credits	**3+2**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Understand the principles of biochemistry (as applicable to human nutrition).
CO 2. Obtain an insight into the chemistry of major nutrients and physiologically important compounds.
CO 3. Comprehend the biological processes and systems as applicable to human nutrition.
CO 4. Apply the knowledge acquired to human nutrition and dietetics

Content of Theory	**45 Hrs**
Unit–1	15
Carbohydrates: Nomenclature, Classification of carbohydrates – monosaccharides, oligosaccharides, polysaccharides – examples and structure. Metabolism – Glycolysis, TCA cycle, HMP Shunt, Glycogenesis, Glycogenolysis. Carbohydrate digestion and absorption. Importance of carbohydrates. Biological oxidation and enzymes: Compounds of ETC, mechanism, oxidative phosphorylation, high energy phosphate – ATP-ADP cycle and energy conservation.	
Unit -2	15

Lipids: Nomenclature, Classification of simple lipids – fats, oils, waxes. Complex lipids – phospholipids, glycolipids. Derived lipids – steroids, terpenes, carotenoids with examples, structure and function Digestion and absorption. Fatty acids – classification – essential and non-essential fatty acids, examples, properties, functions. Metabolism – β-oxidation of saturated fatty acids. Biosynthesis and catabolism of cholesterol

Unit -3	15
Enzymes: Definition, nomenclature, types and classification of enzymes. Active site. Definition, types of coenzymes, specificity of enzymes. Isoenzymes, enzyme kinetics, factors affecting velocity of enzymes catalysed reactions. Regulation of enzyme activity, enzyme inhibition	

Pedagogy

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

Course Title	**Nutritional Biochemistry - I (Practical)**	Practical Credits	**2**

Content of Practical

1. Qualitative analysis for carbohydrates - Glucose, Fructose, Maltose, Lactose, Sucrose,Starch and Galactose
2. Quantitative analysis in blood and serum - Blood glucose
3. Quantitative analysis in blood and serum - Cholesterol
4. Quantitative analysis in blood and serum - Urea
5. Enzymes – effect of pH on human salivary α-amylase activity
6. Qualitative test for minerals
7. Quantitative estimation of Ascorbic acid using any two different samples
8. Preparation of ash solution
9. Quantitative estimation of Calcium using any two different samples
10. Quantitative estimation of Phosphorus using any two different samples
11. Quantitative estimation of Iron using any two different samples
12. Estimation of Calcium from types of milk

Pedagogy

Formative Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
Total	**25 Marks**

References

- Sathyanarayana U, Chakrapani U. (2021) Biochemistry, Elsevier, Gurgaon
- Jain JL (2012), Fundamentals of Biochemistry, S. Chand and Company Ltd.
- Das, D (2005) Biochemistry, 12th Ed., Academic Publishers, Kolkata
- Stryer L (1995) Biochemistry, Freeman WH and Co.
- West ES, Todd WR, Mason HS, Van Bruggen JT (1974) Text book of Biochemistry, 4th Ed., Amerind Publ. Co. Pvt. Ltd.,
- Lehninger AL, Nelson DL, Cox MM (1993) Principles of Bio Chemistry, 2nd Ed., CBS Publ., anddistributors.
- Devlin TM (1986) Textbook of Biochemistry with clinical correlations, 2nd Ed., John Wiley & Sons.

Program Name	**B Sc Food Nutrition and Dietetics**	Semester	**Third Semester**
Course Title	**Human Nutrition (Theory)**		
Course Code:	**DSC**	No. of Theory Credits	**3**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Understand the functions and sources of nutrients
CO 2. Apply the knowledge in maintenance of good health for individual and the community.
CO 3. Evaluate factors affecting availability and requirements of minerals and vitamins
CO 4. Assess the role of water and fibre in nutrition

Content of Theory	45 Hrs
Unit–1	15
Macro minerals: Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and Sulphur-functions, sources, requirements and effects of deficiency, Bioavailability	
Unit -2	15
Micro minerals: Copper, Cobalt, Zinc, Iodine, Manganese, Fluorine, Molybdenum, Selenium, Chromium, Iron-functions, sources, requirements and effects of deficiency, Bioavailability	
Unit -3	15
Vitamins: Classification on the basis of solubility, Vitamin A, D, E, K, Ascorbic acid, Thiamine, Riboflavin, Niacin, Folic acid, Vitamin B12, Pantothenic acid, Pyridoxine- functions, sources, absorption, requirements and deficiency Water: Importance, distribution in the body, functions, oedema, dehydration, sources, water balance and requirements. Fibre: Definition, classification, sources and role of fibre in humannutrition	

Pedagogy

Formative Assessment:

Assessment Occasion/ type	Weightage in Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

References

- WTO Technical Reports Series for Different Nutrients.
- Srilakshmi B (2015) Nutrition science - 4th Ed., New Age International Publ., New Delhi
- Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros Medical Publ., New Delhi
- Bamji M, Rao NP, Reddy V. (2007) Text book of Human Nutrition, Oxford and IBH Publ. Co. Pvt Ltd, New Delhi

- Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2005) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins
- Gopalan C (1991) Nutrition value of Indian foods, ICMR
- Guthrie AH (1986): Introductory Nutrition, 6th Ed., The CV Mosby Co.
- Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition,17th Ed., Macmillan Publ. Co.
- Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras.

Program Name	**B Sc Food Nutrition and Dietetics**	Semester	**Fourth Semester**
Course Title	**Dietetics II (Theory + Practical)**		
Course Code:	**DSC**	No. of Theory +Practical Credits	**3+2**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After successful completion of this course, students will be able to:

CO 1. Understand the principles of diet therapy for various ailments and diseases
CO 2. Work out the modifications of normal diet for therapeutic purposes
CO 3. Assess food allergies, intolerance and nutrient-drug interactions for appropriate dietetics approaches
CO 4. Evaluate nutritional requirements for deficiencies and develop suitable dietary treatments

Content of Theory	**45 Hrs**
Unit–1	15
Diet in burns injury and surgery conditions: Burns- definition, classification, complications: Dietary management - objectives, macronutrients, micronutrients, general considerations. Injury/ Trauma- definition. Metabolic, physiological and hormonal response to Injury: Dietary management - objectives, macronutrients, micronutrients, general considerations. Surgery- definition. Metabolic, physiological and hormonal response to surgery: Dietary management - objectives, preoperative and postoperative nutritional care, macronutrients, micronutrients, general considerations	
Unit -2	15
Gastro-intestinal tract ailments: Diarrhoea- definition, classification, consequences. Treatment of diarrhoea- Fluid management- Oral Rehydration Therapy (ORT). Dietary management - objectives, macronutrients, micronutrients, general considerations, low residue and low fiber foods. Definition, symptoms, classification, complications and dietary management - objectives, macronutrients, micronutrients, general considerations, foods allowed and not allowed for the following: Constipation, Gastro Oesophageal Reflux Disease (GERD), Gastritis- acute and chronic, Peptic ulcer, Irritable bowel syndrome, Steatorrhoea, Ulcerative colitis, Diverticulosis. Food intolerance: Definition, causative factors, diagnosis, treatment – elimination diet. Lactose intolerance symptoms, causative foods and stages according to severity, foods included and excluded, nutritional treatment. Gluten intolerance – symptoms, dietary treatment, foods included and excluded, nutritional treatment. Nutrient- drug interaction	
Unit -3	15
Food Allergy: Definition, types of allergy, common food as allergens. Signs and Symptoms, tests for allergy. Dietetic treatment. Nutritional deficiency: Protein – energy malnutrition- aetiology, types, symptoms, dietary treatment and prevention, hospital treatment, domiciliary rehabilitation. Aetiology, clinical features, dietary treatment	

and prevention, prophylaxis programmes of the following: Iodine Deficiency disease and Vitamin A deficiency. Nutritional Anaemia - Aetiology, clinical features, types, dietary treatment and prevention of the following: Iron deficiency Anaemia / Disorder (IDD), Megaloblastic Anaemia, Folate Deficiency, Pernicious Anaemia

Pedagogy

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

Course Title	**Dietetics II (Practical)**	Practical Credits	**2**
Content of Practical			
Planning, preparing and serving the following diets (two case studies) 1. Bu rns 2. Co nstipation 3. Pe ptic ulcer 4. Pr otein deficiency 5. Iro n deficiency 6. Vit amin A deficiency			

Pedagogy

Formative Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	05
Test 2	05

Practical Record	10
Participation and Involvement	05
Total	**25 Marks**

References

- Srilakshmi B (2011) Dietetics, 6th Ed, New Age International Publ., New Delhi
- Joshi SA, (1992) Nutrition and dietetics, Tata McGraw Hill Publications, New Delhi
- Mahan LK, Arlin MT (1992) Krause's Food, Nutrition and Diet Therapy, 8th Ed., W.B Saunders Company, London
- Williams SR (1989) Nutrition and diet therapy, 6th Ed., Time, Mirror, Mosby College Publ.St Louis
- Raheen Begun (1989) A textbook of foods, nutrition and dietetics, Sterling Publ., New Delhi
- Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition, 17th Ed, Macmillan Publ and Co.
- Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982): Nutrition in health and disease, 17th Ed., JB Lippincott and Co., Philadelphia
- Antia FP (1973) Clinical dietetics and nutrition, 2nd Ed., Oxford Univ. Press, Delhi

Program Name	**B Sc Food Nutrition and Dietetics**	Semester	**Fourth Semester**
Course Title	**Life Span Nutrition II (Theory + Practical)**		
Course Code:	**DSC**	No. of Theory +Practical Credits	**3+2**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After successful completion of this course, students will be able to:

CO 1. Understand the process of growth and development and the concept of growth promotion
CO 2. Comprehend nutritional needs at different stages of growth.
CO 3. Evaluate nutritional needs during pregnancy and lactation
CO 4. Apply nutritional requirements for the aged taking their physiology into account

Content of Theory	**45 Hrs**
Unit–1	15

Nutritional needs of adults: Reference man and reference woman in relation to occupation. Dietary guidelines to reduce the cost of a meal. Nutritional requirements.	
Unit -2	15
Nutrition during pregnancy: Normal growth and weight gain. Physiological changes. Dietary modifications. General dietary problems. Complications during various stages of pregnancy. Nutritional requirements. Diet planning Nutritional needs during lactation: Physiology of lactation. Milk output and factors affecting it. Dietary guidelines. Nutritional requirements. Diet planning	
Unit -3	15
Nutritional needs during old age: Physiological changes, RDA, Nutritional guidelines, nutritional, health concerns & complications and their management. Dietary modifications. Factors contributing to longevity	

Pedagogy

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

Course Title	**Life span Nutrition - II (Practical)**	Practical Credits	**2**
Content of Practical			
Planning, preparing diets and calculating the major nutrients of following (Standard with two planned diets of different calories and activities) 1. Adult 2. Pregnancy 3. Lactation 4. Old age			

Pedagogy

Formative Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	05
Test 2	05

Practical Record	10
Participation and Involvement	05
Total	**25 Marks**

References

- Elizabeth, K. E. (2022). Nutrition and child development,6th Ed., Paras Medical Publisher, Hyderabad.
- Joshi AS. (2021). Nutrition and Dietetics, 5th Ed. McGraw Hill, Noida
- Srilashmi B. (2019). Dietetics, 8th Ed., New Age International Publishers., New Delhi
- Mudambi SR, Rajgopal MV. (2020). Fundamentals Of Foods, Nutrition And Diet Therapy, 6th Ed.,New Age International Publishers., New Delhi
- Agarwal A, Udipi SA. (2013). Textbook Of Human Nutrition., 1st Ed., Jaypee Brothers Medical Publishers, New Delhi
- Srilakshmi B (2011) Dietetics, 6th Ed., New Age International Publ., New Delhi
- Mclaren DS, Meguid MM (1998) Nutrition and its disorders, Churchill Livingstone
- Gopalan C (1993) Recent trends in nutrition, 9th Ed., Oxford Univ. Press
- Ghosh (1992) The feeding and care of infants and young children, VHAI, 6th Ed., New Delhi
- Swaminathan M (1985) Essentials of food and nutrition, Vol I and II, Ganesh and Co, Madras
- WHO (1978) A growth chart for international use in maternal and child health care, Geneva

Program Name	**B Sc Food Nutrition and Dietetics**	Semester	**Fourth Semester**
Course Title	**Quality Control I (Theory)**		
Course Code:	**DSC**	No. of Theory Credits	**3**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO 1. Understand international and national food laws, regulations and standards governing the safety of the food from field to fork

CO 2. Able to locate and interpret government regulations regarding the manufacture and sale of food products.

CO 3. Describe the use of adulterants added to foods

CO 4. Discuss the application of biotechnological techniques and evaluate packaging requirements of diverse foods

Content of Theory	**45 Hrs**
Unit–1	15

Food Laws: PFA - Mode of work and duties of food inspectors. Essential commodities act: fruit product order, milk and milk product order, meat product order, cold storage order, the vegetable oil product order, standard and weight measurement act, the infant milk substitute, feeding bottles and infant food act.	
Unit -2	15
Food standards: ISI, AGMARK, Export inspection council, consumer protection act, CODEX Alimentarius, FSSAI. HACCP - Importance. Principles. Determination of CCP. Problems in implementing HACCP. Importance of TQM, GMP and GLP Adulteration of food: Definition. Types. Contamination of food by incidental adulteration by microorganisms, packing materials and other sources. Tests to detect common adulterants	
Unit -3	15
Food technology: Biotechnology in food: Application, GM foods. Nutraceuticals. Organic foods. Packaging of foods: Classification, types of packaging materials – paper, plastics, glass, tins and metals, packaging of different food products – bakery, dairy, dehydrated, fresh fruits and vegetables, fats and oils, frozen food products	

Pedagogy

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

References

- Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India
- Manay SN, Shadaksharaswamy M. (2001), Eds. Foods, Facts and Principles. 3rd edition, New Age International. New Delhi.
- Martin EH (1986) Standard methods for the examination of dairy products
- Ranjanna S (1985) Handbook of analysis and quality control for fruit and vegetable products
- Lees R (1978) Food analysis, analytical and quality control methods for food manufacturers and buyers
- Keister DC (1977) Food and beverage control, Prentice Hall Inc, New Jersey
- Coltman MM (1977) Food and beverage cost control, Prentice Hall Inc, New Jersey
- Kotas R (1973) An approach to food costing, Nelson Thornes, London

Open Electives Syllabus as per requirement may be obtained from KSHEC website

MODEL QUESTION PAPER

B.Sc. DEGREE EXAMINATION – MONTH, YEAR
I Semester B.Sc. Food Nutrition and Dietetics (Basic and Hons.) Theory

(CODE NO): TITLE OF THE COURSE

Time: 2 Hours Max. Marks: 60

I. Write short notes on any TEN of the following: 2x10=20

1-12

II. Write explanatory notes on any FIVE of the following questions: (4x5=20)

1-7

III. Write essays on any TWO of the following: (10x2=20)

1-4

Ensure equal distribution from all Units

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: a. b.	2×2.5=5 marks
V. Viva.	5 marks
VI. Record.	5 marks

****