DEPARTMENT OF CLINICAL NUTRITION AND DIETETICS

PREAMBLE

UG: Programme profile & the syllabi of courses offered in the semester I and II along with III & IV evaluation components (with effect from 2022 - 2025 batch onwards).

PROGRAMME PROFILE B.Sc., CLINICAL NUTRITION AND DIETETICS

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO No.	Upon completion of these courses the students would be able to
PSO-1	Identify the fundamentals of nutrition, dietetics and food microbiology to promote health and administer healthy eating principles throughout the community and the nation
PSO-2	Deal with understanding of food groups, nutrients, nutrition & health, metabolism & acid base balance of body, energy.
PSO-3	Detailed study of Macro and micro nutrients, dietary modification for inborn errors of metabolism.
PSO-4	Evaluate, adopt and apply the best practices relating to health, safety, quality and client satisfaction in the field of Nutrition and Dietetics.
PSO-5	Apply the principles and theoretical knowledge in nutrition, dietetics, biochemistry and physiology through practical courses and internships in hospitals.
PSO-6	Enable pursuit of higher education, research and career in Nutrition, Food Service Management and Dietetics and health education causing meaningful societal impact.

Semester	Part	Category	Course code	Course Title	Previous course code	Hrs per week	Credit Min / Max
I	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL107/ UTAL108/ UHIL102/ UFRL102	Basic Tamil I/ Advanced Tamil I/ Hindi I / French I	UTAL105/ UTAL106/ UHIL101/ UFRL101	5	3/4
	II	Communicative English I / AECC-I (2 Levels)	UCEL101/ UCEL102	English for Communication – I (Stream – I) / English for Communication – I (Stream – II)	--	5	3/4
	III	Core I / DSC - I	UCNM101	Food Science	--	4	4
		Core II / DSC - II	UCNM102	Human Nutrition - I	--	4	4
		Core Practical I	UCNR101	Food Science Practical	--	3	2
		Allied I / GE I	UBCA101	Biochemistry	--	4	3
		Allied Practical	UBCR101	Biochemistry Practical	--	3	2
		PE	UPEM101	Professional English I	--	6	4
	IV	Value Education /			--	2	1

		SEC					
				TOTAL		**36**	**26/28**
II	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL207 / UTAL208 / UHIL202 / UFRL202	Basic Tamil II/ Advanced Tamil II/ Hindi II/ French II	UTAL205/ UTAL206/ UHIL201/ UFRL201	5	3/4
	II	Communicative English / AECC-II (2 Levels)	UCEL201 / UCEL202	English for Communication - II (Stream – I) / English for Communication – II (Stream – II)	--	5	3/4
	III	Core III / DSC – III	UCNM201	Human Nutrition - II	--	4	4
		Core IV / DSC – IV	UCNM202	Human Physiology		4	3
		Core Practical II	UCNR201	Nutrient Analysis and Physiology Practical	--	3	2
		Allied II/ GE -II	UFSA201	Food Service Management	--	3	3
		Allied II practical	UFSR201	Quantity Cookery Practical	--	3	2
		PE	UPEM201	Professional English II	--	6	4
	IV	Non Major Elective (SEC)			--	3	2
	V	Extension activity/ Physical Education/NCC	--	--	--	-	1/2
				TOTAL		**36**	**27/30**
III	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL307/ UTAL308/ UHIL302/ UFRL302	Basic Tamil III/ Advanced Tamil III/ Hindi III/ French III	UTAL305/ UTAL306/ UHIL301/ UFRL301	5	3/4
	II	Communicative English / AECC-I (2 Levels)	UENL309/ UENL310	English for Communication III (Stream – I) / English for Communication III (Stream – II)	UENL307/ UENL308	5	3/4
	III	Core V / DSC - V	UCNM301	Medical Nutrition Therapy - I	---	5	5
		Core Practical III	UCNR302	Medical Nutrition Therapy Practical	---	3	2
		Allied III/ GE -III	UMBA301	Basics of Food Microbiology	---	4	3
		Allied III/ GE -III	UMBR301	Food Microbiology Practical	---	3	2
	IV	Online Course		NPTEL / Spoken Tutorial	--	3	1/2
		Value Education/ SEC			--	2	1
				TOTAL	**--**	**30**	**20/23**
IV	I	Language/ AECC-II / Tamil (2 Levels) Hindi / French	UTAL407/ UTAL408/ UHIL402/ UFRL402	Basic Tamil IV/ Advanced Tamil IV/ Hindi IV/ French IV	UTAL405/ UTAL406/ UHIL401/ UFRL401	5	3/4
	II	English / AECC-I (2 Levels)	UENL409/ UENL410	English for Communication – IV (Stream – I) /	UENL407/ UENL408	5	3/4

				English for Communication – IV (Stream – II)			
	III	Core VI / DSC – VI	UCNM401	Community Nutrition	---	4	4
		Core VII / DSC - VII	UCNM402	Nutrition Through Life Cycle	---	4	4
		Core Practical IV	UCNR401	Community Nutrition Practical	---	3	2
		Allied IV/ GE –IV	UMAA401	Basics of Statistics	---	4	3
	IV	Non Major Elective			--	3	2
		Soft Skill/ SEC			--	2	1
	V	Extension Activity/ Physical Education/ NCC			--	-	- /2
				TOTAL		**30**	**22/26**
V	III	Major Core VII / DSC – VII	UCNM501	Clinical Nutrition	--	5	5
		Core VIII/ DSC - VIII	UCNM502	Principles of Food Preservation	---	5	5
		Core IX / DSC – IX	UCNM503	Food Product Development and Entrepreneurship	---	5	5
		Major Elective-I / DSE – I	UCNO501	Scientific Writing in Nutrition Research	--	5	4
			UCNO502	Health Psychology	--		
		Core Practical V	UCNR501	Clinical Nutrition Practical	---	4	3
		Core IX / DSC – IX	UCNP501	Project	---	4	4
		Value Education/ SEC			---	2	1
				TOTAL		**30**	**27**
VI	III	Core X / DSC – X	UCNM601	Medical Nutrition therapy-II	---	6	6
		Core XI / DSC – XI	UCNM602	Nutrition Education and Counseling	---	6	6
		Core XII / DSC - XII	UCNM603	Sports Nutrition	---	5	5
		Core XIII / DSC - XIII	UCNM605	Comprehensive Viva voce	--	-	1
		Core Practical VI	UCNR601	Medical Nutrition therapy-II Practical	--	6	3
		Major Elective – II / DSE – II	UCNO601	Herbal Remedies & Alternative Therapy	--	5	4
			UCNO602	Human Development	--		
			UCNO603	Food Hygiene and Sanitation	--		
	IV	Soft Skill/ SEC			--	2	1
	V	Extension activity/ Physical Education/ NCC			--	-	-/2
				TOTAL		**30**	**26/28**
				GRAND TOTAL		**192**	**148/162**

COURSES OFFERED TO OTHER DEPARTMENTS
NON MAJOR ELECTIVES (NME)

Semester	Part	Category	Course code	Course Title	Previous course code	Contact Hour/ Week	Credit Min/Max
II	IV	Non Major Elective	UCDE301	Basics of Food and Nutrition	--	3	2
			UCDE302	Baking	--		
			UCDE303	Flower Arrangement	--		

EXTRA CREDIT EARNING PROVISION (Only for Interested Students)

Semester	Part	Category	Course Code	Course Title	Credit
II	III	Internship	UCDI201	Hospital Internship	1
IV	III	Internship	UCDI401	Food Quality Control Internship	1
VI	III	Self Study paper	UCDS601	Case Study	2

EXPERIENTIAL LEARNING OFFERED IN SEMESTER V & VI

Semester	Course Code	Course Title	Assessment
V	UCNM501	Clinical Nutrition	Component III
VI	UFSA201	Food Service Management	Component IV

FOOD SCIENCE
UCDM101

Semester : 1 **Credits 4**
Category : Core I/ DSC-I **Hours /Week : 4**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours 52**

Course Objectives

CO No.	To enable the students to
CO -1	Understand the principles underlying food preparation.
CO -2	Obtain knowledge of different food groups, nutritive value and their role in day to day diet.
CO -3	Develop the skills and techniques in food preparation with conservation of nutrientsand Palatability using cooking methods generally employed.
CO -4	Learn the usage and importance of whole grains, pulses and vegetables in daily Basis.
CO -5	Design own diet plan based on the requirement.

UNIT –I INTRODUCTION TO FOODS **10 Hours**

Concept of food, Nutrients, Basic food groups, Nutritional Classification of foods & Uses – Energy yielding, Body Building and Protective foods. Cooking Methods: Moist and Dry heat methods of cooking, merits and demerits, Functions of foods.

UNIT II - CEREALS AND PULSES **10 Hours**

Cereal and Cereal products – structure, composition, nutritive value, effect of cooking on the nutritive value of cereals, gelatinization, retrogradation, dextrinization, crystallization, caramelization, gluten formation. Gels – meaning, types, properties, factors influencing gel formation.

Pulses and legumes - structure, composition, nutritive value of grams, dhals, effect of cooking on pulses, biological value, effect of heat on protein- denaturation, coagulation and Maillard reaction, foam formation, fermentation, germination.

UNIT – III VEGETABLES AND FRUITS **10 Hours**

Classification, nutritional composition; pigments – water soluble, fat soluble, properties and functions; enzymes, tannins, pectin, acids and flavones; selection; cooking methods. Factors affecting – changes on cooking; enzymatic browning: causes, prevention; conservation of nutrients.

UNIT IV - MILK AND MILK PRODUCTS, NUTS, OILSEEDS, FATS AND OILS **12 Hours**

Milk and Milk products – composition, constituents and nutritive value, principles of milk cookery, coagulation, effect of cooking and processing on milk.

Nuts and Oil seeds – types, structure, composition and nutritive value.

Fats and Oils - types, saturated and unsaturated fats, hydrogenation, invisible fats, use of fat in cooking, factors affecting absorption of fats, smoking point, peroxidation, rancidity. Food emulsions-meaning, emulsifying agents, natural and synthetic emulsifiers.

UNIT – V MEAT & MEAT PRODUCTS, EGGS AND BEVERAGES 10 Hours

Meat: Classification, nutritional composition, selection, postmortem changes, storage, cooking methods, effects, factors affecting, uses.

Poultry and fish: Classification, nutritional composition, selection, storage, cooking methods and uses.

Eggs - structure, composition, nutritive value, selection, principles and methods of egg cookery, use of eggs in cooking. Foam – properties, factors influencing foam formation & factors affecting foam stability.

Beverages - Classification and benefits.

Text Books

- Srilakshmi, B. (2016), *Food Science*, (5th Ed), New Age Publishers India, New Delhi.
- Many, S and Shadaksharaswami, M. *Food: Facts and Principles*, New Age Publishers.

Reference Books

- Swaminathan, M., (2012) *Food science, Chemistry and Experimental foods*, Bangalore Printing and Publishing Company.
- Potter M,N. and Hotchkiss, J.H. *Food Science*, CBS Publications and Distributors, Daryaganji, New Delhi.
- Philip, T., *Modern Cookery for teaching and trade*, volume I and II, Orient Longmans Ltd.
- Vickie A. Vaclavik and Elizabeth W.Christian, *Essentials of Food Science*, Springer.

e-Resources [MOOC, SWAYAM, NPTEL, Websites etc.]

- www.nal.vsda.gov/fnic/foodcomp
- www.fda.gov-vegetables
- http://www.eatforhealth.gov.au-fleshfoods,egg&milk
- https://www.business.qld.gov.av-sensoryanalysis of food products
- https://youtu.be/oE8YV2zlO8M

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define food groups and its function, food pyramid and understanding cooking methods.	K1
CO-2	Describe the nutritive value; the cookery concepts involved in cereals and pulses.	K2
CO-3	Illustrate with nutritional classification, changesin pigments of fruits, vegetables and apply the knowledge on preparation of beverages.	K3
CO-4	Explain the composition, nutritive value and developing skills in the preparation of milk and egg product and determine the smoking point of any cooking oil.	K4
CO-5	Explain the nutritive value, selection and methods of cooking fleshy foods and evaluate the usesand abuses of spices and condiments.	K4

HUMAN NUTRITION - I
UCDM102

Semester : 1 **Credits 4**
Category : Core II/ DSC-II **Hours/Week: 4**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours : 52**

Course Objectives

CO No.	To enable the students to
CO -1	Identify the nutrients needed by humans and explain their major functions in the body.
CO -2	Understand the interrelationship between nutrition and human health.
CO -3	Understand the meaning of energy balance and methods to calculate energy needs.
CO -4	Learn the nutritional importance of carbohydrates, lipids and proteins.
CO -5	Gain the knowledge on role of macromolecules in human health.

UNIT-I INTRODUCTION TO NUTRITION **12 Hours**

Introduction to nutrition – Definition of nutrition and nutrients, adequate, optimum and good nutrition, malnutrition. Inter relationship between nutrition and health, visible symptoms of good health.

UNIT – II FOOD AND ENERGY **10 Hours**

Energy: Definition - Calories, Joule, Calorimetry, direct and indirect calorimetry, respiratory quotient, Energy value of foods, physiological fuel values. Energy needs of the body – BMR, SDA, factors influencing BMR, the energy cost of physical activities, calculation of total caloric requirements, factorial method for determining total energy needs.

UNIT – III CARBOHYDRATES **10 Hours**

Definition, Classification, Sources, Functions, Deficiency, Toxicity and Requirements.

UNIT - IV PROTEINS **10 Hours**

Definition, Classification, Sources, Functions, Deficiency, Toxicity and Requirements.

Proteins– structure and properties of Amino Acids, Essential and Non-essential Amino Acids.

UNIT – V LIPIDS **10 Hours**

Definition, Classification, Sources, Functions, Deficiency, Toxicity and Requirements.

Text Books

- M.Swaminathan (2015), *Advanced Text book of Food and Nutrition*: Bappco Press. Bappco.
- Sathyanarayana. (2017), *Biochemistry*, Elsevier.
- Srilakshmi.B. (2019) *Dietetics* – (Multi Colour Edition Ed), New age International Publisher.

References

- Andreas M. Papas. *Antioxidant Status, Diet, Nutrition, and Health,*CRC Press.
- Margaret Mc Williams (2012). *Food Fundamentals* (10th Ed) Prentice Hall.
- Tom Brody. *Nutritional Biochemistry*, Academic Press, USA.
- Krause's (2013). Food, Nutrition & diet therapy (11th Ed.,) W.B Saunders.

e-Resources

- https://www.amazon.in/Nutritional-Biochemistry-Tom-Brody-ebook/dp/B0087GZCUW
- amazon.in/Nutritional-Biochemistry-D-C-Sharma-ebook/dp/B08FR1MHD8
- https://www.elsevier.com/books/nutritional-biochemistry/brody/978-0-12-134836-6

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Define the fundamental concepts of food and nutrition.	K1
CO-2	Tabulate the daily requirements of macro and micro nutrients.	K1
CO-3	Explain the nutritional significance of macromolecules.	K2
CO-4	Explain the meaning of energy balance, and methods to calculate energy needs.	K4
CO-5	Recommend others about holistic Nutrition, life style ,wellness and healthy Living.	K5

FOOD SCIENCE PRACTICAL
UCDR101

Semester : 1 **Credits : 2**
Category : Core Practical I **Hours/Week : 3**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours : 39**

Course Objectives

CO No.	To enable the students to
CO -1	Understand the basic food laboratory techniques.
CO -2	Practice the measuring techniques of various food items.
CO -3	Identify the ways to prevent nutrient losses during cookery.
CO -4	Gain experience in planning, preparing and serving food.
CO -5	Demonstrate the different methods of cooking.

EXPERIMENTS

1. BASIC FOOD LABORATORY TECHNIQUES

a. Methods of Measurement of ingredients.

b. Methods of measuring different types of foods – grains, flours and liquids.

c. Determination of edible portion percentage.

d. Cooking methods Moist heat methods – boiling, simmering, steaming and pressure cooking, dry heat methods – baking.

2. CEREALS AND CEREAL COOKERY

a. Preparation of a few cereal products using Rice, Wheat, Ragi.

b. Experimental cookery on cereals.

c. Types of Gel.

3. PULSES

a. Preparation of a few dishes using pulses.

b. Experimental cookery.

4. VEGETABLES AND FRUITS

a. Effect of cooking on vegetables.

b. Darkening of vegetables and fruits.

c. Preparation of a few vegetable curries, and fruits salad.

5. MILK COOKERY

Preparation of a few ice creams and milk based products.

6. EGG

Preparation of

a. Scrambled egg, Poached egg and Omelette, foam formation.

b. Experimental cookery.

7. FATS AND OILS

a. Determination of fats on selected food items.

8. BEVERAGE

a. Preparation of Coffees, Tea, Cocoa drinks and various milk based fruit juice beverages.

9. **DEVELOPING VALUE ADDED FOODS** (cereals, millets, pulses and vegetable based) - any Four

Text Books

- Lowe B, (2015), *Experimental cookery from chemical and physical stand point*, Forgotten books, UK.
- Srilakshmi B, (2015), *Food Science*, Sixth Edition, New Age International Ltd Publishers, New Delhi.

Reference Books

- ICMR., *Laboratory techniques in Nutrition*. Hyderabad, NIN.

e-Resources

- https://www.youtube.com/watch?v=lWq_4XBnwNM
- https://food.ndtv.com › Ingredients
- ttps://www.youtube.com/watch?v=8mGeJFpCptw
- https://www.youtube.com/watch?v=3sOccQyYQxo
- ttps://www.youtube.com/watch?v=Y7YYa1yhzro
- https://www.youtube.com/watch?v=gk_rPkglyao

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the scientific principles in food preparation.	K1
CO-2	Demonstrate the different methods of food measurement and cooking	K4
CO-3	Explain the effect of desirable and undesirable changes during cooking of foods	K2
CO-4	Explain the basic methods and principles involved in cooking	K4
CO-5	Evaluate the change of pigments during cooking	K5

BIOCHEMISTRY
UBCA101

Semester : 1 **Credits 3**
Category : Allied I **Hours/Week 3**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours 39**

Course Objectives

CO No.	To enable the students to
CO -1	Understand relationship between the structure and functional properties of food.
CO -2	Learn the nutritional, safety and organoleptic aspects of food.
CO -3	Understand the principles of nutrition through the study of Biochemistry.
CO -4	Define the Carbohydrates, Proteins, Amino Acids, Lipids and Nucleic Acids.
CO -5	List the types of macromolecules, structure, properties and functions.

UNIT – I INTRODUCTION TO BOCHEMISTRY 7 Hours

Definition and relation to nutrition, Enzyme classification, Nomenclature, Factors affecting enzymatic activity, Mechanism of action. Co- enzyme and prosthetic group role of B vitamins.

UNIT – III CARBOHYDRATES 8 Hours

Carbohydrates, Structure and properties of Monosaccharides – glucose, fructose, galactose; Disaccharides – maltose, lactose, sucrose; Polysaccharides – Dextrin, Starch, Glycogen; Carbohydrates- glycolysis, gluconeogenesis, glycogenesis, glycogenolysis, blood sugar regulation.

UNIT - V PROTEINS **8 Hours**

Definition, Classification, Structure (primary, secondary & tertiary), properties and functions of proteins. Structure and properties of Amino Acids, Essential and Non-essential Amino Acids, general reactions of amino acid, amino acid metabolism-tyrosine, histidine, phenylalanine, glutamic acid and alanine, urea cycle

UNIT – IV LIPIDS **8 Hours**

Lipids, types and properties of Fatty acids, composition and properties of fats, significance of Acid Value, Iodine Value and Saponification Value Classification and structure of phospholipids, structure of glycolipids, types and structure of sterols, Lipids – oxidation and bio synthesis of fatty acids. Synthesis and utilization of ketone bodies, ketosis, fatty livers Lipoproteins – types, composition, role and significance in diseases.

UNIT – V NUCLEIC ACIDS **8 Hours**

Nucleic acids, bases, nucleotides, purines and pyrimidines structure and function. Inter relationship between carbohydrate, fat and protein metabolism – Hormonal regulation of metabolism. Inborn errors of metabolism with reference to carbohydrate – Fructosuria and galactosemia. Protein – Phenyl ketonuria, Alcaptonuria, amino aciduria.

Text Books

- Vasudevan DM, Sreekumari S, (2007). *Textbook of Biochemistry,* 5th edition, Jaypee Publishers, New Delhi.
- J.L.Jain. (2000). *Fundamentals of Biochemistry,* Paperback edition.
- Ambika Shanmugam, (2016). *Fundamentals of Biochemistry.* (8th Ed.) Published by Author.

Reference Books

- Harper's, (2018), *Illustrated Biochemistry* Thirty-First Edition (A & L Lange Series) Paperback
- Conn E E and Stump P.K. (1981) – *Outlines of Biochemistry* – Wiley Eastern (P) Ltd. New Delhi.
- Cox MM and Nelson DL Lehninger, (2008). *Principles of biochemistry* 5th edition, EH Freman &Company, New York.

e-Resources

- https://epgp.inflibnet.ac.in/Biochemistry-book-U-Satyanarayana ebook/dp/B07F9QHV6Z?asin=B07F9QHV6Z&revisionId=&format=2&depth=1
- https://www.amazon.com/dp/B0725LHWPB?tag=uuid10-20&asin=B0725LHWPB&revisionId=f5f49437&format=1&depth=1

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the biochemical pathways relavent in nutrient metabolism.	K2
CO-2	Explain the nutritional significance of macromolecules.	K2
CO-3	Illustrate the nutrition-related conditions and assessment of nutritional status.	K3
CO-4	Explain the metabolic inter-relationship between macronutrients.	K4
CO-5	Classify the different types of macromolecules and its significance.	K4

BIOCHEMISTRY PRACTICAL
UBCR101

Semester : 1 **Credits : 3**
Category : Allied Practical I **Hours/Week : 3**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours 39**

Course Objectives

CO No.	To enable the students to
CO -1	Understand relationship between the structure and functional properties of food
CO -2	Explore the laboratory skills to measure, control and modify the chemical and physical properties of food
CO -3	Understand the principles of nutrition through the study of Biochemistry.
CO -4	Aware on various biochemical test used for biomolecule analysis.
CO -5	Develop and distinguish how individual food components contribute to the overall quality of foods.

EXPERIMENTS:

1. Qualitative tests for sugars – Glucose, Fructose, Lactose, Maltose and Starch.
2. Quantitative estimation of reducing sugar.
3. Qualitative analysis of amino acids
   a. Reactions of individual amino acids (Tyrosine, Tryptophan, Arginine, Histidine, Cystine)
4. Qualitative tests for proteins
5. Quantitative tests for lipids
   a. Lipid extraction
   b. Determination of Iodine value

Reference Books

- Pattabiraman. T.N. (2015), *Laboratory Manual in Biochemistry*, 4th edition, New Delhi, All IndiaPublishers and distributors.
- Mazur A and Harrow.B, *Biochemistry – A Laboratory Manual*, John Wiley Sons Inc, New York.

- Varley, *Practical clinical biochemistry*, William Heinemann Medical books, London, Ltd. Inter Science Books Inc, New York.

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Analyze the constituents of food present in biological fluid.	K4
CO-2	Record the readings of biochemical molecules using calorimetric method.	K5
CO-3	Acquire skills on preparation of solutions.	K2
CO-4	Interpret the serum levels of components of nutritional significance.	K5
CO-5	Plan the major nutrients to be taken.	K6

HUMAN NURITION - II
UCDM201

Semester : 1 **Credits : 4**
Category : Core III/ DSC-III **Hours/Week : 4**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours : 52**

Course Objectives

CO No.	To enable the students to
CO -1	Understand the importance of fat and water soluble vitamins in day to day life
CO -2	Study the role of micronutrients in human health.
CO -3	Gain knowledge on functions, distribution of water and regulation of water balance and acid base and electrolyte balance and
CO -4	Comprehend the components of functional foods.
CO -5	Apply this knowledge of nutrition in daily life.

UNIT –I FAT SOLUBLE VITAMINS **10 Hours**

Fat-soluble vitamins: Food sources, Daily requirement, structure and functions of A,D,E & K, Excess and deficiency disorders of fat – soluble vitamins.

UNIT –II WATER SOLUBLE VITAMINS **10 Hours**

Water soluble vitamins: Food sources, Daily requirement, Structure and functions, Excess and deficiency disorders of Thiamin, Riboflavin, Niacin, B12, Folic acid, Biotin and Vitamin C.

UNIT –III MINERALS **10 Hours**

Macrominerals: Calcium, Phosphorus and magnesium - functions, absorption, DR, food sources and deficiencies.

Microminerals: Iron, Zinc, Fluorine and Iodine - function, absorption, DR, food sources and deficiency.

UNIT- IV WATER AND ELECTROLYTES **12 Hours**

Water: Sources, Requirements, Functions, Mechanism of water balance Electrolyte and acid base balance: Electrolyte: Sodium, Chloride, Potassium sources and RDA, function

UNIT- V INTERRELATIONSHIPS OF NUTRIENTS **10 Hours**

Photochemical, antioxidants and Flavonoid present in foods and their role in human health and disease.

Interrelationships of nutrients: Protein: Energy, Protein: Fats: Carbohydrates, Vitamin D: Calcium, VitaminE: PUFA, Vitamin C: Iron, Niacin: Tryptophan: Vitamin B6 Folic acid: Vitamin B12, Sodium: Potassium**.**

Text Books

- Srilakshmi, B. (2017) *Nutrition Science*, New Age International (P) Ltd., New Delhi.
- Swaminathan, M. (2012) Advanced *Textbook on Food and Nutrition*, Vol. 1, Second Edition, Bangalore Printing and Publishing Co. Ltd., Bangalore.

Reference Books

- Dietary Guidelines for Indians, ICMR (2013) National Institute of Nutrition, Hyderabad.
- Gordon M. Wardlaw, Paul M.Insel. (2015) *Perspectives in nutrition*, 3rd Edition, Mosby year Book, Inc.St.Louis, Missouri.
- Krause, M.V. and Hunesher, M.A. (2013) *Food, Nutrition and Diet Therapy*, 14th Edition, W.B.Saunders Company, Philadelphia, London.
- Gibson GR and Williams CM (2000). *Functional Foods* - Concept to Product.
- Jim Mann &A.Stewart Trusell (2012). *Essential of Human Nutrition* (4th Edition). Published by Oxford University Press.

e-Resources [MOOC, SWAYAM, NPTEL, Websites etc.]

- study.com/.../basic-principles-of-nutrition.html
- ocw.jhsph.edu/index.cfm/go/viewCourse/course/.
- www.britannica.com/science/human-nutrition

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Explain the importance of micronutrients.	K2
CO-2	Describe the role of food and nutrients in health and disease Prevention.	K1
CO-3	Evaluation nutrition information based on scientific reasoning for clinical and community application.	K5
CO-4	Analyze conceptualize, implement and evaluate the functions, metabolism, requirements and effects of deficiency of nutrients.	K4
CO-5	Analyze the interrelationships of nutrients.	K4

HUMAN PHYSIOLOGY
UCDM202

Semester : 1 **Credits : 3**
Category : Core III/ DSC-IV **Hours/Week : 4**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours :52**
Course Objectives

CO No.	To enable the students to
CO -1	Understand the physical structure and functioning of human body.
CO -2	Recognize the importance of human organs (Heart, Lungs & Kidneys).
CO -3	Define the body fluids and its importance.
CO -4	Name the different parts of nervous and muscular system.
CO -5	Illustrate the blood coagulation and blood grouping.

UNIT-I CELL, TISSUES AND BLOOD **11 Hours**

Cell - Structure and functions, Tissues - Structure and functions
Blood - Composition, functions, RBC – Structure, functions, erthropoiesis, Haemoglobin, WBC- Structure, functions, Classification. Blood Platelets: Structure, functions, Reticulo endothelia system, Blood groups – Rh factor. Blood coagulation, Spleen –Structure and functions, Lymp– Lymphatic system.

UNIT-II PHYSIOLOGY OF NERVE & MUSCLE, NERVOUS SYSTEM & SENSE ORGANS **11 Hours**

Spinal cord – Structure and functions. Ascending and descending tracts, reflex action. Brain – Structure and functions of cerebrum, optic thalamus, midbrain, pons medulla oblongata, Hypo thalamus, cerebellum. Autonomic nervous system, sympathetic and parasympathetic. Sensory organs - Structure and function of eye, ear and skin.

UNIT III CIRCULATORY SYSTEM **10 Hours**

Circulatory system – Structure and functions of heart - cardiac cycle. Blood vessels – Structure of artery, vein, capillaries, Cardiac output, Arterial Blood pressure, clinical measurement of blood pressure, properties of cardiate muscle, origin and conduction of heart beat,Regulation of Heart's action.

UNIT-IV RESPIRATORY SYSTEM AND DIGESTIVE SYSTEM **10 Hours**

Respiratory system - Basic anatomy of the respiratory system, process of respiration, transport and exchange of oxygen and carbon di-oxide in the body.
Digestive system – Organization and functions of digestive system, Process of the digestion, absorption and utilization of food.

UNIT- V EXCRETORY SYSTEM, ENDOCRINE AND REPRODUCTIVE SYSTEM **10 Hours**

Excretory system - Excretory organs - structure of kidney and functions, formation of urine, composition of urine. Muscles – types of muscles, physiology of muscular action. Central nervous system - Physiology of the nerve cell, parts of the central nervous system and function. Endocrine glands - Structure and function of pituitary, thyroid, islets of Langerhans and adrenal gland. Reproductive system – Basics of the male and female reproductive organs. Menstrual cycle.

Text Books

- Chatterjee C.C (2016), *Human Physiology*, 11th Edition, Medical Allied Agency, Kolkata.
- Sembulingam, K. (2012) *Essentials of Medical Physiology*, 6th Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

Reference Books

- Best and Taylor, (2011) 13th Edition *The Physiological Basis of Medical Practice*, Saunders Company.
- Chaudhri, K. (2016) *Concise Medical Physiology*, 7th Edition, New Central Book Agency (Parentral) Ltd., Calcutta Fox.
- Guyton & Hall (2010), *Textbook of Medical Physiology, (12th Ed.).*, Reed Elsevier India Private Limited, New Delhi.
- Murray et al, (2012), *Harper's Physiological Biochemistry, (29th Ed.).*, Tata McGraw Hill Publication. Co. Limited, New Delhi.

e-Resources [MOOC, SWAYAM, NPTEL, Websites etc.]

- www.microbenotes.com/category/human-physiology
- www.longdom.org/scholarly/human-physiology...
- https://youtu.be/IYQsinv938g

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Explain the components of blood, blood grouping & cardio vascular system.	K1
CO-2	Illustrate the mechanism of digestion, absorption of macromolecules and explain urine formation.	K2
CO-3	Describe the process of gaseous exchange in tissues and lungs, respiratory adaption to high altitude.	K2
CO-4	Measure and give results for identifying the physiological functions.	K5
CO-5	Determine the mechanism of contraction and relaxation of muscles.	K5

NUTRIENT ANALYSIS AND PHYSIOLOGY PRACTICAL
UCDM202

Semester	**: 2**	**Credits**	**: 2**
Category	**: Core Practical II**	**Hours/Week**	**: 3**
Class & Major:	**I B.Sc Clinical Nutrition and Dietetics**	**Total Hours**	**39**

Course Objectives

CO No.	To enable the students to
CO -1	Study the estimation methods through quantitative analysis.
CO -2	Learrn to measure blood pressure, WBC and RBC cell count .
CO -3	Know the principle behind the nutrient analysis and physiological analysis using blood.
CO -4	Learn the human organs, structure and positioning.
CO -5	Gain knowledge on different tissues, muscles and organs of the body

EXPERIMENTS

NUTRIENT ANALYSIS

1. Quantitative estimation of calcium and vitamin C.
2. Quantitative estimation of phosphorus
3. Estimation of Iron

PHYSIOLOGY

4. Determination of pulse rate in Resting condition and after exercise (30 beats/10 beats method)
5. Determination of blood pressure by Sphygmomanometer (Auscultatory method).
6. Measurement of Peak Expiratory flow rate.
7. Determination of Bleeding Time (BT) and Clotting Time (CT).
8. Detection of Blood group (Slide method).
9. Measurement of Haemoglobin level (Sahli`s or Drabkinmethod).
10. Identification of WBC (different groups),estimation of WBC and RBC.

References

- Gerals Litwak, *A Laboratory Manual*, John Wiley sons Inc, New York.
- Sri Lakshmi. B. *Dietetics*, New Delhi, New Age International Pub. L
- Vander, A.J, Sherman, J.H. and Luciano, D.S. *Human Physiology - the Mechanisms of Body Functions*, TMH Publishing Co., Ltd.,
- Best, CH and NB Taylor, *The living body*, latest edition, Asia publishing house, Bombay.

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Understands the methodology of estimation of certain nutritionally significant markers	K2
CO-2	Interpret the serum levels of components of nutritional significance	K5
CO-3	Attain knowledge about the principles of nutrition through the study of physiology.	K2
CO-4	Identify the blood grouping of the individuals	K5
CO-5	Evaluate the physiological functions relevant to nutrition care	K5

FOOD SERVICE MANAGEMENT
UFSA201

Semester : 1I **Credits : 3**
Category : Allied II / GE II **Hours/Week : 3**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours : 39**

Course Objectives

CO No.	To enable the students to
CO -1	Gain knowledge about different types of food services and also various types of catering.
CO -2	Understand the basic principles of food services management and learn about the effective use of available recourses.
CO -3	Possess leadership, supervisory and human relation skills within the restaurant and food service Industry.
CO -4	Perform communication skills relevant to the restaurant, food industry etc.
CO -5	Demonstrate professional behaviors expected within the food service industry.

UNIT I - HISTORY OF DEVELOPMENT AND TYPES OF CATERING **8 Hours**

History of food service unit. Types - Hotel, Motel, Restaurant, Cafeteria and Chain hotels. Types of catering - Air, Rail, Sea and Space. Styles of services – conventional, commissary, read prepared and assembly service system.

UNIT II - ORGANIZATION AND RESOURCE MANAGEMENT **8 Hours**

Organization chart, Role of food service manager. Classification, characteristics, factors affecting the use and effective conservation of resources - time, energy, fuel, finance and staff.

UNIT III - EQUIPMENTS AND FURNITURE MANAGEMENT 8 Hours

a. Classification of equipment, factors involved in selection of equipments; purchase of equipment, operational knowledge, care and maintenance of equipments; dining roomfurnishings.

b. Furniture management - Materials Used - base materials used in the manufacture of equipments, materials used for finishes, materials used in the manufacture of dining room furnishings.

UNIT IV - INTERIOR DESIGN - LIGHTING AND TABLE SETTING, FLOWER ARRANGEMENTS AND COLOUR SCHEMES 8 Hours

Place of art in everyday life - importance of good taste - objectives of interior design. Design elements - types and principles of design - harmony, proportion, balance rhythm and emphasis. Table setting and service-appraising and drawing silver cutlery and crockery, folding of napkins – laying of table cloth, table mats – Arrangement of cover and table – Appointment according to the menu – serving food at the table clearing of the table.

Principles of flower arrangements, styles of flower arrangements, flowers & foliage, containers stem holders & other accessories General guidelines for colour schemes of food service units.

UNIT V - QUANTITY FOOD PREPARATION 8 Hours

Menu planning - Indian and Western - standardization and portion control, effective use of left over.

Standardization - any three selected quantity recipes and their preparation. Yield of cost per serving – size of serving.

Text Books

- John B. Knight and Lendal H. Kotschevar (2000). *Quantity Food Production, Planning, and Management*, 3rd Edition.
- Lea R. Dopson, David K. Hayes (2015), - *Food and Beverage Cost Control*, 6th Edition by John Wiley & Sons, Inc., or related companies.
- Pechkam, G.C (2010) - *Foundations of food preparation*, the Macmillan Publishing Co., New York.
- J. Payne-Palacio, M. Theis, *Introduction to Foodservice*, 11th Ed. - BBS

Reference Books

- Mohini Selti and Surjeet Malhan, 2015 – *Catering Management* – an integrated approach, Wiley Eastern Limited, New Delhi.
- West, B.B.Wood.L.Harger, V.F. and Shugart, G., *Food Service in Institutions*, John Wiley and Sons, New York.

Journals

- Food service systems Management Education council (FSMEC),
- Journal of food service management and education

Websites Reference

- www.uscg.mil/petaluma/TPF/FS_SMS/Support_Folder/486_A.pdf
- www.quizlet.com/2665900/fcs-food-production-management-and-services-reference-book-flashcards/

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	List of human resources within a food services organization or Department.	K1
CO-2	Communicate appropriately with clients, staff and management.	K5
CO-3	Apply food services technology and operate industry equipment.	K4
CO-4	Develop nutritional menus for food service production.	K6
CO-5	Manage food service production.	K5

QUANTITY COOKERY PRACTICAL

UFSR201

Semester : 1I **Credits : 2**
Category : Allied II Practical **Hours/Week : 3**
Class & Major: I B.Sc Clinical Nutrition and Dietetics **Total Hours : 39**

Course Objectives

CO No.	To enable the students to
CO -1	Understand basic principles of quantity meal planning and proper utilization of the resources
CO -2	Develop knowledge and skills necessary to prepare, cook and present meals in large quantity and with appropriate safety and quality control.
CO -3	Promote nutritive benefit as the focal point in planning meals and preparing food in large quantities;
CO -4	Develop an appreciation of the uniqueness of traditional / multi cuisine
CO -5	Critically assess the value of new technologies, the cost effectiveness and long term value.

Experiments

1. Concept and techniques of food standardization.
2. Standardization of recipes – Minimum of 4 portions (Step up or Step down).
3. Visit to well-organized food services units – Hostel, Commercial, Industrial, Hospital, Transport.
4. Quantity Cookery - preparation of south indian, north indian, eastern, western and continental Menu for 25 members.
5. Portion control in preparation and serving food in large quantity - determine portion size for 25 members
6. Organizing, preparing and serving one special sale for 50 members

References

- Judy.L.Halpenny (2012) *Flavours For a crowd – Practical large quantity recipes*, First Edition, Balboa Press,

- Ceserani, V, Kinton, R. and Foskett, D. *Practical cookery*, London, ELBS.

Web References

- healthyeatingatschool.ca/uploads/Tips_LoRes_Jul309.pdf
- www.dshs.wa.gov/altsa/senior-nutrition-program standards/administration/standardization-recipesand-portion-control.

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Describe the principles and techniques involved in preparing large proportions and standardization of food.	K1
CO-2	Explain the methods of preparation of multi cuisine recipes.	K2
CO-3	Choose the ingredients for quantity cookery according to portion size and cost	K3
CO-4	Analyze the new technology and its potential in relation to food preparation and cookery.	K4
CO-5	Organize sale and fix profit margin for food products.	K6

HOSPITAL INTERNSHIP

AIM:

To provide training wherein a graduate is expected to conduct actual practice of diet management and health care and acquire skills under supervision of a experienced dietician so that a student may become capable of functioning independently.

Course Objectives

CO No.	To enable the students to
CO -1	Manage diet prescription independently for clinically common disease conditions encountered to higher level.
CO -2	Develop the knowledge, attitude and skills needed to become an entry-level Dietitian.
CO -3	Have in-depth knowledge of the relationships between nutrition data and pathologic processes, and how nutrition data relate to health and disease.
CO -4	Have the talent to design, evaluate and implement new methods or protocols in different cases.
CO -5	Work independently and as a team member to perform critical thinking and problem solving skills in different domains.

PERIOD OF INTERNSHIP:

- One month internship in a multispecialty hospital with dietary department.

Course Outcomes

CO No.	On completion of the course the student will be able to	Bloom's Level
CO-1	Express the skills and planning therapeutic diets	K2
CO-2	Ability to be a health professional	K3

CO-3	Apply the knowledge for diet counseling	K3
CO-4	Competent to manage catering outlet	K1
CO-5	Possess a sound knowledge of food and nutrition, quantitative food production, biological sciences, pathophysiology of disease, and be able to act in a variety of capacities in clinical, administrative, and community settings.	K2 & K3

CASE STUDIES:

- Five to ten case studies of different disease conditions have to be taken up during the internship.
- Report to be submitted in the hospital and institution.

INTERNSHIP REPORT: EVALUATION PATTERN

Report on internship will be evaluated as stated below.

External marks – 60

Marks awarded by the training institution - 20 marks
Report presentation - 20 marks
Viva voce - 20 marks

Internal marks - 40

Marks awarded by the guide - 20 marks
Report preparation - 20 marks

Total marks - 100

EXPERIENTIAL LEARNING

1. Visit to Blood bank.
2. Observation on giving transfusion.

III & IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
I	Core I / DSC - I	UCDM101	Food Science	Nutrient Chart Preparation	Demo on any one nutrient
	Core II / DSC - II	UCDM102	Human Nutrition - I	Assignment	Model preparation
	Allied I / GE I Allied Practical	UBCA101	Biochemistry	Seminar	Assignment
II	Core III / DSC - III	UCDM201	Human Nutrition - II	Assignment	Model preparation
	Core III / DSC - IV	UCDM202	Human Physiology	Model preparation	Seminar
	Allied II/ GE -II	UCNA201	Food Safety Management - I	Exhibition cum sale	Seminar