



BENGALURU CITY UNIVERSITY

CHOICE BASED CREDIT SYSTEM

(as per SEP 2024)

Syllabus for I & II Semester

BA/B.Sc. Home Science

B.Sc. Nutrition & Dietetics

B.Sc. Clinical Nutrition

2024-25

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Structure of B.A/ B.Sc. Home Science

As one

Discipline Major

(Model II)

Curriculum for BA/BSc -Home Science as one Major (Model II)

Name of the Degree Program: BA/BSc

Discipline Core: Home Science Total Credits for the Program: 125 Credits

Starting year of implementation: 2024-25

Program Outcomes:

By the end of the program the students will be able to:

1. Deliver quality tertiary education through learning while doing.
2. Reflect universal and domain-specific values in Home Science.
3. Involve, communicate and engage key stakeholders.
4. Preaching and practice change as a continuum.
5. Develop the ability to address the complexities and interface among self, societal and national priorities.
6. Generate multi-skilled leaders with a holistic perspective that cuts across disciplines.
7. Instill both generic and subject-specific skills to succeed in the employment market.
8. Foster a genre of responsible students with a passion for lifelong learning and entrepreneurship.
9. Develop sensitivity, resourcefulness, and competence to render service to families, communities, and the nation at large.
10. Promote research, innovation, and design (product) development favoring all the disciplines in Home Science.
11. Enhance digital literacy and apply them to engage in real time problem solving and ideation related to all fields of Home Science.
12. Appreciate and benefit from the symbiotic relationship among the five core disciplines of Home Science – Resource Management, Food Science and Nutrition, Textiles and Clothing, Human Development and Family Studies and Extension and Communication

Assessment:

Weightage for assessments (in percentage)

Type of Course	Formative Assessment / IA	Summative Assessment
Theory	20	80
Practical	10	40

SEMESTER 1

NUTRITION AND MEAL MANAGEMENT

Code : HSCT1.1

Hours: 52

Instruction hrs./week:04

Total Marks :100

Theory:80

Internal Assessment:20

Program Outcomes:

1. To understand the functions of food and role of various nutrients
2. To understand the practical guidelines for dietary needs of human nutrition at different stages of life.

Content	52 Hrs.
Unit – 1 Introduction	13 hours
Chapter 1- Introduction to Nutrition a) Definition of Nutrition, Malnutrition, EAR, and Health. b) Functions of food, Food group, My plate & Balanced diet.	6 Hrs.
Chapter 2-Methods of Cooking - Advantages and disadvantages of a) Water–Boiling, steaming, pressure cooking b) Oil/Fat–Shallow frying, deep frying c) c) Air– Baking	7 hrs.
Chapter 3-Water & Energy a) Water–Functions, sources and water balance b) Energy- definition, BMR , factors affecting BMR	
Unit - 2 Macro & Micro Nutrients	13 hours
Chapter 4-Nutrients Macro and Micronutrients-classification, Sources, functions and deficiency. A) Carbohydrates B) Proteins C) Fats	8 hrs.

<p>Chapter 5-Minerals Calcium, Iron, Iodine</p> <p>Vitamins –</p> <ul style="list-style-type: none"> A) Fat soluble vitamins A, D, E & K B) Water soluble vitamins – vitamin C and vitamin B complex (Thiamine, Riboflavin, Niacin) 	<p>5 hrs.</p>
<p>Unit – 3 Meal planning and Diet therapy</p>	<p>13 hours</p>
<p>Chapter 6 -Meal planning</p> <ul style="list-style-type: none"> a) Steps in meal planning b) Determinants of food choice <p>Chapter 7 -Diet therapy</p> <ul style="list-style-type: none"> a) Routine hospital diets –Clear, full fluid, soft and bland diet. b) Dietary guidelines for: Underweight, Obesity, Diarrhea, Constipation. 	<p>3 hrs.</p> <p>10 hrs.</p>
<p>Unit 4: Nutrition Through Life Cycle</p>	<p>13 hours</p>
<p>Chapter 8-Nutrition through lifecycle</p> <ul style="list-style-type: none"> a) Indian reference Man and Woman b) Dietary guidelines: Adulthood, Pregnancy, Lactation. c) Infancy– Complementary feeding, Pre-school, Adolescence, Old age 	<p>5hrs</p> <p>6 hrs</p>

Pedagogy

Formative Assessment = 20 marks	
Assessment	Weightage in Marks
Test 1	10
Assignment + Project	5 + 5
Total	80 marks (SA) + 20 marks = 100 marks

PRACTICAL

Code: HSCP1.1

No. of Classes: 14

Hours/Week:03

TotalMarks:50

Practical:40

InternalAssessment:10

1. Weights and Measures **2 classes**
2. Methods of Cooking: **3 classes**
 - a. Boiling
 - b. Pressure Cooking
 - c. Frying–Shallow/Deep Fat
 - d. Baking
3. Identification of Nutrient rich foods **2 classes**
4. Planning and preparation of Macronutrient rich recipes **3 classes**
 - a. Energy
 - b. Protein
5. Planning and preparation of Micronutrient rich recipes **4 classes**
 - a. Iron
 - b. Calcium

References:

1. SrilakshmiB,(2007),Dietetics.New Age Internationalpublishers.NewDelhi
2. SrilakshmiB,(2002),NutritionScience.NewAgeInternationalpublishers. NewDelhi
3. SwaminathanM.(2002),AdvancedTextbookonfoodandNutrition.VolumeI.Bappco.
4. Gopalan, C, Rama Sastry B.V., and S.C.Balasubramanian (2009), Nutritive value of IndianFoods.NIN-. ICMR.Hyderabad.
5. MudambiSR andRajagopalM V,(2008),Fundamentals ofFoods,Nutrition &diettherapybyNew AgeInternational Publishers, New Delhi

<p>Chapter 3 Neonate Physical characteristics, reflexes-grasping, Moro, sucking, palmar, tonic neck reflex. Adjustments of the neonates, sensory capacities.</p>	8 hrs.
<p>Chapter 4 Infancy Characteristics, developmental tasks, physical, motor, social, cognitive and Emotional. Breast feeding, weaning, supplementary foods, immunization.</p>	5 hrs.
Unit – 3 Childhood & Adolescence	13 hours
<p>Chapter 5-Early Childhood Characteristics, developmental tasks, physical, motor, social, Cognitive, emotional and language development.</p>	3 hrs.
<p>Chapter 6 -Late Childhood &Adolescence Late Childhood-Characteristics, developmental tasks, physical, motor, social, cognitive, emotional and language development Interests, Influence of peer group. Adolescence - Characteristics, developmental tasks, physical changes, puberty, primary and sexual characteristics, social, emotional, cognitive development and identity formation. Interests and problems of adolescents, sexual health education.</p>	10 hrs.
Unit 4: Adulthood	13 hours
<p>Chapter 7-Early Adulthood Characteristics and developmental tasks, physical social, cognitive, emotional and moral development.</p>	5hrs
<p>Chapter 8- A) Middle Adulthood – Characteristics and developmental tasks, Physical, physiological and socio-emotional changes. Adjustments in middle age. B) Late Adulthood – Characteristics and developmental tasks, physical, physiological, social and emotional changes; decline in cognitive abilities; Adjustments, problems faced by the elderly, Retirement.</p>	8hrs

Pedagogy

Formative Assessment = 20 marks	
Assessment	Weightage in Marks
Test 1	10
Assignment + Project	5 + 5
Total	80 marks (SA) + 20 marks = 100 marks

PRACTICAL

Code: HSCP2.1

Number of Classes:14

Hours per week:3

TotalMarks:50

Practical:40

InternalAssessment:10

1. Prepare an album on the stages of prenatal development **3 classes**
2. Planning and preparing of weaning foods. **4 classes**
3. Develop an activity to foster cognitive development in school children **3 classes**
4. Prepare a visual aid to create awareness on any one problem among adolescents. **3 classes**
5. Visit to an old age home. **1 class**

References:

1. Baradha.G 'Basics of Human Development' Sarada Laya Press, Sri Avinashilingam Education Trust Institutions, Coimbatore2008.
2. Hurlock. Elizabeth 'Developmental Psychology– A Life Span Approach' Tata McGraw Hill Publications, New Delhi Latest Edition.
3. Santrock. John (2015) 'A topical approach to lifespan development', Tata McGraw Hill company, Delhi.
4. Suryakanthi .A.(2015)'Child Development' Kavitha Publications, Gandhi gram,TamilNadu.

**STRUCTURE OF
B.SC. NUTRITION AND DIETETICS
AS ONE
DISCIPLINE MAJOR**

(Model II)

SEMESTER 1

FUNDAMENTALS OF NUTRITION

Code : NDT 1.1

Hours:52

Instruction hrs./week: 04

Total Marks:100

Theory: 80

Internal Assessment:20

Content	52Hrs
Unit – 1 Introduction to Nutrition	13hours
Concept of nutrition - nutrients, nutritional status, malnutrition, balanced diet & health Functions of food, Food groups, Food pyramid - Indian and USDA, My plate Preliminary preparation of food, Methods of enhancing nutritive value Methods of cooking - Boiling, Steaming, Pressure cooking, Shallow frying, Deep fat frying, Baking, Water: Functions, sources and water balance	
Unit - 2 Macronutrients	13 hours
Classification, Sources, Functions and Deficiency of Carbohydrates, Proteins and Fats	
Unit - 3 Energy Metabolism	13 hours
Significance, components, factors influencing body composition, energy metabolism, BMR Measurement methods - Direct and Indirect, Energy expenditure in activities Influence of energy excess & deficit on body composition - obesity and under nutrition	

Unit – 4 Micronutrients - Sources, Functions and Deficiency	13 hours
Minerals: Calcium, Phosphorous, Iron, Iodine, Zinc Fat soluble vitamins (Vitamin A, D, E, K) Water soluble vitamins (B complex vitamins: Thiamine, Riboflavin, Niacin, Folic acid and Vitamin C)	

Pedagogy

Formative Assessment = 20 marks	
Assessment	Weightage in Marks
Test 1	10
Assignment + Project	5 + 5
Total	80 marks (SA) + 20 marks = 100 marks

PRACTICAL

Code: NDP1.1
Number of weeks: 14
Hours per week: 3

Total Marks: 50
Practical: 40
Internal Assessment: 10

1. Weights and measures
2. Standardization of recipes
3. Methods of cooking
 - a. Water – boiling, steaming, pressure cooking
 - b. Oil- Shallow frying, deep frying
 - c. Baking
4. Identification of nutrient rich foods- protein iron ,vitamin A, Calcium

REFERENCES

1. Raheena Begum., (2009), A textbook of Food, Nutrition & Dietetics, Sterling Publications, New Delhi.
2. Mudambi S R and Rajagopal M V., (2008), Fundamentals of Food, Nutrition and Diet Therapy by New Age International Publishers, New Delhi
3. Srilakshmi. B., (2009), Human Nutrition, New Age International Publishers

SEMESTER 2

PRINCIPLES OF FOOD SCIENCE & PRESERVATION

Code: NDT2.1

Hours:5

Instruction hrs./week:04

Total Marks:100

Theory:80

Internal Assessment:20

Course Outcomes (COs):

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

UNIT-1 Introduction to Food Science	13 hrs.
Concepts of food science: (a) Colloids - sols, gels, foam and emulsion (b) Bound and free water (c) pH Value (d) Properties of water- osmosis and osmotic pressure, Boiling, melting and freezing points (e) Sensory Evaluation- Subjective and objective. Cereals & Millets- importance, composition & types of cereals and millets Starch – Types, effect of cooking, Gelatinization, Retrogradation and Dextrinization Malting, non-enzymatic reactions, Leavening agents Pulses- composition, toxic constituents and cooking of pulses, variety and processing	

Unit – 2 Fruit, Vegetable, Milk and Egg cookery	13 hours
<p>Fruits and vegetables – Classification, Composition, Pigments, flavors, changes during cooking and enzymatic browning.</p> <p>Milk and milk products- composition, storage, processing of milk, coagulation & Milk products</p> <p>Egg- structure, composition, storage, quality & grading, role of egg in food preparation, coagulation.</p>	
Unit – 3 Sugar, Oil & fats and fleshy food cookery	13 hours
<p>Sugar, Jaggery and honey - Composition, sugar and related products, Behaviors of syrups at different temperatures, Crystallization and caramelization.</p> <p>Oil and Fats- Composition, storage, Refining and processing – Hydrogenation, plasticity, winterization & shortening of fats. Effect of heating, Rancidity, Specific fat (Lard, Butter, Margarine)</p> <p>Fleshy foods</p> <p>Meat - Structure of meat, composition, Storage, postmortem changes in meat, Curing of meat, Tenderization, Aging of meat, Grading.</p> <p>Fish and poultry- Composition, preservation & storage</p>	
Unit – 4 Food Preservation	13 hours
<p>Food laws and standards – General principles of food safety, BIS, AGMARK</p> <p>Food Preservation, food spoilage</p> <p>Method of preservation by:</p> <p>a) low temperature b) high temperature c) dehydration</p> <p>d) food irradiation</p>	

Pedagogy

Formative Assessment = 20 marks	
Assessment	Weightage in Marks
Test 1	10
Assignment + Project	5 + 5
Total	80 marks (SA) + 20 marks = 100 marks

PRACTICAL

Code:NDP2.1

Number of Classes:14

Hours per week:3

TotalMarks:50

Practical:40

InternalAssessment:10

List of Experiments to be conducted:

1. Starch cookery I - microscopic observation of different starches gel formation and gelatinization.
2. Starch cookery II- Rice cookery, gluten formation, leavened & unleavened products.
3. Pulse and legume cookery – Sprouting & effect of added substance.
4. Fermented products
5. Milk cookery – casein formation and curd setting.
6. Vegetable cookery- Effect on pigments and enzymatic browning in fruits and vegetables
7. Egg cookery
8. Fat and oil cookery.
9. Sugar and Jaggery- Syrup formation, crystallization and caramelization.
10. Sensory evaluation.

References

1. Arora K., Gupta K.V., Theory of cooking
2. Bennen Marion. Introductory foods
3. Lavies. (1998) Food commodities. Heinemann Ltd, London
4. Lowe Bella Experimental cookery

5. Norman N Potter, Joseph H Hotchkiss (1999) Food science Technology
6. Peckham. Foundation of food preparation
7. Srilakshmi. Food Science. New Age International Publishers, New Delhi.
8. Sari Edelstein, 2014, Food Science-An ecological approach, Jones & Bartlett Learning, MA

STRUCTURE OF
B.Sc. CLINICAL NUTRITION AND DIETETICS
(Model IV)

**B.Sc. Clinical Nutrition and Dietetics
SEMESTER 1**

Course Title: PRINCIPLES OF NUTRITION DSC-1	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:20	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 80

CONTENT	45Hrs
Unit-1 INTRODUCTION	15Hrs

Understanding terminologies:

Food, nutrition, health, nutrients, nutritional status, malnutrition-under nutrition over nutrition and optimum nutrition, diet, diet therapy, therapeutic nutrition, kilocalorie, joule, diet diversity, body mass index, daily values, nutrient density.

Methods of determining human nutrient need

Food and nutrient requirements:

Guidelines and Recommendations, development of National Nutritional Requirements, translation of nutritional requirements into Dietary Guidelines. food group system, functions of food Physiological, Psychological and Social factors affecting food intake and food habits, Recommended Dietary allowance (RDA), General Principles of Deriving RDA, Use of Recommended Dietary Allowances (RDAs), Limitations of RDAs, Balanced diet, use of Food exchange list. Food pyramid, my plate, basic of menu planning for family.

Unit – 2 ENERGY	15Hrs
<p>Definition, units of energy, energy value of food. Components of energy requirement, factors affecting energy requirements, methods of measuring energy expenditure. RMR, Physical Activity Level (PAL), BMR, factors affecting B.M.R, determination of BMR by calculation (Harris Benedict). Energy needs of the body (reference man and reference woman), Energy requirement during work, thermic effect of food, SDA.</p> <p>Human body composition – Methods of assessment (direct and indirect), Changes in body composition during life cycle. Factors affecting body composition: body weight and physical activity</p>	
Unit – 3 FOOD PREPARATION AND HEALTH	15Hrs
<p>Selection of foods, preliminary preparation of food, principles of cooking, methods of cooking - Boiling, Steaming, Pressure cooking, Microwave oven, Frying (shallow, deep fat), Smoking point of oil, Combination method, methods of cooking: advantages and disadvantages. Effect of cooking on nutritive value, methods of enhancing nutritive value</p> <p>Nutrition and Health- Inter-relationship between food, nutrition, and health. Food choices – nutrients and nourishment, cognitive and environmental influences. Nutrient and food guides for health promotion. Balanced diet-definitions and its importance</p>	

Formative Assessment = 20 marks	
Assessment Occasion / type	Weightage in Marks
Test 1	10

Assignment + Project	5 + 5
Total	80 marks(SA) + 20 marks = 100 marks

Practical –2Credits

No of classes -12

1. Identification of foods under food groups.
2. Study of My plate and Food Pyramid
3. Weights and measures of common food (Raw and cooked weight)
4. Cooking methods – Planning and Preparing of recipes by
 - a. Boiling,
 - b. Steaming,
 - c. Pressure cooking,
 - d. Microwave cooking
 - e. Frying (shallow, deep fat), Smoking point of oil
 - f. Combination method
5. Identifying food composition table and Usage food exchange list
6. Calculation of energy requirement and energy expenditure for an adult man
7. Calculation of energy requirement and energy expenditure for an adult woman

REFERENCES

1. Mudambi S R and Rajagopal M V, (2008), Fundamentals of Foods, nutrition & Diet therapy by new age international publishers, New Delhi
2. Srilakshmi B, (2002), nutrition science. New Age International publishers. New Delhi.
3. Shubhangaini A Joshi, (2010), Nutrition and Dietetics, with Indian case studies, Tata McGraw-Hill, New Delhi
4. Bamji, M.S, Reddy, V. (1998), Textbook of Human Nutrition, Oxford & IBH Publishing Co, New Delhi. Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Blackwell SciencePublishing Co.
5. Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillan Pub. Co. New York.
6. Swaminathan, M. (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.
7. Guthrie, H.A & Picciano, M.F (1995), Morby Publishing Co, New York.
8. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, New Delhi
9. Williams- Basic nutrition and Diet therapy, Elsevier 12thedition

**B.Sc. -Clinical Nutrition and Dietetics
SEMESTER 1**

Course Title: ESSENTIALS OF MACRO NUTRIENTS DSC-2	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:20	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 80

Course Outcomes (COs): At the end of the course the student should be able to:

- 1. Understand significance of Macro nutrients in the diet**
- 2. Understand their physiological functions, requirements, and sources of macro nutrients**

CONTENT	45Hrs
Unit-1 CARBOHYDRATES	15Hrs
Chapter No.1: Carbohydrates: Composition, classification, digestion, absorption and metabolism, Functions, Sources and Requirements, excess and deficiencies.	8 Hrs.
Chapter No.2: Dietary fiber – definition, classification, sources, role of fiber in Nutrition. Resistant starch, fructo-oligosaccharides, other oligosaccharides: Chemical composition and physiological significance. Glycemic Index and glycemic load. Review of nutritional significance of carbohydrates and changing trends in dietary intake of different types of carbohydrates and their implications.	7 Hrs.

Unit – 2 PROTEINS	15Hrs
Chapter No.3: Proteins: Composition, classification of proteins and amino- acids, functions, digestion, absorption and metabolism, Requirements and Sources, Effect of deficiency. Assessment of Protein quality. BV, PER, NPU and chemical score.	
Unit–3 LIPIDS	15 Hrs.
Chapter No.4: Lipids: Classification, functions, digestion, absorption and metabolism, Sources and Requirements - SFA, MUFA, PUFA: functions and deficiency, Role of n-3 and n-6 fatty acids, Trans Fatty Acids, dietary guidelines (International and National) for visible and invisible fats in diets.	

Formative Assessment = 20 marks	
Assessment	Weightage in Marks
Test 1	10
Assignment + Project	5 + 5
Total	80 marks (SA) + 20 marks = 100 marks

PRACTICAL

No of Classes-12

1. Planning and preparation of energy dense recipes
2. Planning and preparation of low energy recipes
3. Planning and Preparation of low Glycemic index recipes. Calculation of Glycemic index and Glycemic load
4. Planning and preparation of high & low fibre recipes
5. Planning and preparation of protein dense recipes
6. Planning and preparation of low protein recipe
7. Planning and preparation of n-3 and n-6 rich recipes

References:

1. Shubhangaini A Joshi, (2010), Nutrition and Dietetics, with Indian case studies, Tata McGraw-Hill, New Delhi
2. Srilakshmi B. (2013) human Nutrition for B.Sc. Nursing students, New Age international publications, New Delhi.
3. Mudambi S.R and Rajagopal M.V (2008) Fundamentals of foods, Nutrition and Diet therapy, 6th revised edition, new age international publications, New Delhi
4. Swaminathan M S (2012) Fundamentals of food nutrition Bappcco Publication
5. Longvah T Anathan R, Bhaskarachary K, and Venkaiah k (2017) Indian food composition table, NIN.ICMR Hyderabad
6. Bamji, M.S, Reddy, V. (1998), Textbook of Human Nutrition, Oxford & IBH Publishing Co, NewDelhi.
7. Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science Publishing.
8. Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillan Pub. Co. New York.
9. Swaminathan, M. (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company.
10. Guthrie, H.A & Picciano, M.F (1995), Morby Publishing Co, New York.
11. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, New Delhi.

B.SC. CLINICAL NUTRITION AND DIETETICS

SEMESTER 1

Course Title: FOOD SANITATION AND HYGYEINE -DSC3	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:20	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 80

Course Outcomes (COs): At the end of the course the student should be able to:

1. Understand importance of food hygiene
2. Understand the procedure for cleaning and sanitation

CONTENT	45 Hrs.
Unit-1 INTRODUCTION	15 Hrs.
Chapter No.1: Terminologies – Sanitation, hygiene, food safety, food sanitation, Contamination, Food spoilage, danger zone. Significance of sanitation in food	8 Hrs .

<p>catering units, hospital kitchens, food handlers. FSSAI: Safe food handling and hygiene practices -guidelines.</p> <p>Chapter No.2: Introduction - Serving safe food, food borne illnesses, preventing food borne illnesses, key practices for ensuring food sanitation. Personal hygiene - importance, sanitary habits, and practices, use of protective clothing during food preparation in large establishments.</p>	<p>7 Hrs</p>
<p>Unit-2 PURCHASE ANDHYGIENE</p>	<p>15 Hrs.</p>
<p>Chapter No.3: Purchasing and Storage - Choosing a supplier, Inspection Procedures, Receiving and Inspecting Specific Food, Storage - General Storage Guidelines, Types of Storage, storing specific food, storage techniques - dry food storage, refrigerated storage, freezer storage.</p>	<p>7 Hrs</p>
<p>Chapter No.4: Hygiene in Service - Hygiene procedures in food preparation, holding and display food for service, serving food safely, off-site services, hot holding of foods, Safe use of left - over food, hygiene in food service, protective display of food. Storage and disposal of waste – Classification of waste, methods of disposal.</p>	<p>8 Hrs</p>
<p>Unit – 3 CLEANING AND SANITATION</p>	<p>15 Hrs.</p>
<p>Chapter No.4: Cleaning and Sanitation - Sanitation Standards for Equipment, installing and maintaining kitchen equipment, Cleaning and Sanitizing - Cleaning vs. Sanitizing, machine dishwashing, manual dishwashing, sanitizing food contact surfaces, cleaning the Premises, storing utensils, tableware, and equipment, using cleaning agents, developing a cleaning Program. Pest control methods and its importance.</p>	<p>15 Hrs.</p>

Formative Assessment = 20 marks	
Assessment	Weightage in Marks
Test 1	10
Assignment + Project	5 + 5
Total	80 marks (SA) + 20 marks = 100 marks

References

1. De Vries. (1997) Food Safety and Toxicity, CRC, New York.
2. Lawley, R., Curtis L. and Davis, J. (2004) The Food Safety Hazard Guidebook, RSC publishing.
3. Mario Stanga, Sanitation: Cleaning and Disinfection in the Food Industry, Wiley, 2010.
4. Marriott, Norman G. (1985). Principles of Food Sanitation, AVI, New York USA.
5. Norman G. Marriott, Principles of sanitation, Van Nostrand Reinhold Company, New York.1985.
6. Roday. S. (1999) Food Hygiene and Sanitation, Tata McGraw-Hill Company Limited, New Delhi.
7. Y. H. Hui, L. Bernard Bruinsma, J. Richard Gorham, Wai-Kit Nip, Phillip S. Tong, Phil Ventresca, Food plant sanitation, CRC Press,2002.
8. Y. H. Hui, Plant sanitation for food processing and food service, CRC Press,2014.

B.SC. CLINICAL NUTRITION AND DIETETICS
SEMESTER 2

Course Title: HUMAN PHYSIOLOGY (DSC – 4)	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:20	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 80

Course Pre-requisite(s): PUC/ 10+2 (with chemistry or biology as one optional)

Course Outcomes (COs):

At the end of the course the student should be able to:

- 1 To gain elementary knowledge of functions of organ systems in the human body.
2. To learn about the physiological functions, sources, requirements, micronutrients and its deficiencies
3. To understand the concept of water balance and the function of electrolytes in human nutrition
4. To understand the major nutritional problems in populations
5. To study the different programs and interventions for improving nutritional status

CONTENT	45 HRS
<p>UNIT 1- Basic Cells and Tissues</p> <p>Structure and Function of Cell, Physiological properties of protoplasm.</p> <p>Levels of cellular organization and function - cell organelles and tissues -</p> <p>Structure and functions of epithelial, connective, muscular and nervous tissue, organs and systems – Brief review, Cell membrane transport across cell, membrane and intercellular communication, cell multiplication</p> <p>Introduction of biological membranes to understand molecular transport , transport of large molecules, receptor mediated endocytosis, exocytosis.</p> <p>Molecular aspects of transport; Passive diffusion, facilitated diffusion, active transport. active transport - sodium potassium pump.</p>	15 Hrs.

<p>Unit – 2 - Organ system</p> <p>Digestive System - Digestive system: Review of structure (Physiology) and function - Secretory, Digestive and Absorptive functions. Functions of mouth pharynx, esophagus, stomach, intestine and intestinal villi. Liver, pancreas and gall bladder and their dysfunction Digestive glands: salivary, gastric, liver, pancreas. Digestion of nutrients- Proteins, fats, carbohydrates. The Hunger and thirst mechanism. Motility and hormones of</p>	15 Hrs.
<p>GIT. Regulation of food intake - role of hunger and satiety centers, effect of nutrients.</p> <p>Circulatory System - Blood: Properties, formation, composition and functions and homeostasis. Formation and function of plasma proteins, erythropoiesis. Blood groups & histocompatibility. Composition & functions of CSF and Lymph. Structure & functions of heart, blood vessels- physiological aspects, ECG, Blood pressure.</p> <p>Respiratory system - Outlined structure of respiratory system, Primary function of respiratory system, Mechanism of respiration, Transport of gases and artificial respiration. Role of lungs in the exchange of gases, Transport of oxygen and CO₂. Cardiorespiratory changes during exercise and training</p> <p>Excretory System - Structure and functions of nephron, glomerular filtration, tubular absorption and secretion. Urine formation - Role of kidney in maintaining pH of blood -Water, electrolyte and acid base balance – diuretics</p> <p>Nervous System: Review of structure and function of neuron - conduction of nerve impulse, synapses, and role of neurotransmitters, Organization of central and Peripheral nervous system, Hypothalamus and its role in various body functions</p>	

Unit – 3	15 Hrs.
<p>Skeletal & Muscular System - Ultra structure of skeletal muscle and bone, role of collagen and elastin in bone composition, growth and remodeling, factors affecting long bone growth. Muscular system: Muscle type, structure: Muscle proteins – contractile and non-contractile. Energetics of muscle contraction, Muscular dystrophies.</p> <p>Reproductive System and Endocrine System -Male reproductive system - Structure and functions. Spermatogenesis. Female reproductive system - Structure and functions. Oogenesis. Menstrual cycle, Puberty, Menopause. Fertilization, Development of fertilized ovum (Brief account) Placenta and its functions – Parturition. Endocrinology- Functions of hormones of the pituitary,</p> <p>Immune System - Organs and cells of the Immune system, Primary and secondary Lymphoid organs. Immunity- Definition, Types, Innate immunity, Adaptive immunity, cell mediated and humoral immunity. Complement system. Antigens - Chemical nature of antigens, hapten, antigenicity, immunogenicity, epitope. Monoclonal antibodies – definition and production. Major histocompatibility complex proteins (MHC): Definition. Types, physiological role. Vaccines- Definition, significance of vaccines. Hypersensitivity reactions- definition, types, and examples thyroid, parathyroid, adrenal, pancreas, and gonads. Steroid hormones their functions and mechanism of action.</p>	

Formative Assessment = 20 marks	
Assessment	Weightage in Marks
Test 1	10
Assignment + Project	5 + 5
Total	80 marks (SA) + 20 marks = 100 marks

PRACTICAL:2Credit

12 classes

1. Microscopic study of tissues- Epithelial, connective, and muscular tissues
 2. Smear preparation of human blood for RBC and WBC count
 3. Estimation of hemoglobin by Sahli- Hellige (Calorimetric) hematin method
 4. Determination of blood groups and Rh factor
 5. Determination of bleeding time by Duke's method
 6. Determination of Blood clotting time by Wright's method
 7. Clinical examination of urine
- a) Physical examination: volume color, odour, appearance, ph.
- b) Test for abnormal constituents of urine: Sugar, blood, albumin, Bile salts and ketone bodies.
8. Pulse, B.P and respiratory rate at rest and after exercises

References

1. Human Physiology by CC. Chatterjee, 11th edition (1985)
2. Essentials of Medical physiology by K Sambulingam, 3rd edition, 2005
3. The Cell, Copper, Geoffery, M., Oxford University Press, (2001)
4. Textbook of Biochemistry with Clinical correlations; Thomas Devlin [Ed.] (1997), Wiley –Liss.
5. Lehninger- Principles of Biochemistry; DL Nelson and MM Cox [Eds], 6th Edn. Macmillan Publications(2012).
6. Principles of Human Physiology; 4th Edn. Cindy L. Stanfield Pearson, (2010).
7. Principles of Biochemistry: Smith et al., [Ed.] (1986) McGraw Hill.
8. Principles of Biochemistry: General Aspects, Smith et al., [Ed.] (1986) McGraw Hill.
9. Human Biochemistry, Orten and Neuhans, 10th Edn. Mosbey International,(1983).
10. Review of Medical Physiology, Gannong, W.F.15th Edn., Maruzen Asia,(1991).

B.SC. CLINICAL NUTRITION AND DIETETICS

SEMESTER 2

Course Title: ESSENTIALS OF MICRONUTRIENTS (DSC – 5)	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:20	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 80

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Understand the significance of micronutrients
2. Know the role of water and electrolytes in the body

CONTENT	45 Hrs.
Unit –1 – Vitamins	15 Hrs.
<p>– Definition and classification</p> <p>Fat soluble vitamins - Physiological functions, Sources, Requirements, Deficiency and Hypervitaminosis of Vitamin A, D, E and K</p> <p>Water Soluble vitamins - Physiological functions, Sources, Requirements and Deficiency of B Complex Vitamins- Thiamine, Riboflavin, Niacin, Pyridoxine, Folic Acid, Pantothenic Acid, Cyanocobalamin and Vitamin C.</p> <p>Interaction with other nutrients and its effects.</p>	
Unit – 2 – Minerals	15 Hrs.
<p>Definition, Classification, Distribution in the body, Functions, Sources and requirement and Effects of Deficiency of Calcium, Phosphorus, Magnesium, Sodium, Potassium, Manganese, Selenium, Iron, Zinc, Iodine, Molybdenum, Cobalt and Fluorine</p> <p>Trace Elements - Distribution in the body, Functions, Sources and requirement and Effects of Deficiency of Vanadium, Silicon, Boron, Nickel, Lithium, Lead, Cadmium, Sulphur.</p>	
Unit – 3 – Water and Electrolytes	15 Hrs.
<p>Water - Importance, distribution in the body, functions of water and sources, water intake and loss. Dehydration, edema.</p> <p>Electrolytes - Types, sources, composition of body fluids, maintenance of fluid and electrolyte balance and imbalance</p>	

Formative Assessment = 20 marks	
Assessment Occasion / type	Weightage in Marks
Test 1	10
Assignment + Project	5 + 5
Total	80 marks (SA)+ 20 marks = 100 marks

Practical: 2Credit

12 CLASSES

1. Planning and preparation of Vitamin A rich recipes
2. Planning and preparation of Vitamin C rich recipes
3. Planning and preparation of Vitamin B complex rich recipes
4. Planning and preparation of Calcium rich recipes
5. Planning and preparation of iron rich recipes
6. Planning and preparation of Folate rich recipes
7. Estimation of iron in food sources
8. Estimation of calcium in milk
9. Estimation of vitamin C in food sources
10. Estimation of vitamin A by calorimetric method
11. Estimation of total mineral content in a food sample using muffle furnace

REFERENCES

1. Shubhangaini A Joshi, (2010), Nutrition and Dietetics, with Indian case studies, Tata McGraw-Hill, New Delhi
2. Srilakshmi B. (2013) human Nutrition for B.Sc. Nursing students, New Age international publications, New Delhi.
3. Mudambi S.R and Rajagopal M.V (2008) Fundamentals of foods, Nutrition and Diet therapy, 6threvised edition, new age international publications, New Delhi
4. Swaminathan MS (2012) Fundamentals of food nutrition Bappcco Publication
5. Longvah T Anathan R, Bhaskarachary K, and Venkaiah k (2017) Indian food composition table, NIN.ICMR Hyderabad
6. Bamji, M.S, Reddy, V. (1998), Textbook of Human Nutrition, Oxford & IBH Publishing Co, NewDelhi.
7. Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science Publishing Co.
8. Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillan Pub. Co. New York.
9. Swaminathan, M. (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.
10. Guthrie, H.A & Picciano, M.F (1995), Morby Publishing Co, New York.
11. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, New Delhi

B.SC. CLINICAL NUTRITION AND DIETETICS
SEMESTER 2

Course Title: FOOD SAFETY AND SECURITY DSC 6	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:20	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 80

Course Pre-requisite(s): PUC/ 10+2 (with chemistry or biology as one optional)

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Understand food laws, regulations and policies
2. Know about food safety and food adulteration,

CONTENT	45 Hrs.
<p>Unit –1</p> <p>Food Safety - definition of food safety and food spoilage, factors affecting food safety and food spoilage: GMP, GAP, SSOP, GHP, food adulteration - definition, types adulteration in various foods- intentional, incidental, and metallic contaminants</p> <p>Food Laws and Regulations National Legislation - Essential Commodities Act, Standard of Weight and Measures Act, ISI, Mark of BIS, Agmark, BIS. GRAS and permissible limits for chemical preservatives and legal aspects for γ -irradiations.</p> <p>Recent concerns in food safety: New and Emerging Pathogens. Genetically modified foods / Transgenics / Organic foods. Newer approaches to food safety.</p> <p>PFA, FPO, Food Safety and Standards Bill 2005, International Laws and Agreements - FAO, WHO, Codex Alimentarius, WTO, JECFA, APEDA, ISO 22000 series, Hazard Analysis Critical Control Point (HACCP): principles of HAACP, applications of HACCP Current Food Safety Standards in India, Current Food Safety regulations 2001, Food Safety and Standards Authority of India, objectives of developing food safety standards, enforcement of structure and procedure, role of food analyst, safety analysis, action by designated officer and report of food analyst</p>	15 Hrs.

Unit – 2	15 Hrs.
<p>Food and Nutrition Security – Definition, Food production, access, distribution, availability, losses, consumption, Food distribution strategies and storage of food. Socio-cultural aspects and Dietary Patterns: Their implications for Nutrition and Health. Nutritional Status - Determinants of nutritional status of individual and populations, Nutrition and Non-nutritional indicators -Socio-cultural, Biologic, Environmental, Economic.</p> <p>Major Nutritional Problems – An overview etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: Macro and micronutrient deficiencies.</p>	
Unit – 3	15 Hrs.
<p>National Food, Nutrition and Health Policies- Plan of action and programs, Approaches and Strategies for improving nutritional status and health, Programmatic options- their advantages and demerits. feasibility, political support, available resources (human, financial, infrastructural). Case studies of selected strategies and programs: their rationale and context. How to select interventions from a range of possible options: Health-based interventions, Food-based interventions including fortification and genetic improvement of foods, supplementary feeding, nutrition education for behavior change.</p> <p>Health economics and economics of malnutrition- Its impact on productivity and national development, Cost-Benefit, Cost effectiveness, Cost efficiency</p>	

Formative Assessment = 20 marks	
Assessment Occasion / type	Weightage in Marks
Test 1	10

Assignment + Project	5 + 5
Total	80 marks (SA)+ 20 marks = 100 marks

References

1. Bamji, M.S., Rao, P.N., Reddy, V. (Eds) (1996): Textbook of Human Nutrition, Oxford and IBHPublishing Co. Pvt. Ltd., NewDelhi.
 2. Gopalan, C. and Kaur, S. (Eds) (1989): Women and Nutrition in India, Nutrition FoundationofIndia.
 3. Gopalan, C. (Ed) (1987): Combating Undernutrition – Basic Issues and Practical Approaches, Nutrition Foundation of India.
 4. Achaya, K.T. (Ed) (1984): Interfaces between agriculture nutrition and food science, TheUnited Nations University.
 5. National Family Health Survey I & II (1993, 2000): International Institute for PopulationStudies, Mumbai.
 6. National Plan of Action on Nutrition (1995): Food & Nutrition Board, Dept. Of WCD, Govt.of India.
 7. National Nutrition Policy (1993): Dept. of WCD, Govt. of India.
 8. Nutrition Education for the Public (1997): FAO Food and Nutrition Paper, 62,FAO.
 9. Allen, L. and Ahluwalia, N. (1997) Improving Iron Status Through Diet: The Application of Knowledge Correcting Dietary Iron Bioavailability in Human Populations. OMNI/USAID, Arlington, VA ,USA
 10. Nestel, P. (ed) (1995). Proceedings: Interventions for Child Survival. OMNI/USAID Arlington,VA, USA.
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